

BIO 1130FF

An introduction to Organismal biology
Midterm examination
Worth either 15% or 20% of your final grade

Saturday, November 7, 2015

Part A: Multiple choice questions
26 points (1 point/question)

Fill in the bubbles for your name and student number and BIO1130FF for the course code. Fill in the same information in text in the boxes above the bubbles.

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Multiple choice questions - Place your answers on the answer sheet

FF1 What is the main structure of a virus?

- a. RNA surrounded by a nuclear envelope.
- b. Nucleic acid molecules surrounded by a protein coat or capsid.
- c. Single cell with nucleus and organelles.
- X** d. A cytoplasm enclosed by a membrane.

FF2 Which of the following statements about viral envelopes is correct?

- X** a. They contain glycoproteins of viral origin.
- b. They are located between the virus's capsid and its nucleic acid.
- c. They are composed of a lipid bilayer derived from the viral membrane.
- d. They are composed of peptidoglycan, the same material as bacterial cell walls.

FF.3 Small circles of DNA that occur in bacteria in addition to the main circular chromosomal DNA molecule are called

- a. transformants.
- b. plastids.
- X** c. plasmids.
- d. plasmitrons.

FF.4 What is the primary ecological role of prokaryotes?

- a. adding methane to the atmosphere
- b. parasitizing eukaryotes, thus causing diseases
- c. metabolizing materials in extreme environments
- X** d. breaking down organic matter
- e. serving as primary producers in terrestrial environments

FF.5 The two rounds of genomic duplication that occurred in the early evolution of vertebrates is an example of this type of chromosomal mutation (Choose the most precise answer).

- a. Translocation
- b. Polyploidy
- X** c. Alloplody
- d. Duplication
- e. Autopoloidy

FF.6 Four of the five population attributes can be calculated with the Hardy-Weinberg equation. Select the EXCEPTION.

- a. the frequency of a dominant allele
- b. the frequency of homozygous dominant genotypes
- X** c. the frequency of mutation
- d. the frequency of heterozygotes
- e. the frequency of a recessive allele

FF.7 In a single molecule of water, two hydrogen atoms are bonded to a single oxygen atom by

- a. ionic bonds.
- X** b. polar covalent bonds.
- c. nonpolar covalent bonds.
- d. van der Waals interactions.
- e. hydrogen bonds.

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FF.8 Bacteria participate in the nitrogen cycle through which mechanism?

- a. nitrification
- b. nitrogen fixation
- c. decomposition
- d. denitrification

X e. all of the above

FF.9 If we want to know the percentage of particular genotypes within an actual population, assuming complete dominance and two alleles, the one measurement we have to actually make is of the frequency of the

- a. dominant phenotypes.
- b. heterozygous phenotypes.
- c. homozygous dominant genotypes.

X d. recessive phenotypes.

- e. heterozygous genotypes.

FF.10 Viruses are considered nonliving because they

- a. lack a nucleus.
- b. lack a cell wall.

X c. cannot reproduce outside a host cell.

- d. contain RNA as their genetic material.

FF.11 You measure the variation in toe length of all the students in your class and arrive at numbers that reflect a wide range of variation, with some short toes, some long and just about every length in between those two extremes. Your conclusion is that toe length is subject to

X a. quantitative variation.

- b. allele polymorphism.
- c. qualitative variation.
- d. microevolution.

FF.12 Radiometric dating is a technique used to determine the age of rocks. Geologists have used this technique to determine that:

- a. Earth is about 6.2 trillion years old, and life appeared on Earth about 4.9 trillion years ago.
- b. Earth is about 4.6 million years old, and life appeared on Earth about 4.4 million years ago.
- c. Earth is about 6.2 thousand years old, and life appeared on Earth about 6 thousand years ago.

X d. Earth is about 4.6 billion years old, and life appeared on Earth about 3.4 billion years ago.

FF.13 Which of the following characteristic would likely be true for a bacterium that stains positive in a gram stain test?

