Package Title: Test Bank
Course Title: Wessner 3e
Chapter Number: 2 Bacteria

Question Type: Multiple Choice

1) What is the typical length of a bacterium?

a) 5–10 nm
b) 0.5–5 µm
c) 20–40 µm
d) 5–10 mm
e) 20–40 mm

Answer: b

Difficulty: Easy
Section Reference: Section 2.1 Morphology of Bacterial Cells
Learning Objective: LO 2.1 Describe the shape, multicellular arrangement and general sizes of common bacteria.

2) Which term describes straight, rod-shaped bacteria?

a) Cocci
b) Bacilli
c) Spirilla
d) Vibrios
e) Pleiomorphs

Answer: b

Difficulty: Easy
Section Reference: Section 2.1 Morphology of Bacterial Cells
Learning Objective: LO 2.1 Describe the shape, multicellular arrangement and general sizes of common bacteria.

3) Which bacterial group is expected to display pleomorphism?

a) Actinomycetes
b) *Mycoplasma*
c) Cyanobacteria
d) *Streptococcus*

e) *Staphylococcus*

Answer: b

Difficulty: Medium
Section Reference: Section 2.1 Morphology of Bacterial Cells
Learning Objective: LO 2.1 Describe the shape, multicellular arrangement and general sizes of common bacteria.

4) Within a population of *E. coli* cells, you frequently observe rod-shaped cells that are significantly larger than the rest. This species is not known to be pleomorphic. Which is the most likely explanation for your observation?

a) Cells are different because nutritional needs are not being met.
b) Cells are at different stages of growth before binary fission.
c) Cells are contaminated with *Staphylococcus*.
d) Cells have lost their cell walls.
e) Cells have lost their plasma membranes.

Answer: b

Difficulty: Medium
Section Reference: Section 2.1 Morphology of Bacterial Cells
Learning Objective: LO 2.1 Describe the shape, multicellular arrangement and general sizes of common bacteria.

5) The so-called ultra-small bacteria will likely have a diameter approximating:

a) 1 micrometer.
b) 1.5 micrometers.
c) 0.15 micrometer.
d) 0.5 micrometer.
e) 0.015 micrometer.

Answer: c

Difficulty: Hard
Section Reference: Section 2.1 Morphology of Bacterial Cells
Learning Objective: LO 2.1 Describe the shape, multicellular arrangement and general sizes of common bacteria.

6) Given the size of a typical ribosome, how many would you expect to find inside an ultra-small bacterium?

a) A single ribosome
b) 5–20 ribosomes
c) 50–100 ribosomes
d) 100–200 ribosomes
e) 500–1000 ribosomes

Answer: b

Difficulty: Hard
Section Reference: Section 2.1 Morphology of Bacterial Cells
Learning Objective: LO 2.1 Describe the shape, multicellular arrangement and general sizes of common bacteria.

7) Which region contains the chromosome in the bacterial cell?

a) Nucleus
b) Nucleoid
c) Plasmid
d) Plastid
e) Prophage

Answer: b

Difficulty: Easy
Section Reference: Section 2.2 The Cytoplasm
Learning Objective: LO 2.2 Describe the nucleoid and the components of bacterial cytoplasm.

8) Which is an example of an "inclusion body" found in a bacterial cell?

a) The nucleus
b) The mitochondria
c) A topoisomerase
d) The cell membrane
e) Polyhydroxybutyrate

Answer: e

Difficulty: Easy
Section Reference: Section 2.2 The Cytoplasm
Learning Objective: LO 2.2 Describe the nucleoid and the components of bacterial cytoplasm.

9) Sulfur globules are an example of inclusion bodies that may be found in some bacterial cells.

What is their use?

a) They are a carbon source.
b) They are used for nucleotide synthesis.
c) They are used as an energy source.
d) They provide buoyancy.
e) They assist in membrane synthesis.

Answer: c

Difficulty: Medium
Section Reference: Section 2.2 The Cytoplasm
Learning Objective: LO 2.2 Describe the nucleoid and the components of bacterial cytoplasm.

10) How are gas vesicles used by bacterial cells?

a) As a source of oxygen for aerobic respiration
b) As a source of nitrogen for protein synthesis
c) As a source of hydrogen for reductive reactions
d) For assistance with photosynthesis
e) As an energy source

Answer: d

Difficulty: Medium
Section Reference: Section 2.2 The Cytoplasm
Learning Objective: LO 2.2 Describe the nucleoid and the components of bacterial cytoplasm.

