

Test Bank Questions

Chapter 21 *Enterobacteriaceae*

1. Which of the following characteristics has recently changed when defining the family *Enterobacteriaceae*?

- a. Gram-negative rods
- b. Ferment glucose
- c. Reduce nitrates to nitrites
- d. Oxidase negative

ANSWER: d

(Level 1, Objective 1)

2. Which of the following antigens remains after boiling a suspension of a member of the *Enterobacteriaceae* for 10 minutes?

- a. K
- b. O
- c. H
- d. Vi

ANSWER: b

(Level 1, Objective 1)

3. Which of the following properties or reactions consistently differentiates gram-negative rods of the *Enterobacteriaceae* from the non-fermenting gram-negative rods?
- a. Growth on MacConkey
 - b. TSI reaction of K/A or A/A
 - c. Oxidase reaction
 - d. Presence of LPS

ANSWER: b

(Level 1, Objective 1)

4. Phenylalanine deaminase is produced by all of the following organisms **except**
- a. *Proteus vulgaris*.
 - b. *Morganella morganii*.
 - c. *Serratia marcescens*.
 - d. *Providencia stuartii*.

ANSWER: c

(Level 1, Objective 2)

5. Which genera of the *Enterobacteriaceae* are considered enteric pathogens?

- a. *Enterobacter*, *Providencia*, and *Proteus*
- b. *Enterobacter*, *Citrobacter*, and *Morganella*
- c. *E. coli*, *Citrobacter*, and *Klebsiella*
- d. *Yersinia*, *Salmonella*, and *Shigella*

ANSWER: d

(Level 1, Objective 2)

6. Given the presence of blood and white blood cells in stool, which of the following organisms is the most likely pathogen?

- a. non-motile, urea-negative, non-lactose fermenter.
- b. H₂S-positive, lysine-positive, citrate-negative, non-lactose fermenter.
- c. H₂S-positive, lysine-positive, citrate-positive, non-lactose fermenter.
- d. PAD-positive, urea-positive non-lactose fermenter.

ANSWER: a

(Level 3, Objective 3)

7. All of the following organisms are commonly associated with urinary tract infections *except* a

- a. VP-negative, citrate-negative, indole-positive, lactose fermenter.
- b. H₂S-positive, urea-negative, lysine-positive, non-lactose fermenter.
- c. H₂S-positive, urea-positive, indole-negative, non-lactose fermenter.
- d. non-motile, VP-positive, indole-negative, lactose fermenter.

ANSWER: b

(Level 3, Objective 3)

8. Pus collected from a draining axillary lymph node is sent to the laboratory. A gram-negative rod is observed on Gram stain. Twenty-four hours after incubation at 35°C in CO₂, a poorly growing non-lactose fermenter is observed. After 48 hours, the colonies on BAP and MAC were slightly larger. The organism proved to be

Motility at 35°C: negative

Urea: no color change

Motility at 25°C: negative

PAD: no color change

VP: no color change

Lysine and Ornithine: no color change

Indole: no color change

TSI: red slant and yellow butt

Citrate: green

This organism is the causative agent of

- a. typhoid fever.
- b. gastroenteritis.
- c. plague.
- d. mesenteric lymph adenitis.

ANSWER: c

(Level 3, Objective 3)

9. The lipopolysaccharide associated with the *Enterobacteriaceae* is

- a. used in conjugation.
- b. part of the plasma membrane.
- c. protective against antimicrobial agents.
- d. an endotoxin.

ANSWER: d

(Level 1, Objective 4)

10. Which of the following reactions is associated with the gram-negative rod best known for its capsule production?

- a. Positive motility
- b. H₂S production
- c. VP positive
- d. PAD positive

ANSWER: c

(Level 2, Objectives 4, 5, and 7)

11. A beta-hemolytic, lactose fermenter is isolated in pure culture from catheterized urine of an 88-year-old female. What additional spot or rapid test result is necessary to presumptively identify this organism?