X a. Thicker peptidoglycan in cell wall

- b. Less sensitive to penicillin
- c. Two cell membranes
- d. No plasma membrane

FF.14 Microevolution can be said to have taken place when

- a. several mutations occur in a population.
- b. a population has different forms of the same gene.
- c. a feature of an individual animal changes through use or disuse.

X d. a population experiences a shift in allele frequencies.

- e. a mutation occurs in a population.

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FF.15 Which type of bond must be broken for water to vaporize?

- a. hydrogen bonds
- b. polar covalent bonds
- c. ionic bonds
- d. nonpolar covalent bonds
- e. covalent bonds

FF.16 When the sequence of the human genome was published what was the approximate percentage of the genome that was viral DNA?

- a. 15%
- b. 8%
- c. 2%
- e. 0% - None

FF.17 The enzyme reverse transcriptase is used by HIV viruses to catalyze the synthesis of _____.

- a. RNA from a template DNA strand
- b. DNA from a template RNA strand
- c. RNA from a template RNA strand
- d. DNA from a template DNA strand

FF.18 Modern wheat contains a complete set of Chromosomes from three different species. This is an example of which type of chromosomal mutation? (Choose the most precise answer.)

- a. Translocation
- b. Polyploidy
- c. Allopolyploidy
- d. Duplication
- e. Autopolyploidy

FF.19 Which of these statements about prokaryotes is correct?

- a. Bacterial cells conjugate to mutually exchange genetic material.
- b. Their genetic material is confined within a nuclear envelope.
- c. Genetic variation in bacteria is not known to occur, nor should it occur, because of their asexual mode of reproduction.
- d. They divide by binary fission, without mitosis or meiosis.

FF.20 This part of the bacterial flagellum spans across the membranes and cell wall and is anchored in place by protein rings.

- a. Flagellum
- b. hook
- c. Motor
- d. Filament

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FF.21 An Eastern European immigrant carrying the allele for TaySachs disease settled in a small village on the St. Lawrence River. Many generations later, the frequency of the allele in that village is statistically higher than it is in the immigrant's homeland. What microevolutionary principle does this story describe?

- a. founder effect
- b. natural selection
- c. Hardy-Weinberg genetic equilibrium
- d. neutral variation
- e. bottle neck effect

FF.22 Which free-living cells were the earliest contributors to the formation of Earth's oxidizing atmosphere?

- a. endosymbionts
- b. mitochondria
- c. seaweeds
- d. cyanobacteria
- e. chloroplasts

FF.23 A prophage is a/an _____.

- a. virus that attacks bacteria but does not cause disease in animals or plants
- b. viral genome, integrated into the host cell chromosome
- c. infective particle made up of nucleic acid and protein
- d. virus that is capable of entering the lytic but not lysogenic cycle

FF.24 RNA molecules can both carry genetic information and be catalytic. This supports the proposal that

- a. RNA was the first hereditary information.
- b. free nucleotides would not have been necessary ingredients in the synthesis of new RNA molecules.
- c. protocells had an RNA membrane.
- d. RNA could make energy.
- e. RNA is a polymer of amino acids.

FF.25 Which of these is the smallest unit upon which natural selection directly acts?

- a. a population's gene frequency
- b. an individual's genome
- c. an individual's genotype
- d. an individual's phenotype
- e. a species' gene frequency

FF.26 When a gamete receives the same number of chromosomes as a somatic cell,

- a. an unreduced gamete is formed and autopolyploidy is present.
- b. a reduced gamete is formed and autopolyploidy is present.
- c. a reduced gamete is formed and allopolyploidy is present.
- d. an unreduced gamete is formed and allopolyploidy and autopolyploidy are present.

BIO 1130MM

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Multiple choice questions - Place your answers on the answer sheet

MM.1 Which of the following characteristic would likely be true for a bacterium that stains positive in a gram stain test?

- a. Thicker peptidoglycan in cell wall
- b. Less sensitive to penicillin
- c. Two cell membranes
- d. No plasma membrane

MM.2 A recessive allele may be maintained within a larger population because of

- a. diploidy.
- b. gene flow.
- c. sexual selection.
- d. genetic drift.

