

**General Microbiology  
Examination #1  
Winter Semester 2006**

**Student name:** \_\_\_\_\_

**Score:** \_\_\_\_\_ points out of 65points

**Your percent score is** \_\_\_\_\_%

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**Students:**

- 1. Please use a #2 pencil on the scantron sheet.**
  - 2. Each scantron question has a point value of 0.91 points**
  - 3. Record any erasures on the list provided at the front of the room. Protect yourself, as the verdict of the scoring machine is final.**
  - 4. Feel free to ask for further information about any of the questions.**
  - 5. The total value of this portion of the examination is 45.5 points**
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1. The type of microscope that you make use of during the laboratory is called a \_\_\_\_ microscope.

- A) Complex
- B) Confocal
- C) Compound
- D) None of these.

2. The identifying characteristic of the above mentioned microscope is \_\_\_\_.

- A) The fact that it has a resolving power of greater than 1 micrometer
- B) The fact that it has both coarse and fine adjustment controls
- C) The fact that the image presented to your eye is formed by two interacting lens Systems.
- D) None of these.

3. If you were purchasing a microscope and basing your choice solely on which instrument had the greatest or best resolving power, you would have to choose microscope \_\_\_\_.

- A) Microscope A, Resolving power of 10 micrometers
- B) Microscope B, Resolving power of 1 micrometer
- C) Microscope C, Resolving power of 0.1 micrometer
- D) Microscope D, Resolving power of 0.01 micrometer

4. Which of the following factors plays a role in determining the resolving power of a microscope?
- A) The optical density of the ocular lens system
  - B) The number of lumens of light that the illuminator releases per minute
  - C) The wavelength of the illumination used in the operation of the instrument
  - D) None of these.
5. The immersion oil used in connection with the operation of your microscope \_\_\_\_.
- A) Enhances or increases the resolving power of the instrument
  - B) Decreases the resolving power of the instrument
  - C) Has no effect on the resolving power of the instrument
  - D) None of these.
6. If your microscope has oculars rated at 20X and an objective rated at 100X, the total magnification capability of the instrument is \_\_\_\_X
- A) 120
  - B) 5
  - C) 2000
  - D) None of these.
7. The short history of microbiology presented in class began with a man by the name of Leeuwenhoek. This individual is important to the science of microbiology because it was he who \_\_\_\_.
- A) First demonstrated their role in disease
  - B) Discovered the existence of these organisms
  - C) First demonstrated that microbes have genetic information and reproduce like other forms of life.
  - D) None of these.
8. The observations of Leeuwenhoek were collected and disseminated by what scientific society? (Note, this organization is still in existence)
- A) The British Botanical Society
  - B) The Royal Society of London
  - C) The British Society for the Advancement of Science
  - D) None of these.

**The following questions are from the Article dealing with Potato Blight**

Questions 9-14

9. This article begins with a description of the potato blight in \_\_\_\_.
- A) Russia
  - B) China
  - C) The USA
  - D) None of these

10. Currently the problem of potato blight is “handled” the North America and Western Europe by \_\_\_\_.

- A) Crop rotation
- B) The use of vaccines
- C) The use of pesticides
- D) None of these.

11. According to the article, the problem of potato blight \_\_\_\_.

- A) Is the biggest current problem in agriculture
- B) Is a problem which is rapidly becoming a less severe problem in modern Agriculture
- C) Is a problem that is currently only of significance in the agriculture of the developing world.
- D) None of these.

12. While the potato “left its home” late in the 1400s, potato blight appears not to have left its ancestral home until the \_\_\_\_.

- A) 1500s
- B) 1600s
- C) 1700s
- D) None of these

13. According to the article, the “ancestral home” of the microbe responsible for the blight appears to be \_\_\_\_.

- A) Mexico
- B) China
- C) Canada
- D) None of these.





14. The major problem in utilizing modern crossing breeding techniques to produce blight resistant potatoes is \_\_\_\_.

- A) The fact that no blight resistance genes have been found in potatoes
- B) The cultivated potato is not a diploid plant
- C) Potatoes can reproduce only sexually
- D) None of these.

**The following questions are based on Study Guides #2, and 3.**

15. Given the construction of your microscope, which of the following objectives has the smallest or shallowest depth of field?

- A) 4X
- B) 10X
- C) 40X
- D) None of these.