11) The bacterial chromosome is a highly condensed structure that is tightly wound around itself to fit into the bacterial cell. What is the main enzyme responsible for condensing the DNA?

a) DNA polymerase
b) DNA ligase
c) DNA topoisomerase
d) DNA endonuclease
e) DNA synthetase

Answer: c

Difficulty: Easy
Section Reference: Section 2.2 The Cytoplasm
Learning Objective: LO 2.2 Describe the nucleoid and the components of bacterial cytoplasm.

12) Carboxysomes play a role in:

a) energy release.
b) aerobic respiration.
c) anaerobic respiration.
d) buoyancy control.
e) carbon fixation.

Answer: e

Difficulty: Medium
Section Reference: Section 2.2 The Cytoplasm
Learning Objective: LO 2.2 Describe the nucleoid and the components of bacterial cytoplasm.

13) What would you expect to be a molecular property of the proteinaceous wall surrounding *Microcystis* vesicles that are gas-, but not water-, permeable?

a) Strongly negatively charged
b) Strongly positively charged
c) Hydrophobic in nature
d) Hydrophilic in nature

Answer: c

Difficulty: Hard
Section Reference: Section 2.2 The Cytoplasm
Learning Objective: LO 2.2 Describe the nucleoid and the components of bacterial cytoplasm.

14) What is the main function of the FtsZ protein in the bacterial cell?

a) DNA replication
b) Transcription
c) Translation
d) Cell division
e) Meiosis

Answer: d

Difficulty: Easy
Section Reference: Section 2.3 The Bacterial Cytoskeleton
Learning Objective: LO 2.3 Describe the functions of the bacterial cytoskeleton and other protein-based structural elements in the bacterial cell.

15) The MreB protein in bacteria may play an important role in:

a) cell shape.
b) motility.
c) energy metabolism.
d) meiosis.
e) nuclear division.

Answer: a

Difficulty: Medium
Section Reference: Section 2.3 The Bacterial Cytoskeleton
Learning Objective: LO 2.3 Describe the functions of the bacterial cytoskeleton and other protein-based structural elements in the bacterial cell.

16) What is the role of the ParM protein in bacteria?

a) To determine cell shape
b) To segregate plasmids to each cell during cell division
c) To assist in carrying out meiosis
d) To aid in cell movement during chemotaxis
e) To aid in sugar and protein metabolism

Answer: b

Difficulty: Medium
Section Reference: Section 2.3 The Bacterial Cytoskeleton
Learning Objective: LO 2.3 Describe the functions of the bacterial cytoskeleton and other protein-based structural elements in the bacterial cell.

17) What protein plays an important role in determining cell shape by directing cell wall synthesis in non-spherical bacteria?

a) FtsZ
b) MreB
c) ParM
d) FlaA
e) PepZ

Answer: b

Difficulty: Easy
Section Reference: Section 2.3 The Bacterial Cytoskeleton

Learning Objective: LO 2.3 Describe the functions of the bacterial cytoskeleton and other protein-based structural elements in the bacterial cell.

18) The plasmid region where ParR attaches would be the eukaryal (mitotic) equivalent of:

a) telomere.
b) chromatid.
c) centromere.
d) spindle.
e) chromosome.

Answer: c

Difficulty: Hard
Section Reference: Section 2.3 The Bacterial Cytoskeleton
Learning Objective: LO 2.3 Describe the functions of the bacterial cytoskeleton and other protein-based structural elements in the bacterial cell.

19) The mitotic activity that is equivalent to the plasmid separation achieved by ParM is:

a) interphase.
b) prophase.
c) anaphase.
d) telophase.
e) cytokinesis.

Answer: c

Difficulty: Hard
Section Reference: Section 2.3 The Bacterial Cytoskeleton
Learning Objective: LO 2.3 Describe the functions of the bacterial cytoskeleton and other protein-based structural elements in the bacterial cell.

20) On which other cytoskeletal protein does ParM activity appear to depend?

a) ftsZ polymer
b) ftsZ monomer
c) ParR
d) mreB polymer
e) mreB monomer

Answer: c

Difficulty: Medium
Section Reference: Section 2.3 The Bacterial Cytoskeleton
Learning Objective: LO 2.3 Describe the functions of the bacterial cytoskeleton and other protein-based structural elements in the bacterial cell.