MM.3 Four of the five population attributes can be calculated with the Hardy-Weinberg equation. Select the EXCEPTION.

- a. the frequency of a dominant allele
- b. the frequency of homozygous dominant genotypes
- c. the frequency of mutation
- d. the frequency of heterozygotes
- e. the frequency of a recessive allele

MM.4 Virulent phages undergo a (n) ____ life cycle.

- a. infective
- b. lysogenic
- c. lytic
- d. retroviral

MM.5 Why does ice float in liquid water?

- a. Ice always has air bubbles that keep it afloat.
- b. Hydrogen bonds stabilize and keep the molecules of ice farther apart than the water molecules of liquid water.
- c. The crystalline lattice of ice causes it to be denser than liquid water.
- d. The ionic bonds between the molecules in ice prevent the ice from sinking.
- e. The liquid water molecules have more kinetic energy and thus support the ice.

MM.6 Which of the following statements about archaea is correct?

- a. Their cell walls contain peptidoglycan.
- b. Most are pathogens.
- c. Many are extremophiles.
- d. They have no traits in common with eukaryotic cells.

MM.7 Which gas was originally missing in the Miller-Urey experiments

- a. Methane (CH₄)
- b. Hydrogen (H₂)
- c. Ammonia (H₃)
- d. Carbon dioxide (CO₂)
- e. None of the above.

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- MM.8 An Eastern European immigrant carrying the allele for TaySachs disease settled in a small village on the St. Lawrence River. Many generations later, the frequency of the allele in that village is statistically higher than it is in the immigrant's homeland. What microevolutionary principle does this story describe?
- a. founder effect
 - b. natural selection
 - c. Hardy-Weinberg genetic equilibrium
 - d. neutral variation
 - e. bottle neck effect
- MM.9 The major structural component of bacterial cell walls is
- a. proteoglycan.
 - b. peptidoglycan.
 - c. cellulose.
 - d. arabinogalactan.
- MM.10 Modern wheat contains a complete set of Chromosomes from three different species. This is an example of which type of chromosomal mutation? (Choose the most precise answer.)
- a. Translocation
 - b. Polyploidy
 - c. Allopolody
 - d. Duplication
 - e. Autopolody
- MM.11 In bacteria the purpose of the sex pilus is to
- a. allow transfer of gametes.
 - b. form a gap junction and conjugate.
 - c. facilitate DNA exchange.
 - d. stabilize a network of bacterial cells
- MM.12 This number of proteins in a bacterial flagellum is the same across all different types.
- a. 30
 - b. 23
 - c. 40
 - d. 10
- MM.13 A group of interbreeding individuals in a specific geographical location is called a
- a. ecosystem.
 - b. population.
 - c. community.
 - d. species.
 - e. gene pool.
- MM.14 Photosynthesis by _____ was responsible for the accumulation of oxygen in the atmosphere of early Earth.
- a. green bacteria
 - b. cyanobacteria
 - c. Gram-positive bacteria
 - d. chlamydias

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- MM.15 The Hardy-Weinberg principle of genetic equilibrium tells us what to expect when a sexually reproducing population is
- a. evolving.
 - b. decreasing with each generation.
 - c. increasing with each generation.
 - d. not evolving.
 - e. migrating.
- MM.16 Protobionts (protocells) are
- a. a group of abiotically produced inorganic molecules surrounded by a membrane-like structure.
 - b. a group of abiotically produced organic molecules surrounded by a membrane-like structure.
 - c. a group of biotically produced inorganic molecules surrounded by a membrane-like structure.
 - d. a group of biotically produced organic molecules surrounded by a membrane-like structure.
- MM.17 If we want to know the percentage of particular genotypes within an actual population, assuming complete dominance and two alleles, the one measurement we have to actually make is of the frequency of the
- a. dominant phenotypes.
 - b. heterozygous phenotypes.
 - c. homozygous dominant genotypes.
 - d. recessive phenotypes.
 - e. heterozygous genotypes.
- MM.18 When a retrovirus infects a host cell, reverse transcriptase copies the _____ viral genome into a _____ copy, which is inserted into the host cell genome.
- a. double-stranded RNA; double-stranded DNA
 - b. single-stranded RNA; single stranded DNA
 - c. single-stranded RNA; double-stranded DNA
 - d. single-stranded DNA; double-stranded DNA
- MM.19 Some viruses contain an envelope, which is made of materials derived from _____.
- a. the virus cell membrane
 - b. bacterial cell walls
 - c. the host cell's membrane
 - d. animal cell walls
- MM.20 If a storm kills many small sparrows in a population, but only a few medium-sized and no large ones, which type of selection is probably operating?
- a. directional selection
 - b. stabilizing selection
 - c. disruptive selection
 - d. neutral selection
- MM.21 Which of the following does the neutral mutation hypothesis propose?
- a. Complex structures in most organisms have not been fostered by neutral selection.
 - b. Most mutations have a strongly harmful effect.
 - c. Some mutations are not affected by natural selection.
 - d. Large populations are subject to stronger natural selection than small populations.