- a. Indole negative
- b. Indole positive
- c. MUG negative
- d. Oxidase positive

ANSWER: b

(Level 2, Objective 5)

12. A voided urine culture from a 46-year-old female grows dark lactose fermenting as

well as non-lactose fermenting colonies. The BAP shows gray, beta-hemolytic colonies under a swarming film of growth. The microbiologist performs a spot indole test on swarming colony and it is positive. She reports the organism as presumptive *Proteus vulgaris* using the department's rapid identification criteria. The next day the second colony identifies as *E. coli* using a commercial identification system. Your next step in this process is to

- a. report *Proteus vulgaris* and *E. coli* isolated.
- b. question the identification of the *E. coli* colony and repeat testing.
- c. identify the non-lactose fermenting,, swarming colony using a commercial identification system.
- d. repeat the identification of both organisms using a commercial identification system.

ANSWER: c

(Level 3, Objective 5)

13. A stool culture from an 11-month-old male suffering from bloody diarrhea gave the following results on differential enteric media:

MacConkey agar: clear colonies

Xylose Lysine Deoxycholate agar: clear colonies

Hecktoen Enteric agar: clear colonies

Which of the following tests must be performed to confirm the final identification of this enteric pathogen?

- a. *Salmonella* serotyping
- b. *Shigella* serotyping
- c. Latex agglutination for *E. coli* O157:H7
- d. No further testing is required

ANSWER: b

(Level 2, Objectives 1, 2, and 5)

14. A black colony on HE and XLD agars, isolated from a stool culture, produces the following biochemical reactions:

Motility at 25°C: positive PAD: no color change

Motility at 35°C: positive Indole: no color change

Urea: no color change VP: no color change

If this organism is a strict pathogen, you expect it to also be

- a. citrate positive and lysine positive.

- b. citrate negative and lysine positive.
- c. citrate positive and lysine negative.
- d. citrate negative and lysine negative.

ANSWER: a

(Level 3, Objective 5)

15. One of the most resistant genus and species of the *Enterobacteriaceae* is a
- a. beta-hemolytic, indole-positive, lactose fermenter.
 - b. swarming, indole-negative, non-lactose fermenter.
 - c. nonmotile, VP-negative, non-lactose fermenter.
 - d. VP-positive, nonmotile, indole-negative, lactose fermenter.

ANSWER: d

(Level 2, Objective 6)

16. Which of the following organisms always requires antibiotic therapy when isolated in a stool culture?
- a. *Salmonella* spp.
 - b. *Shigella* spp.

c. *Salmonella typhi*

d. *Edwardsella tarda*

ANSWER: c

(Level 1, Objective 6)

17. A 25-year-old female complained of burning on urination. The urine culture grew a clear colony on MacConkey agar. Biochemical testing revealed the following:

TSI A/A H ₂ S	37°C SIM +/+	25°C SIM +/+	
Citrate –	Urea +	MR/VP +/–	ONPG –
PAD +	Arginine –	Lysine –	Ornithine –

This organism will also

- a. swarm.
- b. need to be serotyped.
- c. appear as a mucoid colony.
- d. exhibit multiple antibiotic resistance.

ANSWER: a

(Level 3, Objective 7)

18. An 8-year-old female was admitted with a complaint of right lower quadrant pain.

She was taken to surgery for removal of her appendix. The appendix appeared normal, but lymph nodes in the peritoneal cavity were inflamed. Cultures of the nodes were taken and sent to the microbiology department. The organism that grew appeared as clear colonies on MAC and provided the following reactions:

TSI A/A 37°C SIM – /– /– 25°C SIM – /– /+

MR/VP +/- PAD – Urea +

Citrate – ONPG + Arginine –

Lysine – Ornithine +

This organism will also produce

- a. bulls-eye colonies on CIN agar.
- b. DNase.
- c. clear colonies on XLD agar.
- d. lipase.

ANSWER: a

(Level 3, Objective 7)

19. A sputum from a cancer patient grew a pink colony on MAC. The biochemical reactions were as follows:

TSI A/A 37°C SIM – /– /– 25°C SIM – /– /–

MR/VP – /+ Citrate + Urea +

PAD – ONPG + Arginine –

Lysine + Ornithine –

What colony characteristic is often associated with this organism?