21) What structure might you expect the MamJ protein to possess?

a) At least one highly negatively charged region
b) At least one highly positively charged region
c) At least one lipophilic region
d) At least one hydrophilic region

Answer: c

Difficulty: Hard
Section Reference: Section 2.3 The Bacterial Cytoskeleton
Learning Objective: LO 2.3 Describe the functions of the bacterial cytoskeleton and other protein-based structural elements in the bacterial cell.

22) Which best describes the chemical structure of the plasma membrane in bacteria?

a) A bilayer of phospholipids
b) A monolayer of phospholipids
c) A monolayer of phospholipids with sterols
d) A bilayer of phospholipids with sterols
e) A trilayer of phospholipids

Answer: a

Difficulty: Easy
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

23) Some bacteria produce sterol-like molecules called _____ that help to stabilize the plasma membrane.

a) ergosterol
b) progesterone
c) hopanoids
d) phycols
e) stigmasterols

Answer: c

Difficulty: Easy
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

24) Which statement is FALSE regarding the plasma membrane?

a) Glucose cannot easily diffuse across the plasma membrane.
b) Protons can easily diffuse across the plasma membrane.
c) Oxygen can easily diffuse across the plasma membrane.
d) Water can easily diffuse across the plasma membrane.
e) Potassium ions cannot easily diffuse across the plasma membrane.

Answer: b

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

25) If cells were placed into a hypertonic solution, what reaction would you expect?

a) The cell would lose water.
b) The cell would gain water.
c) The cell would pump out ions.
d) The cell would lyse.
e) The cell would increase in size.

Answer: a

Difficulty: Easy
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

26) What conditions must exist for an "active transport system" to transport nutrients into a cell?

a) The nutrient concentration must be higher on the outside of the cell.
b) The nutrient concentration must be lower on the inside of the cell.
c) The nutrient concentration must be equal inside and outside of the cell.
d) Passive diffusion needs to drive this transport.

e) Some form of energy is required for proper transport.

Answer: e

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

27) What is a signal peptide?

a) The amino acid sequence of a protein that detects changes in the external environment and signals this change to components in the cell
b) A regulatory protein that turns on/off the expression of certain genes
c) A protein used to signal cell division
d) A short amino acid sequence on the end of a protein that is used to transport the protein out of the cytoplasm
e) A protein in the cytoplasmic membrane that is used to communicate with other closely related cells

Answer: d

Difficulty: Easy
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

28) Which is the major component of the cell wall in the Bacteria domain?

a) Cellulose
b) Chitin
c) Protein
d) Polysaccharide
e) Peptidoglycan

Answer: e

Difficulty: Easy
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

29) The glycan portion of peptidoglycan is composed of alternating units of which two

compounds?

a) Glucose and fructose
b) N-acetylmuramic acid and N-acetylglucosamine
c) N-acetylmannose and N-acetylglucose
d) N-acetylfructose and N-acetylglucose
e) N-acetylmannitol and N-acetylsorbitol

Answer: b

Difficulty: Easy
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

30) What is the main function of peptidoglycan?

a) Controlling movement of nutrients into and out of the cell
b) Protecting the cell from harmful chemicals
c) Regulating the transport of water into the cell
d) Protecting against osmotic stress
e) Generating energy through electron transport phosphorylation

Answer: d

Difficulty: Easy
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

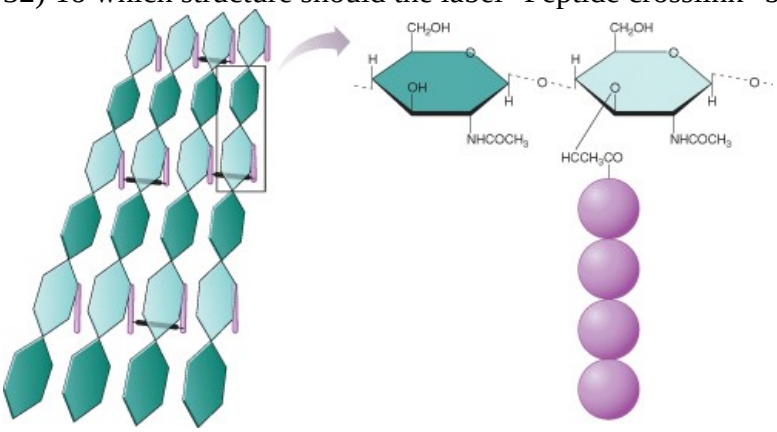
31) What is the reaction of β-lactamase enzymes?

