

1. List the characteristics of a typical bacterial cell. How do prokaryotic cells differ from eukaryotic cells? (1pt)

Typical Bacterial Cell:

- very small in size.
- single chromosome found within nucleoid region
- has a plasma membrane that is surrounded by a cell wall.
- three basic shapes are rod, spherical, and spiral-shaped; though there is a lot of diversity.

Prokaryotic cells

- no nucleus
- DNA found in nucleoid region
- no membrane bound organelles

vs.

Eukaryotic cells

- nucleus
- membrane bound organelles

2. What is binary fission? How does this compare to sexual reproduction? The 2nd part of the question is not specifically discussed, need to think back to our discussion of sexual reproduction. (1 pt)

Binary fission – the splitting of the cell into two equal halves, each with a copy of the DNA and ~1/2 of the cytoplasm (contains the fluid component of the interior of the cell and the various particles and structures found within the cell).

Binary fission is process analogous to mitosis and is a form of asexual reproduction. The daughter cells or progeny are identical copies of the parent cell. In sexual reproduction the genome is combined from two different individuals, making genetically distinct offspring.

3. Given that bacteria reproduce asexually how is it possible for a bacterial cell to get genes from another bacterial cell? (1 pt)

Conjugation is the major way one bacterium exchanges genetic material with another bacterium. The process involves the movement of some DNA, typically found in the small circular plasmids, from one cell to another via a pilus (connection between the two cells).

Transformation can also occur where a bacterial cell will take up DNA that has been released from dead bacterial cells.

Transduction occurs when a virus incorporates some of the bacteria's DNA into their virus' genome and when the virus moves to another cell, it takes the bacteria's DNA with it, 'infecting' the new cell with the DNA from the other bacteria.

4. List four different types of protists (any of the four given). List a couple of characteristics for each of the four. (1pt) (Note: I have meant this to be list only two, or the four but since I wrote all four, I'll expected all four when grading)

Photosynthetic Protists

- unicellular or colonial; a few multicellular
- chloroplasts (for photosynthesis)

Flagellates

- heterotrophic
- use one or more flagella; some have chloroplasts
- symbiotic and parasitic

Ciliates

- largest group of protozoans
- have cilia which are small hairlike structures that cell uses for locomotion, or to help capture prey

Amoeboid

- move using pseudopods / cytoplasm streams into a foot area and then into another area in succession, allowing the organism to move forward
- engulf food via endocytosis, digesting food in a vacuole
- typically aquatic

5. What is a lichen? Describe the relationship between the partners involved in the lichen. (1pt)

A lichen is the mutualistic relationship between a fungal partner and a cyanobacteria or a green algae. Both partners benefit from the association. Lichens can take up nutrients and moisture from poor soil due to the high surface area of the fungal partner. The fungal partner protects the algae (or cyanobacteria) and absorbs minerals and water from the surrounding area, which the photosynthetic partner (algae or cyanobacteria) incorporates into the carbohydrates it produces via photosynthesis. The photosynthetic partner provides the fungus in return with food (carbohydrates, or products from photosynthesis).

6. How does the digestion of a fungus compare to an animal? (1pt)

Both are heterotrophic, however, animals ingest their food and digest it internally, while fungi secrete digestive enzymes into the food it is digesting and absorbs the breakdown products.

7. Describe the fungal mycelia. How is its shape beneficial for its feeding style (not directly answered in the text – think about it and give an educated hypothesis)? (1pt)

Fungal mycelia are a mass of filaments with very high surface area. The mycelia is the 'feeding' portion of the fungus, so it absorbs the nutrients that are broken down. The mycelia spread out into and surrounding the food supply with its incredible surface area, increasing the amount of nutrients absorbed.

8. How is the fungal spore similar to the spores of mosses and ferns? (1pt)

Fungal spores are released and travel away from the parent fungus. When it lands on appropriate substrate it will develop into a new fungus. This is analogous to spore dispersal in mosses and ferns. In addition, like with mosses and ferns, the spore is haploid and will develop into a new organism without having to fuse with another organism.

9. What is chitin? Who else other than fungi have chitin? (1pt)

Chitin is a polysaccharide made up of glucose monomers. Arthropods also have chitin in their exoskeleton.

10. What are yeast? Give some characteristics of yeast. (1pt)

Yeast are unicellular fungi. Yeast carry out cellular respiration in the presence of oxygen, but can also carry out alcoholic fermentation. The alcohol and carbon dioxide that are the waste products from the fermentation are utilized to produce wine and beer as well as bread! Yeast reproduce by budding, where the two halves are unequal after the cellular division (though both halves get the full complement of the DNA).

Bonus: What are viruses? How do they differ from bacterial cells or other single cellular organisms? (1pt)

Viruses are not always considered 'living organisms' due to their dependence on living organisms to be able to sustain themselves. They are very small and acellular (do not exist as a cell). Viruses are parasitic, using the reproductive machinery of living cell in order to replicate themselves.