- a. Swarmer
- b. Yellow pigment
- c. Red pigment
- d. Mucoid

ANSWER: d

(Level 3, Objective 7)

20. A pink colony on MAC grew from an abdominal wound. The biochemical reactions included:

TSI A/A H₂S 37°C SIM +/- /+ 25°C SIM +/- /+

MR/VP +/- Citrate + PAD -

Urea - ONPG + Arginine +

Lysine - Ornithine -

The organism identified is

- a. serologically similar to *Salmonella* spp.
- b. often found hiding in the gallbladder in carriers.
- c. characterized by the production of the Vi antigen.
- d. able to produce only a small amount of H₂S in TSI.

ANSWER: a

(Level 3, Objective 7)

Chapter 22 Nonfermenting Gram-Negative Rods

1. Which of the following characteristics would lead you to suspect the presence of a nonfermenting gram-negative rod?
 - a. TSI reaction is K/A
 - b. Oxidase negative
 - c. Inability to grow on MacConkey agar
 - d. Susceptible to multiple antimicrobial agents

ANSWER: c

(Level 1, Objectives 1 and 2)

2. The deep or butt reaction of a TSI slant appears red-orange for non-fermenting gram-negative rods because the organisms
 - a. ferment the sugars present.
 - b. oxidize the sugars present.
 - c. cannot ferment the sugars present.
 - d. degrade the proteins present.

ANSWER: c

(Level 1, Objective 1)

3. Commercial identification systems may have problems with the identification of non-fermenting gram-negative rods because
- a. some of these organisms are slow growing.
 - b. their biochemical reactions tend to be weak.
 - c. they are not frequently isolated.
 - d. a and b.
 - e. b and c.

ANSWER: d

(Level 1, Objective 1)

4. Respiratory cultures obtained from an individual with cystic fibrosis should include selective medium for the isolation of
- a. *Burkholderia pseudomallei*.
 - b. *Burkholderia cepacia* complex.
 - c. *Acinetobacter baumannii*.

d. *Stenotrophomonas maltophilia*.

ANSWER: b

(Level 1, Objective 3)

5. The second- and third-degree burns of a firefighter become infected with *Pseudomonas aeruginosa* while she is hospitalized in the burn unit. What is the most likely environmental source for this organism?

- a. Her gastrointestinal tract
- b. The bathtub used to debride her wounds
- c. Fresh flowers received from her family
- d. Her blood pressure cuff

ANSWER: b

(Level 2, Objective 3)

6. A 69-year-old retired army general develops pneumonia after his diagnosis of chronic lymphocytic leukemia. The organism isolated in his sputum culture is an oxidase-positive, wrinkled, non-lactose fermenter with a musty odor that is arginine positive. He probably acquired this organism from

- a. aerosols of soil and water while serving in Vietnam.

- b. his pet horse.
- c. the hospital environment.
- d. his normal upper respiratory flora.

ANSWER: a

(Level 3, Objective 3)

7. The decarboxylase control tube inoculated with a suspected non-fermenting gram-negative rod is a turbid dirty gray color after incubation at 35°C in ambient air for 24 hours. This result
- a. renders all decarboxylase results invalid.
 - b. is acceptable and the decarboxylase results can be read.
 - c. indicates the tube was probably not inoculated.
 - d. should be read at 48 hours not 24 hours.

ANSWER: b

(Level 3, Objective 4)

8. Hugh-Leifson oxidation-fermentation (OF) medium differs from carbohydrate medium used to identify *Enterobacteriaceae* by all of the following characteristics ***except***

- a. brom thymol blue is used as the pH indicator.
- b. a control tube is not required for OF medium.
- c. there is a higher percentage of carbohydrate present in OF medium.
- d. there is a lower concentration of protein present in OF medium.

ANSWER: b

(Level 1, Objective 4)

9. An oxidase-positive, wrinkled, non-lactose fermenting colony is suspicious for
- a. the organism that causes glanders.
 - b. an individual with cystic fibrosis.
 - c. a potential bioterrorism agent.
 - d. a common antibiotic-resistant nosocomial organism.

