國立中央大學九十一學年度碩士班研究生入學試題卷

所別：生命科學系 不分組 科目：微生物學 共 2 頁 第 1 頁

(Total 100 points)

I. 問答題

1. Please explain both the physiological characteristics and the habitats of the following microorganisms (每題 4 分,共 16 分)
   1) halophiles
   2) hyperthermophiles
   3) psychrophiles
   4) methanogen

2. Please describe the greatest accomplishment in the area of Microbiology by the following scientists. (每題 3 分,共 15 分)
   1) Anton van Leeuwenhoek
   2) Robert Koch
   3) Sergei N. Winogradsky
   4) Carl Woose
   5) Melvin Calvin

3. Compare and contrast primary and secondary metabolites (4 分). List two molecular explanations for why some metabolites are secondary rather than primary (2 分).

4. Please descibe the experiments to study of the composition of a microbial comminity without cultivation. (8 分)

5. Explain the positive and negative roles of microorganisms in the bioconversion of toxic environmental pollutants. (5 分)

6. What do you understand by the terms fermentation, aerobic respiration and anaerobic respiration? (10 分)

II. 單選題 (每題 2 分, 共 40 分)

1. When the oil-immersion lens is used in a light microscope
   a. light rays are scattered so unnecessary background material is not seen
   b. light rays are concentrated to increase clarity
   c. objects are held in place on the microscope slide
   d. magnification of objects is increased by about ten-fold

2. The periplasm is a
   a. part of the outer cell membrane of Gram negative organisms
   b. part of the inner cell membrane of Gram negative organisms
   c. space between the cytoplasmic membrane and the outer membrane
   d. space between the peptidoglycan and the outer membrane

3. Most prokaryotic cellular reproduction is the result of
   a. Conjugation b. binary fission c. meiosis d. mitosis

4. For most physiological experiments, it is usually most desirable for cells to be in the
   a. lag phase b. log phase c. stationary phase d. death phase

5. The continued maintenance of strains of important microorganisms is dependent upon large, adequately funded culture collection facilities. The repository in the US is
   a. NCIB b. ATCC c. NIH d. NCBI

6. Most of the known antibiotics are produced by which type of microorganism?
   a. Fungi b. Gram-positive, spore-forming bacteria
   c. Actinomycetes d. Gram-negative filamentous bacteria

注意：背面有試題

國立中央大學九十一學年度碩士班研究生入學試題卷

所別：生命科學系 不分組 科目：微生物學 共 2 頁 第 2 頁

7. The earliest stromatolites were probably
   a. anoxygenic phototrophs b. anoxygenic lithotrophs
   c. oxygenic phototropho d. oxygenic lithotrophs
8. A chemical reaction involving _____ may have been one of the first reactions by which organisms were able to conserve energy
   a. iron, oxygen, hydrogen b. sulfur, oxygen, hydrogen
   c. iron, sulfur, oxygen d. iron, sulfur, hydrogen
9. A Gram positive microorganism has the following traits: filamentous, form spores at the end of mycelia, produces antibiotics, produces geosmin, is nutritionally versatile, yields compact "dusty" colonies on agar culture medium. These traits describe the genus
   a. *Streptomyces* b. *Streoptococcus*
   c. *Staphylococcus* d. *Mycobacterium*
10. When electrons are forced backwards, against the thermodynamic gradient, to reduce NAD+ to NADH, the process is called
    a. reverse proton motive force b. reverse reduction
    c. reverse electron flow d. reverse energy flow
11. In most cases, the final product of sulfur oxidation by bacteria is
    a. hydrogen sulfide b. elemental sulfur
    c. sulfate d. thiosulfate
12. The enzymes ammonia monooxygenase and hydroxylamine oxidoreductase are most specifically associated with
    a. nitrification b. nitrate oxidation
    c. nitrate reduction d. nitrite oxidation
13. Homoacetogens and methanogens are
    a. strict aerobes b. strict anaerobes
    c. facultative aerobes d. facultative anaerobes
14. In the soil, the nutrient factor limiting microbial activity might be
    a. carbon b. nitrogen c. phosphorus d. all of the above
15. The vegetative cells of *Mycobacterium tuberculosis* are resistant to many germicides because of
    a. an extra membranous layer between the cell wall and the plasma membrane
    b. the complex nature of the plasma membrane itself
    c. the complex nature of the cell wall
    d. the lattice work found in the glycocalyx
16. The β-lactam antibiotics
    a. inhibit plasma membrane synthesis b. inhibit cell wall synthesis
    c. inhibit protein synthesis d. inhibit nucleic acid synthesis
17. The most successful agents used for antiviral chemotherapy are
    a. protein synthesis inhibitors b. nucleotide analogs
    c. nucleoside analogs d. ATP reductase inhibitors
18. The specificity of the immune response is due to the
    a. monocytes b. lymphocytes c. erythrocytes d. polymorphonuclear granulocytes
19. *Clostridium botulinum* is resistant to heat treatment because of its ability to form
    a. capsules b. cell walls c. endospores d. vacuoles
20. Heat stable proteins tend to have _____ which probably leads to more _____.
    a. hydrophilic cores/ ionic dispersal of particles which would normally cluster
    b. hydrophobuc cores/"salt bridges" betweeen hydrophilic amino acids on the surface
    c. hydrophobic cores/ionic dispersal of particles which would normally cluster
    d. hydrophilic cores/ "salt bridges" between hydrophilic amino acids on the surface