a) Hydrolyze the glycan chain of peptidoglycan
b) Hydrolyze crosslinks between amino acid chains formed in peptidoglycan
c) Inactivate penicillin
d) Inactivate the enzyme lysozyme
e) Prevent the transpeptidation reaction during peptidoglycan synthesis

Answer: c

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

32) To which structure should the label "Peptide crosslink" be pointing?

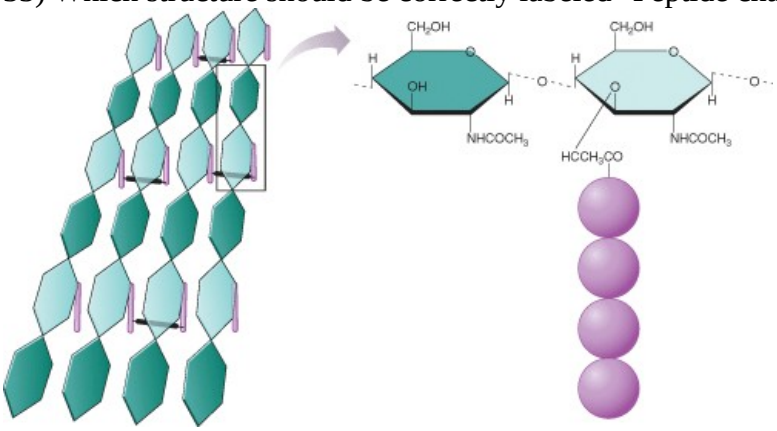


a) Light green hexagon
b) Dark green hexagon
c) Pink vertical sphere
d) Black horizontal line

Answer: d

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

33) Which structure should be correctly labeled "Peptide chain"?



a) Light green hexagon
b) Dark green hexagon
c) Pink vertical sphere
d) Black horizontal line

Answer: c

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

34) Which compound binds the outer membrane of Gram-negative bacteria to the thin peptidoglycan layer?

a) Lipoproteins
b) Lipoteichoic acid
c) Porin
d) Bactoprenol
e) Polysaccharide

Answer: a

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

35) Clavulanic acid can be seen to act in which manner to augment penicillin activity?

a) It molecularly links to penicillin to increase its effectiveness.
b) It acts as a competitive inhibitor of beta lactamase.
c) It acts indirectly to alter peptide crosslinks and strengthen the cell wall.
d) It acts as a non-competitive inhibitor of lysozyme.
e) It strengthens the glyan covalent linkages.

Answer: b

Difficulty: Hard
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

36) One feature of the peptidoglycans found in *E. coli* and *Staphylococcus* that correlates positively with the relative thickness of the layers found in Gram-positive and Gram-negative cells is the:

a) structure of the glycan layer.
b) length of the peptide chains.
c) length of the peptide crossbridges.
d) amino acid sequence of the peptide chains.
e) amino acid sequence of the peptide crossbridges.

Answer: c

Difficulty: Hard
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

37) The differential step in the Gram stain is:

a) the application of crystal violet.
b) the application of the iodine mordant.
c) the alcohol wash step.
d) application of safranin red dye.

Answer: c

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

38) Which of these gene products appears to confer a survival advantage to bacteria living in a competitive environment?

a) TonB dependent receptors
b) TonB MreB protein
c) Flagellin ParM polymers
d) ParR protein ExbB
e) ExbD

Answer: a

Difficulty: Hard
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

39) The type III secretion system is evolutionarily related to proteins involved in making what structure?

a) Flagella
b) Aquaporins
c) Pili
d) Fimbriae
e) Glycocalyx

Answer: a

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

40) The bacterial flagellum is turned by a motor using energy from:

a) ATP.
b) glucose.
c) a proton motive force.
d) phosphoenolpyruvate.
e) AMP.

Answer: c

Difficulty: Medium
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

41) Which of these describes the *peritrichous* arrangement of flagella?

a) Flagella all around the cell
b) Flagella at both polar ends of the cell
c) Flagella in a tuft at one end of the cell
d) Flagella inside the periplasm wrapping around the cell
e) Flagella on a single side of the cell

Answer: a

Difficulty: Easy
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface

allow for motility and interaction with the environment.