ANSWER: c

(Level 2, Objectives 5 and 6)

10. The isolation of an extremely mucoid, oxidase-positive, non-lactose fermenter from the lower respiratory tract usually correlates with the clinical diagnosis of
- a. melioidosis.

- b. nothing—it is an environmental contaminant.
- c. glanders.
- d. cystic fibrosis.

ANSWER: d

(Level 2, Objectives 5 and 6)

11. Which of the following gram-negative rods is associated with individuals who have cystic fibrosis?

- a. An oxidase-positive, pyocyanin-producing, non-lactose fermenter.
- b. An oxidase-negative, nonmotile, non-lactose fermenter that is K/NC on TSI.
- c. An oxidase-positive, lysine-positive, non-lactose fermenter.
- d. a and c.
- e. All of the above.

ANSWER: d

(Level 2, Objectives 5 and 6)

12. Two blood cultures of a premature infant grow a yellow-pigmented colony that is a non-lactose fermenter. The colony provides the following reactions:

Oxidase: purple Indole: pink Motility: negative

The organism is probably

- a. *Burkholderia cepacia* complex.
- b. *Stenotrophomonas maltophilia*.
- c. *Elizabethkingia meningosepticum*.
- d. none of the above.

ANSWER: c

(Level 2, Objectives 5 and 6)

13. An anemic patient received a unit of blood. She develops fever and chills after infusion of the unit. Blood cultures of the patient and a sample of the blood unit grow the same organism. The non-lactose fermenter isolated displays the following reactions:

Oxidase: purple

Growth at 42°C: negative

Colony under UV light: yellow

Arginine: purple

Motility: positive

Gelatin hydrolysis: liquified

Acetamide: no color change

Nitrate after addition of zinc: red

The organism is

- a. *Pseudomonas. putida*
- b. *P. fluorescens.*
- c. *P. aeruginosa.*
- d. *P. stutzeri.*

ANSWER: b

(Level 2, Objectives 5 and 6)

14. Which of the following oxidase-negative, non-motile, non-fermenting, gram-negative rods can mimic a late lactose fermenter due to the oxidation of lactose rather than fermentation?

- a. *Acinetobacter baumannii*
- b. *Burkholderia cepacia* complex
- c. *Achromobacter xylosoxidans*
- d. *Stenotrophomonas maltophilia*

ANSWER: a

(Level 2, Objective 5)

15. A physician calls the microbiology department for the results of a lower respiratory culture of a 15-year-old female with cystic fibrosis. The culture grows an oxidase-negative, motile, lysine-positive, non-lactose fermenter that presents as K/NC on TSI and an oxidase-positive, lysine-positive, non-lactose fermenter. Based on these results, you tell the physician she can potentially treat both organisms with
- a. imipenem.
 - b. an aminoglycoside.
 - c. polymyxin B.
 - d. trimethoprim-sulfamethoxazole.

ANSWER: d

(Level 3, Objectives 5, 6, and 7)

16. An oxidase-negative, non-motile, non-lactose fermenter demonstrates K/NC on TSI and is considered a significant nosocomial pathogen due to its multiresistance. Which of the following antibiotics remains a viable treatment option for this organism?
- a. Imipenem
 - b. Piperacillin/tazobactam
 - c. Aztreonam

d. Ciprofloxacin

ANSWER: a

(Level 2, Objectives 5, 6, and 7)

17. A tracheal aspirate, obtained from a comatose patient on a ventilator, grew an oxidase-positive non-lactose fermenter that produced a distinctive odor of sliced apples. It proved to be:

Motile: positive

Nitrate: red after addition of reagents A, B, and zinc

OF medium:

open tubes: glucose: blue, maltose: blue, lactose: blue, sucrose: blue

closed tubes: glucose: green, maltose: green, lactose: green, sucrose: green

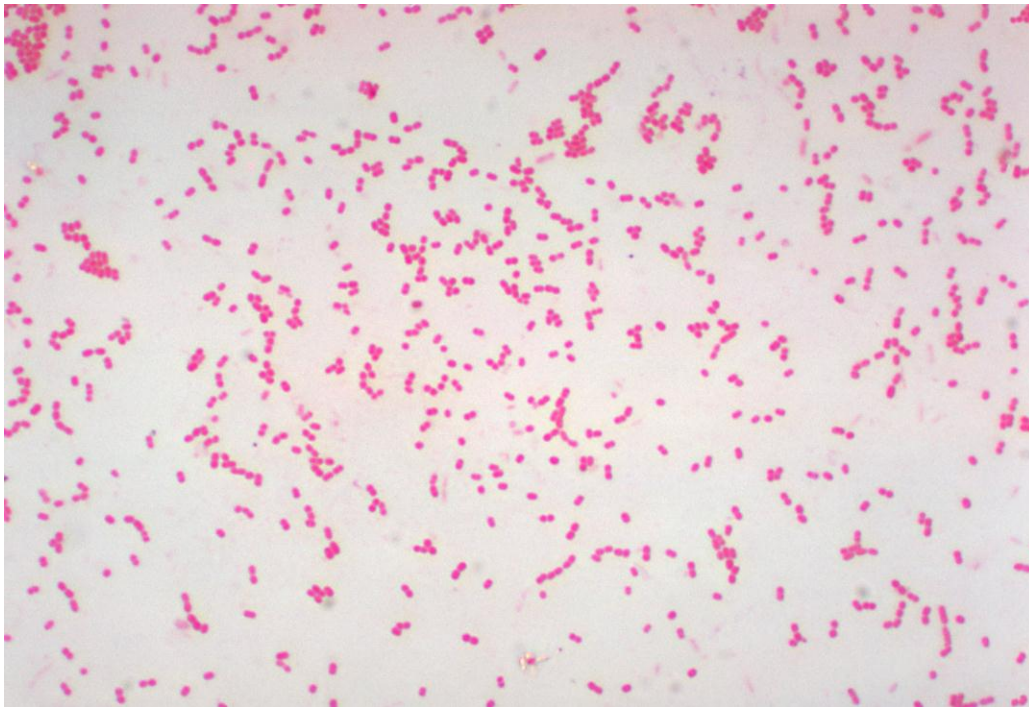
This organism is

- a. *Acinetobacter baumannii*.
- b. *Alcaligenes faecalis*.
- c. *Moraxella nonliquefaciens*.
- d. *Elizabethkingia meningosepticum*.

ANSWER: b

(Level 2, Objective 8)

18. A patient in the intensive care unit has developed pneumonia. A sputum culture grows an oxidase-negative, non-lactose fermenter. The organism is demonstrated in the Gram stain below. The microbiologist works up the organism as a member of the *Enterobacteriaceae*. The next day she realizes her error. The organism displays the following results:



Source: CDC and Dr. W. A. Clark

TSI: K/NC

Motility: negative

OF medium:

open tubes: glucose: yellow, lactose: yellow, maltose: green

closed tubes: glucose: green, lactose: green, maltose: green

This organism is

- a. *Stenotrophomonas maltophilia*.
- b. *Acinetobacter baumannii*.
- c. *Moraxella lacunata*.
- d. *Pseudomonas fluorescens*.

ANSWER: b

(Level 2, Objective 8)

19. A yellow-pigmented gram-negative rod is isolated from the tracheal aspirate of a 76-year-old female. She is comatose due to meningitis and on a ventilator. The organism proved to be:

MacConkey agar: clear colonies Oxidase: no color change

Motility: positive TSI: K/NC

OF medium:

open tubes: glucose: yellow, lactose: yellow, maltose: yellow

closed tubes: glucose: green, lactose: green, maltose: green

When assessing the organisms's clinical significance, it is probably a.
of limited pathogenicity.

- b. a colonizer.
- c. a true nosocomial pathogen.
- d. a and b.

