

Honor pledge: "I have neither given nor received unauthorized aid on this test."

Signed : _____

Date : _____

Name : _____

1. What are the three primary evolutionary branches of life? (5 points)

Multiple choice (1 point each, 10 points total)

_____ 2. Which of the following is most likely to limit the highest temperature life can survive in (as best we know today)?

- A. protein denaturation
- B. DNA/RNA denaturation
- C. metabolic/enzymatic rate control
- D. small molecule stability
- E. amino acid racemization

_____ 3. Other than energy, what do photosynthetic organisms need to get from light in order to fix carbon?

- A. proton gradient (both chemical and electrical)
- B. reduced inorganics (sulfide, thiosulfate, or hydrogen)
- C. activating nucleotides (GTP, CTP, ATP or UTP)
- D. reducing power (NADH, NADPH, or FADH₂)
- E. All of the above

_____ 4. Energy production by the Proteobacteria is (in general terms) based on using variations of _____.

- A. photosystem I and II and photochemistry
- B. the TCA/Kreb's Cycle
- C. electron transport and oxidation/reduction reactions
- D. aerobic heterotrophy
- E. All of the above

_____ 5. Bacterial development is usually based on ...

- A. alternative sigma factors
- B. energy homeostasis
- C. maternal-effect polarity
- D. quorum sensing
- E. there is no such thing as bacterial development

_____ 6. Which of the following is *not* a form of bacterial motility?

- A. twitching
- B. polysaccharide-secretion gliding
- C. flagella
- D. gas vacuole buoyancy
- E. All of the above are forms of bacterial motility

_____ 7. Reductive evolution is most common in...

- A. sulfur or hydrogen metabolizers
- B. photoautotrophs
- C. chemolithoautotrophs
- D. obligate parasites
- E. extremophiles

_____ 8. Which is most likely closest to the fraction of existing bacterial species that have been characterized?

- A. All bacterial species have been characterized
- B. about half
- C. no more than 10%
- D. far less than 1%
- E. none of them

_____ 9. Animals are most closely-related to which of the following kind of eukaryotes?

- A. plants
- B. fungi
- C. ciliates
- D. diatoms
- E. foraminiferans

_____ 10. In which of these ways are Archaea distinct from both Bacteria and Eukarya?

- A. membrane lipids
- B. chromosome structure
- C. morphology
- D. RNA polymerase
- E. all of the above

_____ 11. Which of the following is *not* a likely origin for one or another group of viruses?

- A. spontaneous generation
- B. relics of the RNA World
- C. previously cellular intracellular parasites
- D. genetic offshoots of their hosts
- E. none of the above

12. Describe your favorite microbe. Be sure to include any interesting aspects, for example, of morphology, metabolism, life cycle, habitat, importance to humans, &c. (5 points) *Be sure to read the questions on the rest of the exam before deciding which organism to discuss.*

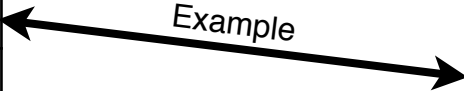
13. Briefly describe your favorite *Archaeon* (member of the Archaea). Be sure to include any interesting aspects, for example, of morphology, metabolism, life cycle, habitat, importance to humans, &c. (5 points) *You cannot use a microbe you've discussed in a previous answer.*

14. Briefly describe your favorite *Firmicute, Actinobacterium, or Planctomycete*. Be sure to include any interesting aspects, for example, of morphology, metabolism, life cycle, habitat, &c. (5 points) *You cannot use a microbe you've discussed in a previous answer.*

15. Briefly describe a **bacterium** that has been studied in detail but never been grown as a pure culture. Be sure to include any interesting aspects, for example, of morphology, metabolism, life cycle, habitat, affect on its host, &c. (5 points) *You cannot use an organism you've described in any previous answer.*

16. Briefly describe a representative **unicellular, non-fungal eukaryote**. Be sure to include any interesting aspects, for example, of morphology, metabolism, life cycle, habitat, importance to humans, &c. (5 points) *You cannot use a microbe you've discussed in a previous answer.*

17. Match the 10 of the following 12 phenotypes with the correct phylogenetic group. Use each only once, and mark the two you choose not to answer with "X"s. (1 points each, 10 points total)

Methanogenesis	<i>Example</i> 	Chlamydia
Elementary bodies		Euryarchaea
Hydrogen oxidation		Firmicutes
oxygenic photosynthesis		Proteobacteria
endospore formation		Spirochaetes
Axial fiber		Cyanobacteria
Spingolipds		Deinococci
Radiation-resistance		Planctomycetes
Internal cell membranes		Actinobacteria
Sulfur-metabolizing thermophiles		Aquificae (Aquifex and relatives)
External sulfur granules		Bacteroids
Purple non-sulfur Bacteria		Chlorobi
Mycolic acid membrane	Crenarchaea	

Use this area to complete any answers that don't fit in the exam space allotted. (Be sure to label with the question number.)