MM.22 What is the primary ecological role of prokaryotes?

- a. adding methane to the atmosphere
- b. parasitizing eukaryotes, thus causing diseases
- c. metabolizing materials in extreme environments
- X** d. breaking down organic matter
- e. serving as primary producers in terrestrial environments

MM.23 Approximately how far back in time does the fossil record extend?

- X** a. 3,500,000,000 years
- b. 3,500,000 years
- c. 5,000,000,000,000 years
- d. 6,000 years
- e. 6,000,000 years

MM.24 Which of the following best defines a virus?

- a. a naked fragment of nucleic acid
- b. a disease-causing group of proteins
- X** c. an entity composed of proteins and nucleic acids
- d. an entity composed of proteins, nucleic acids, and ribosomes

MM.25 The first genes on Earth were probably

- a. RNA produced by autocatalytic, proteinaceous enzymes.
- X** b. auto-catalytic RNA molecules.
- c. oligopeptides located within protocells.
- d. DNA molecules whose information was transcribed to RNA and later translated in polypeptides.
- e. DNA produced by reverse transcriptase from abiotically produced RNA.

MM.26 What gives rise to the cohesiveness of water molecules?

- a. ionic bonds
- X** b. hydrogen bonds
- c. hydrophobic interactions
- d. nonpolar covalent bonds
- e. both hydrophobic interactions and ionic bonds

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Part B: Written questions

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12 pts Part 1. Briefly explain what each of the following terms means or the biological contribution made by the person. Where possible include an example in your explanation from a group or an organism to which the term or name applies.

Prion

{proteinaceous infective agent}{no DNA/RNA/genetic information}{Causes proteins to transform and clump/stick together}{Causes: Mad cow disease/Bovine spongiform encephalopathy/Creutzfeldt-Jakob disease}

Disruptive selection

There are two ways that this can be described by either lower fitness in the midrange of a distribution {When fitness is decreased/organisms selected against}{mid-range of the distribution of the traits is disadvantages} or when increased fitness at the extremes {Fitness of the organisms increases}{at the extremes/tails of the distribution} {mean value remains the same} If a diagram is used it must clearly indicate whether it increased fitness of extremes or decreased fitness of mid-range. Say selection occurs at: is ambiguous.

Missense mutation

{When one base in codon – this point is to be clear that only one base in the triplet changes}{this point explains what happened - is substituted for another/base pair substitution}{ and one change in an amino acid change occurs in the protein}

Cenozoic

{Geological era}{in the Phanerozoic Eon/dates starts 65 million years ago extending to today}{End of the age of dinosaurs and the rise of Birds and Mammals – must have both parts}

28 pts Part 2: Fill in the missing word, or provide the one word answer in the space provided at the end of the sentence. If the line is missing, add it to the end of the line.