ANSWER: d

(Level 3, Objective 8)

20. A 23-year-old male develops folliculitis after spending the afternoon in the hot tub at a ski resort. The ski resort physician submits a swab of the pustular discharge for culture. The organism isolated grew as an oxidase-positive, non-lactose fermenter. It is beta-hemolytic on sheep blood agar with a cyan-colored pigment in the surrounding medium and emits a fruity odor. These culture results
- a. are adequate to presumptively identify the organism as *Pseudomonas aeruginosa*.
 - b. require additional biochemical testing to definitively identify the organism.

- c. are not needed because the organism is an environmental contaminant.
- d. also require viewing the organism under an ultraviolet light.

ANSWER: a

(Level 3, Objective 8)

Chapter 23 *Vibrio, Aeromonas, Plesiomonas, Campylobacter, Helicobacter, and Chromobacterium*

1. A physician suspects his patient has *Helicobacter pylori*. To confirm the diagnosis, he will submit a
 - a. stool specimen.
 - b. blood culture.
 - c. gastric biopsy.
 - d. swab of the infected wound site.

ANSWER: c

(Level 2, Objective 1)

2. Which of the following scenarios indicates the potential for the isolation of *Vibrio vulnificus*?
- a. A fish hook injury on the hand of a 58-year-old male acquired while on vacation in the Gulf of Mexico.
 - b. A 24-year-old female experiencing massive diarrhea after visiting New Delhi for missionary work.
 - c. A 17-year-old female experiencing diarrhea after eating undercooked chicken at a family picnic.
 - d. A foot wound from a 7-year-old male acquired while catching frogs in a freshwater stream.

ANSWER: a

(Level 2, Objective 1)

3. Alkaline peptone water is an ideal transportation medium for
- a. *Campylobacter jejuni*.
 - b. *Aeromonas hydrophila*.
 - c. *Vibrio cholerae*.
 - d. *Helicobacter pylori*.

ANSWER: c

(Level 1, Objective 1)

4. The pathogenesis of *Vibrio cholerae* is related to its ability to
- a. invade tissue and produce an exotoxin.
 - b. produce an ammonia cloud for protection.
 - c. invade the mucous membranes of the intestine.
 - d. produce a powerful enterotoxin.

ANSWER: d

(Level 1, Objective 2)

5. Which of the following environments or atmospheres is required for the isolation of a gram-negative rod that is a stool pathogen and oxidase positive, catalase positive, and able to hydrolyze hippurate?
- a. Halophilic
 - b. Capnophilic and microaerophilic
 - c. Facultative anaerobic
 - d. Ambient air

ANSWER: b

(Level 2, Objective 2)

6. Which of the following oxidase-positive, gram-negative rods can be differentiated from *Vibrio cholerae* based on its inability to grow on thiosulfate citrate bile salts agar?
- a. Non-lactose fermenter that is also K/A on TSI, arginine negative, and resistant to 10 µg O/129 but susceptible to 150 µg O/129
 - b. Lactose fermenter that is also A/A on TSI, arginine negative, and susceptible to both 10 µg and 150 µg O/129
 - c. Lactose fermenter that is also A/A on TSI, arginine positive, and resistant to both 10 µg and 150 µg O/129
 - d. Non-lactose fermenter that is also A/A on TSI, arginine negative, and susceptible to both 10 µg and 150 µg O/129

ANSWER: c

(Level 3, Objective 2)

7. Which of the following tests can be used to rapidly identify *Helicobacter pylori*?
- a. Oxidase
 - b. Spot indole

c. Catalase

d. Urease

ANSWER: d

(Level 1, Objective 2)

8. All of the following tests can be used to differentiate *Aeromonas hydrophila* and *Plesiomonas shigelloides* **except**

a. indole.

b. ornithine.

c. gelatinase.

d. DNase.

ANSWER: a

(Level 2, Objective 2)

9. *Aeromonas hydrophila*, *Plesiomonas shigelloides*, and *Chromobacterium violaceum* share all of the following characteristics **except**

a. transmitted by contact with freshwater.

b. indole production.

c. oxidase production.

d. arginine positive.