16. Malachite green is a stain whose chromophore group carries a positive electrical charge. This means that malachite green is considered to be a (an) \_\_\_\_ stain.
- A) Acidic
  - B) Basic
  - C) Neutral
  - D) None of these.
17. The major reason for “simple staining” bacterial organisms is to \_\_\_\_.
- A) Determine if they are capable of causing disease in plants or animals
  - B) Determine if they have flagella and if so, what the arrangement of these organelles is.
  - C) Make it easier to see the bacteria when viewing them with a microscope
  - D) None of these.
18. The principle reason for “heat fixing” a bacterial smear prior to staining it, is to \_\_\_\_.
- A) Kill the bacterial cells
  - B) Attempt to alter the surface charge of the cells
  - C) Attempt to better stick the bacterial cells to the slide
  - D) None of these.
19. Which of the following cellular arrangements best represents a streptococcal arrangement of cells?
- A) 
  - B) 
  - C) 
  - D) 
20. In the case of Gram staining procedure, you would expect a Gram-positive cell, to appear \_\_\_\_ in color when viewed with the oil immersion objective of your microscope.
- A) Red
  - B) Green
  - C) Yellow
  - D) Violet
21. In the case of Gram staining, you are advised to use only “young” cultures. This is because \_\_\_\_.
- A) Old cultures resist taking up the mordant used in the procedure
  - B) Old cultures consist mainly of Pleomorphic forms and hence given misleading results
  - C) Old cultures, which are of the Gram positive type, will lose their “Gram positiveness” and hence can give misleading results.
  - D) None of these.

22. Some time was spent discussing Pasteur's work in Mr. Bigo's industrial operation. Bigo was in the business of producing \_\_\_\_.
- A) Ethyl alcohol
  - B) Starch
  - C) Paper
  - D) None of these
23. The studies mentioned in the above question (#22) revealed the central importance played in the production of the above-mentioned material by \_\_\_\_.
- A) The mold, *Penicillium*
  - B) Bacterial organisms
  - C) Yeasts
  - D) None of these
24. Pasteur's studies of the concept of spontaneous generation of microorganisms led him to contend that this phenomenon \_\_\_\_ occur.
- A) Occurred only rarely
  - B) Occurred only if the nutrient broth was incubated at the proper temperature
  - C) Does not occur
  - D) None of these
25. Pasteur contended that microbes would collect in what area of his now famous flasks over a period of time?

Here is a sketch of a flask →

26. Pasteur's studies, started at the request of a man by the name of Dumas, eventually gave a great deal of support to a rather old theory known as the \_\_\_\_.
- A) Spontaneous generation
  - B) The Germ Theory of Disease
  - C) The theory of Biogenesis
  - D) None of these

27. Robert Koch, it was noted in class, moved from being a unknown scientific researcher in Germany to one of rather high standing almost overnight. His initial fame came from his studies that involved the disease, \_\_\_\_.

- A) Bubonic plague
- B) Diphtheria
- C) Rabies
- D) None of these

28. One of the diseases that Koch is credited with being the first person to find the causative agent of is tuberculosis. In 2004, there were approximately \_\_\_\_ cases (in the USA) of TB reported to the CDC.

- A) 14500
- B) 22,500
- C) 30,500
- D) None of these

29. The concept of the taxonomic category known as the Domain, has grown out of the work of \_\_\_\_.

- A) Smith
- B) Matthews
- C) Woese
- D) None of these.

30. The above-mentioned individual studied the similarity between types of \_\_\_\_ molecules in a variety of living organisms.

- A) Protein
- B) Polysaccharide
- C) RNA
- D) None of these.

31. In the case of the world of bacteria, Bergey's Manual of Systematic Bacteriology, takes the Domains and initially subdivides them into \_\_\_\_.

- A) Kingdoms
- B) Phyla
- C) Serotypes
- D) None of these.

32. Probably the most famous bacterium in Macomb County is *Escherichia coli* because of its role in beach closing. This bacterium belongs to the genus, \_\_\_\_.

- A) *Coli*
- B) *Escherichia coli*
- C) *Escherichia*
- D) None of these.

33. Question #28 refers to the CDC. This is a federal agency whose full name is \_\_\_\_.
- A) The Centers for Disease Control
  - B) The Centers for Disease Correction
  - C) The Centers for Disease Control and Prevention
  - D) None of these.
34. If you can successfully apply Koch's Postulates to a particular bacterial organism, it would allow you to \_\_\_\_.
- A) State how a person acquires this disease producing microbe
  - B) State how the microbe causes disease symptoms in the organism in which it is living
  - C) State that this microbe causes the disease that you are studying
  - D) None of these.
35. The period, 1857 to the early 1900s is referred to by many people as the "Golden Age of Microbiology" for what reason?
- A) Very large amounts of money were made through the study of microorganisms.
  - B) Most of the today's known microorganisms were identified and studied
  - C) The microbes which cause many well known diseases were isolated, identified, and linked to the disease that they caused
36. The molecules mentioned in question #30, were extracted from the \_\_\_\_ of the organisms being studied.
- A) Chromosomes
  - B) Mitochondria
  - C) Ribosomes
  - D) None of these.
37. Which of the following bacterial organisms would you expect to stain acid fast positive?
- A) *Escherichia coli*
  - B) *Bacillus cereus*
  - C) *Neisseria flava*
  - D) *Mycobacterium phlei*
38. The characteristic of the bacterial cell, which confers an acid-fast positive reaction, is \_\_\_\_.
- A) Its high DNA content
  - B) Its high content of hydrophobic proteins
  - C) The high lipid content of its cell walls
  - D) None of these.

