2017 Mentor Invitational
Microbe Mission

KEY

1. e
2. e
3. c
4. a
5. b
6. d
7. b
8. d
9. e
10. The first stage of Lyme disease is a localized stage that occurs about a week after an infectious tick bite and results in a "bullseye" skin lesion. The disease is treatable at this point. The second, disseminated stage occurs weeks to months later. Symptoms include neurological abnormalities, heart inflammation, and bouts of arthritis. The late stage can occur years later and victims develop neuron demyelination and symptoms similar to Alzheimer's disease. Syphilis, also due to spirochete infection, also has 3 stages of disease.
11. a
12. e
13. a
14. d
15. b
16. b
17. e
18. c
19. a
20. b
21. While both toxins act on neurons at the neuromuscular junction, **botulinum toxin** (botox) blocks the release of the primary stimulatory neurotransmitter, **acetylcholine**. In contrast, t**etanus toxin (**tetanospasmin) blocks release of inhibitory neurotransmitters (**GABA and glycine**). Thus, botox results in flaccid paralysis while tetanospasmin results in spasmodic paralysis.
22. c
23. a
24. e
25. e
26. b
27. b
28. e
29. c
30. d
31. c
32. The bacteria ferment sugars, especially sucrose. The resulting acids move below the enamel surface where they dissociate and react with the hydroxyapatite of the enamel to form soluble calcium and phosphate ions, and the ions diffuse outward.
33. c
34. e
35. d
36. c
37. b
38. a
39. b

40. c
41. a
42. c
43. c

44. Salt has been used as a preservative for centuries, and is mentioned in the Bible. Addition of salt raises the osmotic strength, preventing the growth of many bacteria.

45. d
46. d
47. e
48. a
49. c
50. b
51. e
52. c
53. d
54. d
55. e
56. c
57. c
58. b
59. c
60. b
61. e
62. b
63. d
64. b
65. e
66. b
67. c
68. d
69. e
70. d

71. Most common in nuts, and moist grains.
72. e
73. c
74. b
75. b
76. a
77. c
78. d
79. d
80. d
81. a
82. d
83. b
84. a
85. b
86. b
87. c
88. d
89. a
90. d

91. d
92. a
93. d
94. c
95. d
96. d

97. Lactic acid bacteria are well suited for milk fermentations because the bacteria can tolerate acidic conditions, and are aerotolerant with a strictly fermentative metabolism.

98. a
99. b
100. c
101. a
102. a
103. b
104. c
105. b
106. b
107. c
108. a
109. b
110. a
111. c

112. a
113. b
114. b
115. c
116. d
117. b
118. c
119. 4.5 -4.8 mm or 4700 µm
120. 4700 X 40 = 1000 x FOV

FOV = 188 µm

17-20 cells fit across
Size approximately 9-11 µm