42) What short fiber-like structures protrude from the bacterial surface and are used primarily for attachment?

a) Pili
b) Flagellin
c) Porins
d) Bactoprenol
e) Lipopolysaccharides

Answer: a

Difficulty: Easy
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

43) What is the function of the bacterial capsule?

a) Attachment
b) Prevention of phagocytosis by phagocytic cells
c) Resistance to desiccation
d) All of these choices
e) None of these choices

Answer: d

Difficulty: Easy
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

44) Which of the bacterial behaviors described seems most similar to the differentiation observed in *Caulobacter* growth?

a) *Proteus* swarming
b) *E. coli* intestinal attachment
c) *Treponema* movement with axial filaments
d) Streptococcal capsule formation
e) *E. coli* TonB-dependent receptor active transport

Answer: a

Difficulty: Hard
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

45) What is the major difference between the strategies of *Caulobacter* and *Proteus* in nutrient acquisition?

a) *Caulobacter* increases its own cell surface area, while *Proteus* covers more nutrient-containing surface area to improve nutrient absorption.
b) *Proteus* increases its own cell surface area, while *Caulobacter* covers more nutrient-containing surface area to improve nutrient absorption.
c) *Caulobacter* uses pili to attach to new surface areas, while *Proteus* uses axial filaments for enhanced motility.
d) *Proteus* uses pili to attach to new surface areas, while *Caulobacter* uses axial filaments for enhanced motility.

Answer: a

Difficulty: Medium
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

46) How does *Shigella* benefit from the use of actin polymer formation?

a) Actin polymers are used to control the host cell movement.
b) Actin polymers allow bacteria to invade an epithelial sheet without immune cell exposure.
c) Actin polymer formation adheres bacterial cells to host cells.
d) Actin polymer formation brings extra nutrients directly to the bacteria.
e) Actin polymers protect the bacteria from degradative enzymes in the cytoplasm.

Answer: b

Difficulty: Medium
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

47) Select the structure and associated function that is INCORRECT:

a) Pili, motility

b) Flagella, motility
c) Capsule, attachment
d) Pili, attachment
e) Porin, attachment

Answer: e

Difficulty: Medium
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

48) Select the structure and associated function that is INCORRECT:

a) S-layer, protection
b) Capsule, protection
c) Peptidoglycan, protection
d) Flagella, protection,
e) TonB, diffusion

Answer: e

Difficulty: Medium
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

49) All of the following are taxonomic groups used to classify bacteria EXCEPT:

a) Kingdom.
b) Phylum.
c) Class.
d) Family.
e) Genus.

Answer: a

Difficulty: Easy
Section Reference: Section 2.6 Diversity of Bacteria
Learning Objective: LO 2.6 Explain the basic rules of taxonomy and Systematics used to identify bacteria.

Question type: Multiple Select

50) Which phyla contain photosynthetic bacteria? (Select all that apply.)

a) Proteobacteria
b) Cyanobacteria
c) Firmicutes
d) Deinococcus
e) Actinobacteria

Answer: a, b

Difficulty: Medium
Section Reference: Section 2.6 Diversity of Bacteria
Learning Objective: LO 2.6 Explain the basic rules of taxonomy and Systematics used to identify bacteria.

Question type: Multiple Select

51) Suggest a survival advantage for cyanobacterial filaments compared with the single-celled growth pattern exhibited by species like *E. coli*. (Select all that apply.)

a) Nutrients may be shared down the length of a filament.
b) Nutrient loss may occur along the filament length.
c) Intercellular communication may allow cells to share key enzymes.
d) Intercellular communication leads to differentiation of cell types.

Answer 1: a
Answer 2: c

Difficulty: Medium
Section Reference: Section 2.1 Morphology of Bacterial Cells
Learning Objective: LO 2.1 Describe the shape, multicellular arrangement and general sizes of common bacteria.

52) An advantage of polyhydroxybutyrate use in plastics is: (Select all that apply.)

a) reduced dependence on petroleum products.
b) the likelihood of biodegradability.
c) cheaper manufacturing.
d) potential upcycling of other organic molecules during the plastic manufacture.
e) less biomass generation.