ANSWER: b

(Level 1, Objective 2)

10. Small comma-shaped, oxidase-positive, gram-negative rods that are susceptible to O/129 and string test positive is characteristic for an organism that

- a. is part of the normal gut flora of leeches.
- b. is able to grow at 42°C.
- c. causes the production of rice water stools.
- d. causes peptic ulcers.

ANSWER: c

(Level 2, Objective 2)

11. Which of the following *Vibrio* species does not require saline for growth?

- a. *V. alginolyticus*
- b. *V. vulnificus*
- c. *V. parahaemolyticus*

d. *V. cholerae*

ANSWER: d

(Level 1, Objective 2)

12. *Campylobacter jejuni* is unique in that it will grow, with the appropriate atmosphere, at

a. 4°C.

b. 35°C.

c. 42°C.

d. all of the above.

e. a and c.

ANSWER: d

(Level 1, Objective 2)

13. A gram-negative rod is isolated from the bronchial aspirate of an individual who inhaled a minnow while swimming at Lake of the Ozarks in central Missouri. The organism is oxidase positive. Which of the following organism identifications is **least likely** for this isolate?

a. *E. coli*

- b. *Aeromonas hydrophila*
- c. *Plesiomonas shigelloides*
- d. *Pseudomonas aeruginosa*

ANSWER: a

(Level 2, Objective 2)

14. A dark pigmented colony is isolated from the leg wound of a fisherman from Florida. The gram-negative rod grows on sheep blood and MacConkey agars. The organism provides the following reactions:

TSI: K/A	Indole: no color change	Lysine: no color change
1% NaCL: no growth	Arginine: purple	Ornithine: no color change
DNase: pink halo around the area of organism inoculum		

The microbiologist cannot read the oxidase reaction due to the dark pigment. What can he do to help achieve a valid oxidase reaction?

- a. Perform a modified oxidase test
- b. Grow the organism under anaerobic conditions and retest
- c. The oxidase test is not necessary for the identification of this organism

- d. Grow the organism on a non-nutrient agar and retest

ANSWER: b

(Level 3, Objective 3)

15. A 22-year-old male has recently adopted an Akita puppy that develops diarrhea soon after he takes it home. He soon develops bloody diarrhea and visits his physician. The doctor submits a stool for routine culture and ova and parasite examination. The O & P examination was negative. The routine culture reveals no *Salmonella*, *Shigella*, or verotoxin producing *E. coli*. On special medium, at a unique temperature and atmosphere, a slightly spreading, gray, flat colony is observed. A Gram stain of the colony provides gram-negative rods that appear “S” shaped. Which of the following tests can be used to screen and presumptively identify this stool pathogen?

- a. Catalase and oxidase
- b. Hippurate hydrolysis
- c. Indoxyl acetate
- d. All of the above

ANSWER: a

(Level 2, Objectives 3 and 4)

16. *Helicobacter pylori* is easily identified from a gastric biopsy based on which of the

following tests?

- a. Oxidase
- b. Gram stain
- c. Urease
- d. H₂S production

ANSWER: c

(Level 1, Objective 4)

17. A stool culture reveals an oxidase-positive, non-lactose fermenting colony. A suspension of the organism was made in sterile distilled water and used to inoculate a commercial identification strip that did not demonstrate any positive reactions after incubation. The microbiologist then set up traditional biochemical tube tests and the results were still negative. What is the next step in the identification process?
- a. Perform halotolerance testing
 - b. Reincubate the identification tubes in CO₂
 - c. Perform a string test
 - d. Perform serologic testing using O1 and O139 antisera

ANSWER: a

(Level 3, Objectives 3 and 4)

18. If you suspect an isolate to be *Vibrio* spp., which of the following tests would you be ***least*** likely use as part of the identification scheme due to its low sensitivity and specificity?

- a. O1 and O139 antisera
- b. O/129 susceptibility
- c. String test
- d. TCBS growth

ANSWER: c

(Level 2, Objective 5)

19. Each of the following tests can be used to monitor the effectiveness of therapy against *Helicobacter pylori* ***except***

- a. gastric biopsy.
- b. urea breath test.
- c. serology.
- d. b and c.

e. a and b.