Organisms we've talked about in class			
<i>Acidobacterium capsulatum</i>	<i>Cytophaga hutchinsonii</i>	<i>Methanocaldococcus jannaschii</i>	<i>Roseiflexus castenholzii</i>
<i>Anabaena</i>	<i>Deinococcus radiodurans</i>	<i>Methanosarcina barkeri</i>	<i>Rotalipora globotruncanoides</i>
<i>Anaerolinea thermophila</i>	<i>Dermocarpa</i>	<i>Methanothermobacter thermoautotrophicus</i>	<i>Saccharomyces cerevisiae</i>
<i>Aquifex pyrophilus</i>	<i>Desulfovibrio desulfuricans</i>	<i>Microcystis</i>	<i>Sphaerotilus natans</i>
<i>Archaeoglobus fulgidus</i>	<i>Escherichia coli</i>	Mimivirus	<i>Sphyræna barracuda</i>
<i>Arthrobacter globiformis</i>	<i>Euglyphia strigosa</i>	<i>Mycobacterium ulcerans</i>	<i>Streblomastix strix</i>
<i>Azotobacter vinelandii</i>	<i>Fervisobacterium islandicum</i>	<i>Mycoplasma hominis</i>	<i>Streptomyces antibioticus</i>
<i>Bacillus cereus</i>	<i>Fischerella</i>	<i>Myxococcus xanthus</i>	<i>Sulfolobus solfataricus</i>
bacteriophage M13	<i>Flavobacterium johnsoniae</i>	<i>Nanoarchaeum equitans</i>	<i>Thalassia testinum</i>
bacteriophage Mu	<i>Fusobacterium nucleatum</i>	<i>Navicula</i>	<i>Thermocrinus ruber</i>
<i>Bacteroides thetaiotaomicron</i>	<i>Gemmata obscuriglobus</i>	<i>Nitrospira marina</i>	<i>Thermodesulfobacterium</i>
<i>Bdellovibrio bacteriovorus</i>	<i>Giardia lamblia</i>	<i>Opitutus terrae</i>	<i>Thermoleophilum album</i>
<i>Beggiatoa alba</i>	<i>Halobacterium salinarium</i>	<i>Oscillatoria</i>	<i>Thermomicrobium roseum</i>
<i>Blastopirellula marina</i>	<i>Helicobacter pylori</i>	<i>Pelodictyon phaeoclathratiforme</i>	<i>Thermoplasma acidophilum</i>
<i>Borrelia recurrentis</i>	<i>Heliobacterium chlorum</i>	<i>Physarum polycephum</i>	<i>Thermoproteus tenax</i>
<i>Brocadia anammoxidans</i>	Hepatitis delta virus	<i>Phytophthora infestans</i>	<i>Thermosipho africanus</i>
<i>Buchnera aphidicola</i>	<i>Herpetosiphon aurantiacus</i>	<i>Prochloron</i>	<i>Thermotoga maritima</i>
<i>Caulobacter crescentus</i>	<i>Hexacontium giganthium</i>	<i>Prosthecobacter fusiformis</i>	<i>Thermus aquaticus</i>
<i>Chlamydia trachomatis</i>	<i>Isosphaera pallida</i>	<i>Protochlamydia amoebophila</i>	<i>Thiobacillus thioparus</i>
<i>Chlorobium limicola</i>	<i>Karenia breve</i>	<i>Pyrococcus furiosus</i>	<i>Treponema denticola</i>
<i>Chloroflexus aurantiacus</i>	<i>Korarchaeum cryptofilum</i>	<i>Pyrodictium occultum</i>	<i>Trypanosoma brucei</i>
<i>Chondrus crispus</i>	<i>Leptospira biflexa</i>	<i>Ralstonia solanacearum</i>	<i>Veillonella atypica</i>
<i>Chromatium vinosum</i>	<i>Leptospirillum ferrooxidans</i>	<i>Reclinomonas americana</i>	<i>Verrucomicrobium spinosum</i>
<i>Clostridium botulinum</i>	<i>Leuconostoc mesenteroides</i>	<i>Rhizobium etli</i>	<i>Vorticella</i>
<i>Cryosmallon squamiferum</i>	<i>Magnetobacterium bavaricum</i>	<i>Rhodomicrobium vanniellii</i>	<i>Wolbachia pipientis</i>