Microbe Missions C – ANSWER KEY

2018 National Cathedral Invitational Tournament

- - - NOT FOR STUDENTS - - -

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Total Points Possible: **60**

ALL QUESTIONS ARE 2 POINTS EACH

Part I – Organelles

1. In the figure to the right (Figure 1), what is the organelle represented?
    A. Chloroplast
    B. Nucleus
    C. Ribosome
    D. Mitochondria

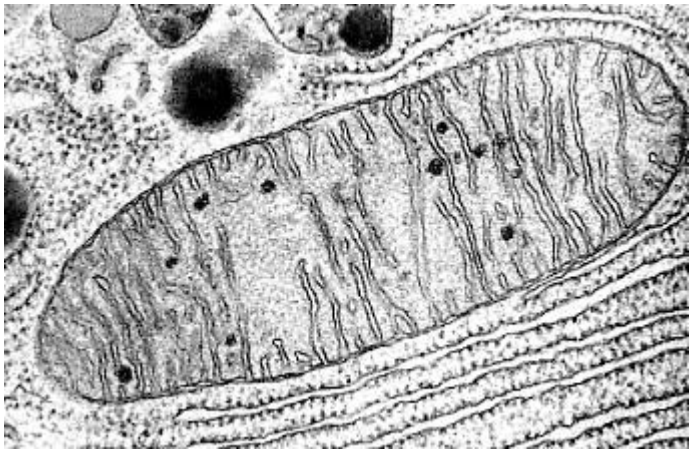

Figure 1
http://emp.byui.edu/wellerg/The%20Cell%20Lab/Eukaryotic%20Cells/The%20Eukaryotic%20Cell%2003%20Cell.html

2. What type of microscope was most likely used to generate this image?
    A. Bright field microscope
    B. Transmission electron microscope
    C. Scanning electron microscope
    D. Phase contrast microscope

3. How did this organelle possibly evolutionary develop?

endosymbiosis

Part II – Microscopy

4. What are the parts of the microscope to the right? (Figure 2)
    A. eye piece
    B. arm
    C. stage clip
    D. coarse focus
    E. fine focus
    F. objective lens
    G. diaphragm
    H. illuminator

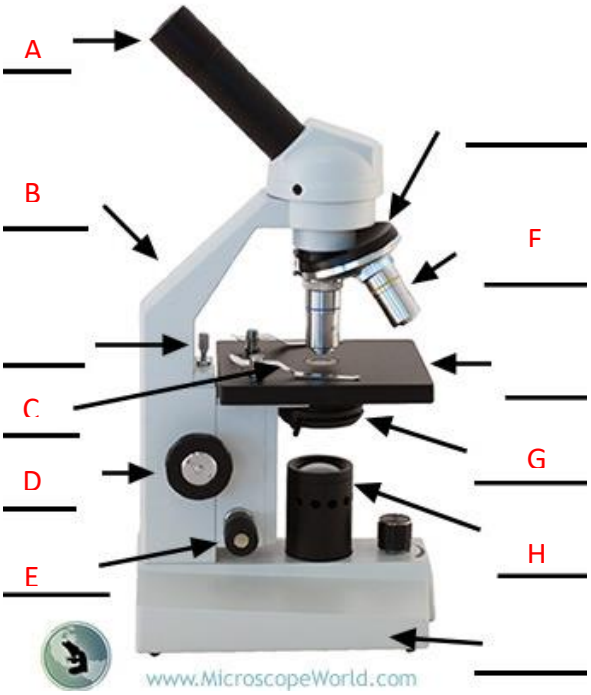

Figure 2

5. What is the purpose of the part labeled G?

Controls the amount of light reaching the specimen

6. What is the purpose of the part labeled H?

Source of light

7. When the magnification of the microscope is increased,
    A. the field of view is lighter and decreased
    B. the field of view is darker and decreased
    C. the field of view is lighter and increased
    D. the field of view is darker and increased

Part III – Bacteria

8. What type of microscope was most likely used to generate this image (Figure 3)?
    A. Bright field microscope
    B. Transmission electron microscope
    C. Scanning electron microscope
    D. Phase contrast microscope

9. Is this bacteria gram negative or gram positive (Figure 3)?
    A. Gram negative
    B. Gram positive

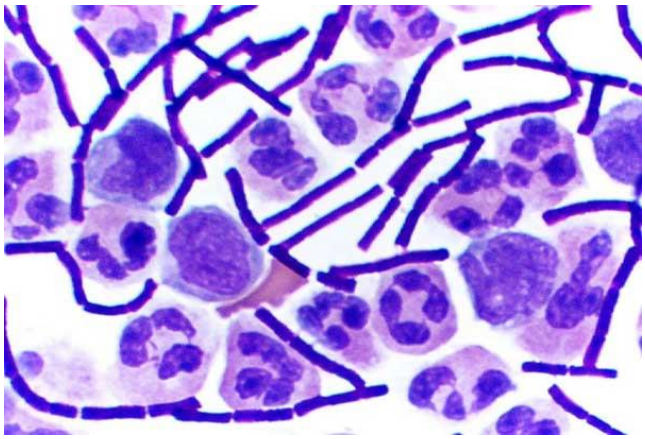

Figure 3 https://en.wikipedia.org/wiki/Gram-positive_bacteria

10. What shape is this bacterium (Figure 3)?
    A. Cocci
    B. Bacillus
    C. Spirillum
    D. Vibrio
    E. Coco-bacillus
    F. Other