39. If the type of spore stain that you conducted in the laboratory is properly carried out, the spores will be \_\_\_ in color when viewed with the oil immersion objective of the microscope.
- A) Red
  - B) Green
  - C) Blue
  - D) None of these.
40. If you needed to determine the type of flagella arrangement that is shown by *Pseudomonas aeruginosa*, which of the references would best suit your purpose?
- A) Standard Methods of Waste Water treatment
  - B) The Handbook of Chemistry and Physics
  - C) Bergey's Manual of Determinative Bacteriology
  - D) None of these.
41. Currently, it is thought that the members of the Domain, \_\_\_ are most closely related to the "universal ancestor" or first form of life of the earth.
- A) Monera
  - B) Bacteria
  - C) Archaea
  - D) None of these.
42. Microbes, which derive their energy from a source that is not, some form of organic matter would be considered to be \_\_\_ in nature.
- A) Heterozygous
  - B) Heterotrophic
  - C) Autotrophic
  - D) None of these.
43. The area of the virus indicated by the arrow, in the diagram shown below is the \_\_\_ of the virus.
- A) Coat
  - B) Core
  - C) Capsomere
  - D) None of these.
- This is the diagram →

44. The chemical nature of the above-mentioned area (question #43) is \_\_\_\_
- A) Protein
  - B) Lipid
  - C) Carbohydrate
  - D) None of these.
45. Prions are disease agents, which are \_\_\_\_ in nature.
- A) Lipid
  - B) Nucleic acid
  - C) Protein
  - D) None of these.
46. Almost all of the human “mad cow” disease patients are currently found in \_\_\_\_.
- A) Canada
  - B) China
  - C) Russia
  - D) None of these.
47. Chronic Wasting Disease is a prion based “problem” that, at the current time is found in animals such as \_\_\_\_ here in the USA.
- A) Pigs
  - B) Rabbits
  - C) Bats
  - D) None of these.
48. *Phytophthora infestans* is a “water mold” which has the ability to infect and destroy \_\_\_\_.
- A) Dogs
  - B) Oak trees
  - C) Potato plants
  - D) None of these
49. You were introduced to the notion of “bioconversion”. One of the examples given in class of this idea involved the production of human \_\_\_\_ by genetically engineered microbial organisms.
- A) Hemoglobin
  - B) Pepsin
  - C) Insulin
  - D) None of these.
50. Mark answer A. This is a “free” question.

**Students:**

- 1. The following portion of the examination has a point value of 19.5 points.**
  - 2. Each question has its point value indicated at its end.**
  - 3. You may use either pencil or pen in answering this section of the examination.**
  - 4. If you are to list items, for your own protection, list only the number that is being requested.**
  - 5. Please use complete sentences where appropriate**
  - 6. Lastly, reread your answers before turning in your paper. Remember, I can only read and grade what you have actually written, not what you wanted to write.**
1. List the currently recognized Domains of Life. Which of these (if any) “house” bacterial organisms? (3pts) Note the number of spaces provided for you may not equal the number of actual domains.

Name of Domains	Does the Domain “house” bacteria (Yes or No)
1.	
2.	
3.	
4.	
5.	

2. What the 3 major cell shapes that bacterial organisms can assume. (3pts)

1.
2.
3.

3. In the case of the Gram Stain, list the materials, which function in the following roles. (1.5pts)

Function in Gram Stain	Name of material
Mordant	
Counterstain	
Decolorizing Agent	

4. The “formula” to make the malachite green solution that you used in conducting the endospore stain is as follows. Dissolve 5 grams of malachite green oxalate in 100 ml of distilled water. How would you make 2.5 liters of this stain? **Show all work.** (2pts)

5. What is the difference between a simple and compound microscope in terms of the lens systems of these instruments? (2pts)

6. Cite 2 methods, other than the use of the on/off switch, that can be used to vary the lighting conditions that you are using to view the subject with your microscope. (2pts)

1.
2

7. Cite 3 characteristics of the bacterial endospore (spore) that made it considerably different from the corresponding vegetative cell. (3pts)

1
2
3

8. Cite the size range and nutritional status of the following groups of microorganisms (3pts)

Nutritional status and size

1. Bacteria	
2. Fungi	
3. Algae	