2.1 Halophile bacteria love this. _____ **Salt** _____

2.2 Geological eras are combined into these larger units of time. _____ **Eons** _____

2.3 The sun is this kind of reactor. _____ **Nuclear** _____

2.4 This term describes the explosion of multicellular animal life forms that appeared 540 million years ago. _____ **Cambrian** _____

2.5 These vents are ruptures in the earth's crust in the deep parts of the oceans and may be a source of the first organic molecules. _____ **Hydrothermal** _____

2.6 The sum of the components of the Hardy-Weinberg equilibrium equation is always equal to this value. _____ **One** _____

2.7 These little hairs found on the surface of some bacteria are important for making cell to cell connections during conjugation. _____ **Pilli** _____

2.8 If the insect that forms the golden rod gall lived in a habitat with only predatory wasps and no woodpeckers, the shift in the size of the gall to larger galls would be an example of this type of selection. _____ **Directional** _____

2.9 The energy source for creating the concentration gradient across the bacterial cell membrane that fuels the bacterial molecular motor. _____ **ATP** _____

2.10 This one carbon hydrocarbon gas was present in the earth's original atmosphere. _____ **Methane** _____

2.11 The region where genetic exchange occurs between two ring species is referred to as this type of zone. _____ **Hybrid** _____

2.12 Efforts by conservation agencies to bridge the gap between small isolated populations of the same species are an example of this type of microevolutionary source of change (Two words). _____ **Gene Flow** _____

2.13 The engine for a bacterial flagellum is fuelled by the creation of a concentration gradient of these across the membrane. _____ **Protons** _____

2.14 The product of binary fission is two of these cells. _____ **Daughter** _____

- 2.15 Because this gas was missing the first forms of life lived under these conditions and had this type of metabolism. _____ **Anaerobic** _____
- 2.16 When a new dominant male takes over a pride of lions he eliminates the young cubs. This is an example of __ **Infanticide** __, a specific type of sexual selection involving male choice.
- 2.17 Solid, small lipid droplets suspended in solution but lacking an aqueous core. __ **Microsphere** _____
- 2.18 This element is produced by dying red stars and is found throughout the universe. _____ **Carbon** _____
- 2.19 If both alleles for a character are the same the organism is considered to be this. _____ **Homozygous** _____
- 2.20 From about 4,800 Ma to 3,800 Ma this eon saw the formation of our solar system and the planet earth. _____ **Hadean** _____
- 2.21 In this stage of the viral life cycle, the viral genome is combined with the bacterial genome. _____ **Lysogenic** _____
- 2.22 Bacterial reproduction where plasmids carry pieces of one bacterial genome and combine it with another's. _____ **Conjugation** _____
- 2.23 For the bacterial reproduction by transduction you need the help of this type of virus. _____ **Bacteriophage** _____
- 2.24 This abbreviation describes events that happened between 4.1-3.8 billion years ago. _____ **LHB** _____
- 2.25 One of the probable events that occurred between 3.8-4.1 billion years ago is that Uranus and this planet switched their relative positions orbiting the sun. _____ **Neptune** _____
- 2.26 Water is a major component of these large intergalactic travelling objects. _____ **Asteroids** _____
- 2.27 The distinction between the different Domains was first identified using the sequence of nucleotides in this macromolecular polymer. _____ **rRNA** _____
- 2.28 This hypothesis attempts to explain the origins of the first lipid layers surrounding an aqueous core. _____ **Bubble** _____

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2.29 When one compound is oxidized there is always another that has been reduced. The two are referred to as being this (Two words) _____ **Redox pair** _____

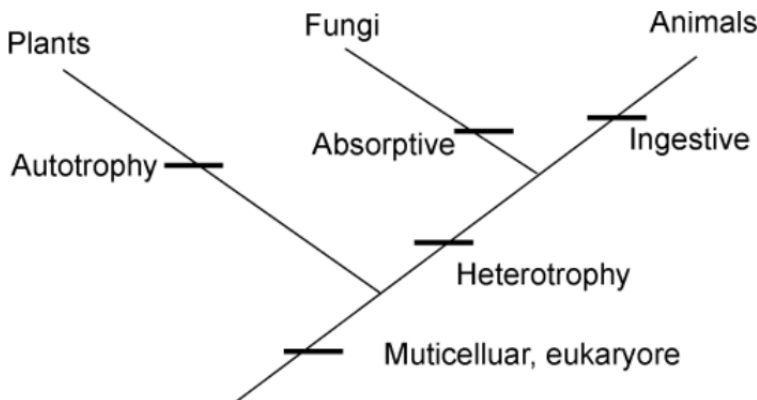
2.30 Non-random mating is also referred to as this type of selection. _____ **Sexual** _____

12 pts Part 3: Answer the following two questions in the space provided. Each question is worth 6 points

3.1 Describe the differences between the three multicellular Eukarya Kingdoms using a cladogram with these differences mapped as symplesiomorphies and autapomorphies.