Answer 1: a

Answer 2: b
Answer 3: c
Answer 4: d

Difficulty: Hard
Section Reference: Section 2.2 The Cytoplasm
Learning Objective: LO 2.2 Describe the nucleoid and the components of bacterial cytoplasm.

53) The proton motive force (PMF) across a cell membrane can be used for which of these processes? (Select all that apply.)

a) Generate ATP
b) Propel the flagella
c) Facilitate symport
d) Facilitate antiport
e) Lower pH outside the cell membrane

Answer 1: a
Answer 2: b
Answer 3: c
Answer 4: d

Difficulty: Hard
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

54) If mutations occur in genes encoding proteins of the general secretory pathway, then which bacterial regions may be deprived of key proteins? (Select all that apply.)

a) Plasma membrane
b) Cytoplasm
c) Gram-negative outer membrane
d) Periplasmic space
e) Nucleoid

Answer 1: a
Answer 2: c
Answer 3: d

Difficulty: Hard
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

55) Identify the correctly paired peptidoglycan targets and their destroyers. (Select all that apply.)

a) NAG-NAM linkages and lysozyme
b) NAG-NAM linkages and penicillin
c) Polyglycine peptide crossbridges and lysostaphin
d) Polyglycine peptide crossbridges and penicillin
e) Beta-lactam and penicillin

Answer 1: a
Answer 2: c

Difficulty: Hard
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

56) Identify the correctly paired peptidoglycan targets and their destroyers. (Select all that apply.)

a) Polyglycine peptide crossbridges and lysozyme
b) Peptidoglycan crosslinking enzymes and penicillin
c) NAG-NAM linkages and penicillin
d) NAG-NAM linkages and lysostaphin
e) NAG-NAM linkages and lysozyme

Answer 1: b
Answer 2: e

Difficulty: Hard
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

57) Which of these molecules can elicit strong inflammatory host responses? (Select all that apply.)

a) Lipoteichoic acid
b) Lipopolysaccharide lipid A
c) NAG-NAM glycan chains
d) Pentaglycine peptides
e) Lipopolysaccharide O side chains

Answer 1: a
Answer 2: b
Answer 3: e

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

58) Which of these molecules will be lysozyme-resistant? (Select all that apply.)

a) Lipoteicheoic acid
b) Lipopolysaccharide lipid A
c) NAG-NAM glycan chains
d) Pentaglycine peptides
e) Lipopolysaccharide O side chains

Answer 1: a
Answer 2: b
Answer 3: d
Answer 4: e

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

59) Which finding(s) suggest most strongly that the phyla illustrated in Fig. 2.36 may be reorganized and revised in future years?

a) There are 2 phyla of Gram-positive bacteria.
b) Bacteria without cell walls exist in the phylum Firmicutes.
c) Proteobacteria consists of five classes, while all other phyla have a single class.
d) Deinococcus and Actinobacteria share a common ancestor.
e) Photosynthetic bacteria are in multiple classes.

Answer: e

Difficulty: Hard
Section Reference: Section 2.6 Diversity of Bacteria
Learning Objective: LO 2.6 Explain the basic rules of taxonomy and Systematics used to identify bacteria.

Question Type: True/False

60) The ABC transporter system uses phosphoenolpyruvate as the energy source to drive transport.

Answer: False

Difficulty: Easy
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

61) The bacterial flagellum is structurally and functionally related to the eukaryal flagellum.

Answer: False

Difficulty: Medium
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

Question Type: Text Entry

62) Short hair-like protrusions on the surface of some bacterial cells, used primarily for attachment but occasionally for motility, are called _____.

Answer: pili

Difficulty: Medium
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

63) _____ motility is used by myxobacteria and some cyanobacteria for smooth movement across a solid surface.

Answer: Gliding

Difficulty: Medium
Section Reference: Section 2.5 The Bacterial Cell Surface

Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

64) What protein prevents other proteins from folding?
a) SecB
b) SecE
c) SecG
d) SecA
e) SecY

Answer: a

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

65) Why is lysozyme more effective at inhibiting bacteria than β-lactam antibiotics?

a) Lysozyme attacks non-growing cells.
b) Lysozyme binds stronger to bacterial cell walls.
c) Lysozyme does not break down as fast.
d) Lysozyme can be combined with other drugs to increase its effectiveness.
e) Lysozyme attacks the plasma membrane as well as the cell wall.

