

- 1 What are 3 general steps doing for taxonomy? (3 points)
- 2 What is the difference between phylogeny and simple classification in taxonomy? (3 points)
- 3 In general, new bacterial species are identified (or classified) by polyphasic taxonomy. What is polyphasic taxonomy? (3 points)
- 4 Archaea is divided into 3~4 phylum depending on researchers including *Euryarchaeota* and *Crenarchaeota*. What are other two phyla recently proposed? (2 points)
- 5 *Halobacterium salinarium* has 3 functional types of rhodopsin like proteins. What are these 3 types of rhodopsins and their cellular functions? (6 points)
- 6 It has known that about 30% of bacterial species found in human feces belong to this genus. What is this genus? (3 points)
- 7 What is microaerophilic? Name a bacteria showing a microaerophilic property (5 points).
- 8 What is the first sequenced archaeal genome? (2 points)
- 9 You had symptoms (e.g. double vision, blurred vision, drooping eyelids and slurred speech, etc.) from having canned foods and are diagnosed as a foodborne poisoning. Which bacterial species you can expect to make this illness? (hint: anaerobe) (3 points)
- 10 Order following microorganisms by their optimum growth temperatures (in ascending order): *Methanopyrus kandleri*, *Thermotoga maritima*, *Pyrococcus furiosus* (3 points)
- 11 Name a genus that regarded as an endosymbiotic ancestor for mitochondria (3 points)

*Purple bacteria, Aquifex pyrophilus, Myxococcus, Desulfovibrio, Methanococcus jannaschii, Borrelia burgdoferi, Sulfolobus solfataricus, Treponema palladium, Nisseria gonorrhoeae, Burkholderia mallai, Bacillus subtilis, Green bacteria, Cyanobacteria, Halobacterium, Methanopyrus kandleri, Camylobacter, Streptococcus pyogenes, Escherichia coli, Vibrio cholerae, Vibrio fisheri, Staphylococcus aureus, Thiobacillus ferroxidans, Nitrobacter, Methanopyrus, Rhizobium, Methylococcus, Hyphomicrobium, Corynebacterium glutamicum, Clostridium, Streptomyces, Salmonella typhimurium, Thermoplasma, Nanoarchaeum equitans, Mycobacterium tuberculosis, Mycoplasma pneumoniae, Cytophaga, Klebsiella, Aerobacterium*

\* Select ALL species or name(s) related to given phenotypes (or terms) in following questions from above examples (3 points each)

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|-------------------------------|-----------------------|
| 12 A fruiting body            | 24 Methylootrophs     |
| 13 Anoxygenic photosynthesis  | 25 Syphilis           |
| 14 Oxygenic photosynthesis    | 26 Microbial leaching |
| 15 Photosynthetic bacteria    | 27 MRSA               |
| 16 Sulfate reducing bacteria  | 28 High G+C Gram(+)   |
| 17 Potential bioterrorism     | 29 Low G+C Gram(+)    |
| 18 Acidophiles                | 30 Nitrogen fixation  |
| 19 Hyperthermophile           | 31 Nitrification      |
| 20 Lyme disease               | 32 Bioilluminescence  |
| 21 S <sup>0</sup> metabolizer | 33 Enterobacteria     |
| 22 Halophiles                 |                       |
| 23 Methanogens                |                       |