If the students don't draw a cladogram the a point each for only defining the kingdoms: all parts must be here

- Plants – multicellular, eukaryote, autotrophs
- Animals – multicellular, eukaryote, ingestive heterotrophs
- Fungi – Multicellular, Eukaryote, absorptive heterotroph



1 point for the cladogram being drawn properly.

1 point for each apomorphy but they must be in the right order/sequence to generate the characters as described in the first part of the marking

3.2 Obtaining a carbon source for building organic molecules and harnessing the energy to do it is the basis of the metabolic diversity of Bacteria. Explain the differences or similarities between the following three: (1) Photoheterotrophs, (2) Chemoorganoheterotrophs, and (3) Chemolithotrophs. Be sure to identify if any of these are found in Eukaryotes.

Similarities: {Both 1 and 2 use existing C-C bonds as a source of carbon}

Differences: {3 uses carbon dioxide as a source of carbon} All three obtain energy differently {1 uses light}{2 uses existing C-C bonds that are broken} {3 from minerals/change of charge/valance in minerals}

1 points – 2 is found in Fungi/Animals

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12 pts Part 1. Briefly explain what each of the following terms means or the biological contribution made by the person. Where possible include an example in your explanation from a group or an organism to which the term or name applies.

Viroid

{RNA circle will be most common but some will have strand} {must state the size very small/small than virus} {Stops mRNA translation/function} {Plants disease/Hepatitis D}

Stabilizing selection

There are two ways that this can be described by either higher fitness in the midrange of a distribution {When fitness is increased/organisms selected} {mid range of the distribution of the traits is advantageous} or when decreased fitness at the extremes {Fitness of the organisms decreases} {at the extremes/tails of the distribution} {mean value remains the same} If a diagram is used it must clearly indicate whether it increased fitness of extremes or decreased fitness of mid-range. Say selection occurs at: is ambiguous.

Mesozoic

{Geological era} {in the Phanerozoic Eon/dates starts 245-65 million years ago} {Appearance of flowering plants and the age of reptiles – must have both}

Nonsense mutation

{When one base in codon – this point is to be clear that only one base in the triplet changes} {this point explains what happened – change results in the termination/stop codon} {protein chain stops growing/shorted protein result}

STUDENT NUMBER: _____

Don't enter your name.

30 pts Part 2: Fill in the missing word, or provide the one word answer in the space provided at the end of the sentence. If the line is missing, add it to the end of the line.

- 2.1 Prokaryotes are before the kernel and eukaryotes have a true kernel - what's the cellular kernel? _____ **Nucleus** _____
- 2.2 In the Hardy-Weinberg equation heterozygotes are represented by these variables. _____ **pq** _____
- 2.3 This atmospheric gas was missing in the first 2.1 billion years of earth's history. _____ **Oxygen** _____
- 2.4 Viruses often have alphanumeric designations in the case of H1N1 for example what type of molecules do the H and N refer to? _____ **Protein** _____
- 2.5 The sun is this kind of reactor. _____ **Nuclear** _____
- 2.6 What percentage of the sun's mass is not made up of the two atoms involved in the nuclear fusion reaction that produces the sun's energy? _____ **Two** _____
- 2.7 These lipids are found in protocells but not micelles. _____ **Phospholipids** _____
- 2.8 If the only predator of the goldenrod gall larvae were wasps, what size of gall would be an adaptive strategy against predation. _____ **Big** _____
- 2.9 Mendel used this non-random mating technique to obtain the strains of pea plants that were homozygous for an allele. _____ **Inbreeding** _____
- 2.10 The region where genetic exchange occurs between two ring species is referred to as this type of zone. _____ **Hybrid** _____
- 2.11 Number of domains that the living world is divided into. _____ **Three** _____
- 2.12 The RNA world is based on the first self replicating system being RNA based. There is an alternative theory and it involves which biopolymers. _____ **Protein** _____
- 2.13 The bacterial cell wall protects the bacteria from doing this. _____ **Swelling** _____
- 2.14 Number of lipid layers in a micelle. _____ **One** _____
- 2.15 This gradient is essential if ATP is to be synthesized in a cell. _____ **Proton** _____
- 2.16 This substance may have assisted in the chemical formation of long chains of amino acids or nucleotides. _____ **Clay** _____