11. This bacterium (Figure 3) is very large and can be cultivated in ordinary nutrient medium under aerobic or anaerobic conditions. This bacterium is ____.
    A. Bacillus antracis
    B. Clostridium tetani
    C. Treponema pallidum
    D. Vibrio cholerae

12. To microbial growth, chemical or physical agents are usually employed. Agents are inhibit the growth of cells are referred to as _____ agents and the process of inhibiting the growth is ____.
    A. Cidal, bactericidal
    B. Cidal, bacteriostatic
    C. Static, bactericidal
    D. Static, bacteriostatic

13. What is the difference between horizontal and vertical gene transfer?

    Vertical gene transfer is when resistance gene is transferred directly to all bacteria's progeny during DNA replication
    Horizontal gene transfer is when genetic material is contained in small packets of DNA and can be transferred between individual bacteria of the same species

14. What is the purpose of Calcium in bacteria?

A. Component of endospores
B. Inorganic cellular cation
C. Component of cytochromes
D. Constituent of cysteine, methionine, and glutathione
E. A and B only
F. B and D only
G. C and D only
H. A, B, C, and D

Part IV – Viruses

15. The scientist who first proposed the term virus is
    A. Beijerinck
    B. Frosh
    C. Ivanoski
    D. Loeffler
    E. Pasteur

16. The scientists who first discovered an animal virus that causes foot-and-mouth disease in cattle are (pick 2).
    A. Beijerinck
    B. Frosh
    C. Ivanoski
    D. Loeffler
    E. Pasteur

17. The image to the right (Figure 4) was most likely taken with why kind of microscope?
    A. Bright field microscope
    B. Transmission electron microscope
    C. Scanning electron microscope
    D. Phase contrast microscope

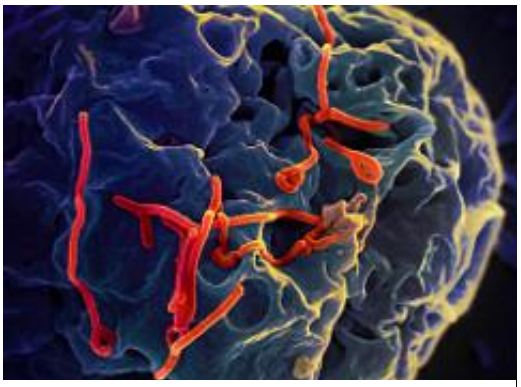

Figure 4 NIAID

18. Figure 1 is an image of the ebola virus. The ebola virus is a **DNA or RNA** virus. (circle one)

19. The ebola virus relies on the immune system to facilitate efficient infection. When the virus enters the cell, it attacks macrophages and monocytes. White blood cells respond to the viral infection by releasing large amounts of proinflammatory cytokines. What does the cytokines do?
    A. decreases the permeability of the vascular endothelium
    B. Recruit more macrophages in the area
    C. A and B
    D. None of the above

20. The ebola virus primarily uses which viral replication cycle?
    A. Lytic cycle which immediately begins producing new viral particles after infection
    B. Lysogenic cycle which immediately begins producing new viral particles after infection
    C. Lytic cycle which can lie in dormancy after infection and integration
    D. Lysogenic cycle which can lie in dormancy after infection and integration

Part V – Fungi

21. The fungus, Pseudogymnoascus destructans, causes a disease called white-nose syndrome. This disease primarily affects the noses of
    A. Humans
    B. Bats
    C. Cats
    D. Pigs

22. Pseudogymnoascus destructans is part of a division of fungi called Ascomycota. Which of the following is true of this phylum?
    A. Largest phylum
    B. All species undergo sexual reproduction in which nonmotile spores, ascospores are formed
    C. A and B
    D. None of the above

23. White-nose syndrome primary affects organisms in what part of North America?
    A. Western
    B. Eastern
    C. Northern
    D. Southern

24. The number of sets of chromosomes in a dikaryotic cell is
    A. Greater than that of a diploid cell
    B. Less than that of a diploid cell
    C. Equal to that of a diploid cell

25. Anaerobic degradation of proteins brought about by bacteria and fungi give the products such as
    A. Mercaptans
    B. Indole
    C. H_2S
    D. All of the above

Part VI – Protozoan/Algal

26. Figure 5 is an image of *Naegleria fowleri*. This ameba is common referred to as the

Brain-eating amoeba or brain-eating ameba

Figure 5 cdc.gov

27. *Naegleria fowleri* typically infects people when contaminated water enters the body through the
    A. Mouth
    B. Eyes
    C. Nose
    D. Broken skin

28. Most cases of primary amebic meningoencephalitis (PAM) caused by *Naegleria fowleri* infection in the U.S. have been fatal. However, there are a few cases in which the patient did survive. These patients were treated through which of the following methods? (select all that apply)
    A. Hypothermia
    B. Miltefosine
    C. Mebendazole
    D. Penicillin

29. Reproduction in protozoa may be
    A. Asexual only
    B. Sexual only
    C. Both asexual and sexual

30. Some protozoa have acquired resistance characteristics to certain treatments. How does this primarily occur
    A. Rapid multiplication
    B. Conjugation
    C. Transformation
    D. Transduction