Answer: a

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

66) Which compound binds the layers of peptidoglycan together in Gram-positive bacteria?

a) Lipoprotein
b) Teichoic acid
c) Porin
d) Bactoprenol
e) Polysaccharide

Answer: b

Difficulty: Medium
Section Reference: Section 2.4 The Cell Envelope

Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

67) What feature unites the members of the phylum Proteobacteria?

a) Photosynthetic
b) Gram positive
c) Gram negative
d) Soil dwelling
e) Acidic environments

Answer: c

Difficulty: Medium
Section Reference: Section 2.6 Diversity of Bacteria
Learning Objective: LO 2.6 Explain the basic rules of taxonomy and Systematics used to identify bacteria.

68) Which of these are reasons bacteria benefit from being part of a biofilm? (Select all that apply.)

a) Bacteria are able to stick to the surface better.
b) Bacteria are able to stick together better.
c) A polysaccharide film protects the biofilm.
d) pH is better-balanced.
e) Changes in temperature are easier to withstand.

Answer 1: a
Answer 2: b
Answer 3: c

Difficulty: Hard
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

69) Which of these characteristics distinguish the bacterium *Epulopiscium fishelsoni*? (Select all that apply.)

a) Cells are shaped like cigars.
b) A single cell can be 200−700 μm in length.
c) Each cell has hundreds to thousands of copies of its genome.
d) The bacteria are found only in the intestines of elephants.

e) Reproduction involves up to 12 smaller cells breaking out of the parent cell.

Answer 1: a
Answer 2: b
Answer 3: c
Answer 4: e

Difficulty: Medium
Section Reference: Section 2.1 Morphology of Bacterial Cells
Learning Objective: LO 2.1 Describe the shape, multicellular arrangement and general sizes of common bacteria.

70) What type of bacteria produce carboxysomes?

a) Magnetotactic bacteria
b) β-lactam bacteria
c) Cyanobacteria
d) Sulfur-storing bacteria
e) Planctomycetes

Answer: c

Difficulty: Hard
Section Reference: Section 2.2 The Cytoplasm
Learning Objective: LO 2.2 Describe the nucleoid and the components of bacterial cytoplasm.

71) Where is the periplasm located?

a) Between the plasma membrane and the nucleoid
b) Between the cell wall and the plasma membrane
c) In the empty area inside carboxysomes
d) In the area located inside secretory vesicles
e) Between the glycocalyx and the cell wall

Answer: b

Difficulty: Easy
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

72) Which of the following is responsible for producing chemotaxis?

a) Gliding motility
b) Flagella
c) Actin polymerization
d) Pili
e) Fimbria

Answer: b

Difficulty: Easy
Section Reference: Section 2.5 The Bacterial Cell Surface
Learning Objective: LO 2.5 Explain how complex protein structures on the bacterial cell surface allow for motility and interaction with the environment.

73) Where is the periplasm located?

a) Between the cell wall and the glycocalyx
b) In the liquid portion within the glycocalyx
c) Between the cell wall and the plasma membrane
d) In the liquid portion surrounding the DNA in the nucleoid

Answer: c

Difficulty: Easy
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.

74) What is a plasmid?

a) Any large membrane-enclosed particle inside a bacterium
b) An extrachromosomal molecule of DNA
c) Magnetite-containing particles that arrange themselves in the middle of a bacterium
d) The area of the plasma membrane where the Z-ring forms for cell division
e) The structure produced when ParM proteins polymerize and separate bacterial chromosomes

Answer: b

Difficulty: Easy
Section Reference: Section 2.3 The Bacterial Cytoskeleton
Learning Objective: LO 2.3 Describe the functions of the bacterial cytoskeleton and other protein-based structural elements in the bacterial cell.

75) What are hopanoids?

a) Proteins responsible for transferring large carbohydrates outside of the plasma membrane
b) DNA binding proteins that work to condense and protect the DNA
c) Long chains of carbohydrates used for bacterial adhesion in biofilms
d) Effective antimicrobial proteins produced by certain photosynthetic bacteria
e) Stable sterol-like molecules believed to stabilize the plasma membrane of some bacteria

Answer: e

Difficulty: Easy
Section Reference: Section 2.4 The Cell Envelope
Learning Objective: LO 2.4 Identify the components of the bacterial cytoplasmic membrane and cell wall, and the functions of these structures.