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Don't enter your name.

- 2.17 Organic chemistry is the study of the chemistry of this element. ____ **Carbon** _____
- 2.18 During this stage of the viral life cycle hundreds if not thousands of new viral particles are released. ____ **Lytic** _____
- 2.19 This form of cellular complexity arose at the start of the last of four eons in earth's history. ____ **Multicellular** _____
- 2.20 On a planet located in the habitable zone of a solar system, what chemical compound is abundant in its liquid form? ____ **Water** _____
- 2.21 This term describes the genetic complement of a eukaryote organisms and why a single mutation may not be expressed as it would in prokaryotes. ____ **Diploid** _____
- 2.22 Whether its protein or RNA that come first doesn't affect the fact that whichever it was it had to be capable of this. ____ **Replication** _____
- 2.23 The frequency of heterozygotes in a population is higher than the usual 10% expected when there is selection against a recessive trait. In terms of the heterozygotes what is this referred to as. ____ **Advantage** _____
- 2.24 Organic carbon molecules may have origins from outside of the planet are referred to as this type of organic chemical source. ____ **Interstellar** _____
- 2.25 The amount of energy required to raise the temperature of a solution by 1C is referred to as the compound's ____ **Specific heat** ____ (Two words).
- 2.26 An isolated group of individuals from the same species. ____ **Population** _____
- 2.28 Occasionally meiosis fails, and gametes from the same species fuse during self-fertilization in plants and the resulting plant has an increase in its number of chromosomes. This term describes this form of chromosomal mutation. ____ **Autoploidy** _____
- 2.29 This is a measure of the number of offspring that an individual produces in its lifetime. ____ **Fitness** _____
- 2.30 Efforts by conservation agencies to bridge the gap between small isolated populations of the same species is an example of this type of microevolutionary source of change (Two words). ____ **Gene Flow** _____

Part three of the exam is on the next page

STUDENT NUMBER: _____

Don't enter your name.

12 pts Part 3: Answer the following two questions in the space provided. Each question is worth 6 points

3.1 Obtaining a carbon source for building organic molecules and harnessing the energy to do it is the basis of the metabolic diversity of Bacteria. Explain the differences or similarities between the following three: (1) Photoautotrophs, (2) Chemoorganotrophs, and (3) Chemolithotrophicheterotrophs. Be sure to identify if any of these are found in Eukaryotes.

Similarities: {1 & 2 both use carbon dioxide as a carbon source}

Differences {3 uses existing C-C bonds that are broken to obtain a carbon source} All three obtain energy differently {1 uses light} {2 uses existing C-C bonds that are broken} {3 from minerals/change of charge/valance in minerals}

1 point: Eukaryote is 1 – the plants

3.2 Eubacteria and Archea have some very distinct differences in how aspects of Biology's central dogma occur. What is the Central Dogma and give two examples of a difference between the two Domains.

Central Dogma: {DNA is self replicating and is used to produce RNA/Transcription} {RNA is used to produce proteins/translation}

Any two of the following:

- {RNA Polymerase} {complex in Archea and simple in bacteria}
- {histone proteins to stabilize DNA} {found in archea absent in bacteria}
- {Primer amino acid in protein synthesis} {methionine in Archea and formylmethione in bacteria}
- {Introns in genes} {found in Archea but not in bacteria}