ANSWER: c

(Level 1, Objectives. 5 and 6)

20. Which of the following individuals could potentially have the worst outcome if his or her described infection is due to *Vibrio vulnificus*?

- a. 47-year-old on vacation in Biloxi, MS. who develops gastroenteritis
- b. 58-year-old liver transplant recipient with septicemia
- c. 69-year-old alcoholic deep sea fisherman with an infected hand wound
- d. 21-year-old surfer with an infected leg wound

ANSWER: b

(Level 2, Objective 6)

Chapter 24 Anaerobic Bacteria

1. Which of the following body sites contains *Bacteroides fragilis* group, *Lactobacillus* spp., and *Bifidobacterium* spp. as part of the normal flora present?

- a. Skin

- b. Upper respiratory tract
- c. Gastrointestinal tract
- d. Genitourinary tract

ANSWER: c

(Level 1, Objective 1)

2. The presence of necrotic tissue provides anaerobes the opportunity to cause infection because
- a. the dead tissue provides needed nutrients for growth.
 - b. the loss of blood supply allows for a lower redox potential.
 - c. they are able to deplete the oxygen present.
 - d. antibiotics cannot reach the tissue adequately.

ANSWER: b

(Level 1, Objective 1)

3. Which of the following specimen types/body sites is considered unacceptable for anaerobic culture?
- a. Endometrial biopsy

- b. Transtracheal aspirate
- c. Decubitus ulcer after debridement
- d. Catheterized urine

ANSWER: d

(Level 1, Objective 2)

4. A 63-year-old male is hospitalized with fever, cough, shortness of breath, and weight loss. He is coughing up thick, foul-smelling, purulent sputum. Talking with him revealed that he consumes about a quart of alcohol per day and smokes two packs of cigarettes per day. He admits he often passes out after one of his many drinking binges. His chest x-ray shows an extensive right upper lobe infiltrate consistent with pneumonia. His laboratory results indicate:

Sputum culture

Macroscopic: grossly purulent and foul smelling

Microscopic: gram-negative rod pattern (many pale, pleomorphic, bipolar staining gram-negative rods and many pale, thin, fusiform gram-negative rods)

Culture: light growth of normal upper respiratory flora

Transtracheal aspirate culture

Macroscopic: grossly purulent and foul smelling

Microscopic: gram-negative rod pattern (many pale, pleomorphic, bipolar staining gram-negative rods and many pale, thin, fusiform gram-negative rods)

Culture: results pending

What clinical feature(s) suggests this individual has anaerobic pneumonia?

- a. Foul odor
- b. Unique morphologies on direct Gram stain
- c. Organisms grown on the sputum culture do not correlate with direct Gram stain
- d. All of the above
- e. B and C

ANSWER: d

(Level 2, Objective 2)

5. You are presenting an in-service to the nurses about the transportation of specimens for anaerobic culture. What is the most important point you want them to remember from your talk?
- a. Adequate volume of specimen

- b. Selection of specimens from only sterile body sites
- c. Use of proper specimen transport systems
- d. Swabs are acceptable but not ideal

ANSWER: c

(Level 2, Objective 2)

6. An organism that is unable to grow in ambient air, grows as tiny colonies in 5 to 10% oxygen and 10% CO₂, and grows under anaerobic environment is called a
- a. strict anaerobe.
 - b. microaerophilic organism.
 - c. microaerotolerant anaerobe.
 - d. facultative anaerobe.

ANSWER: b

(Level 2, Objective 3)

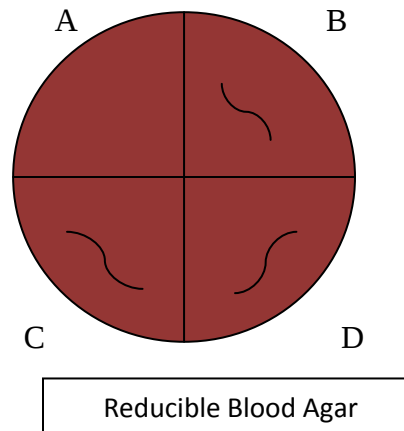
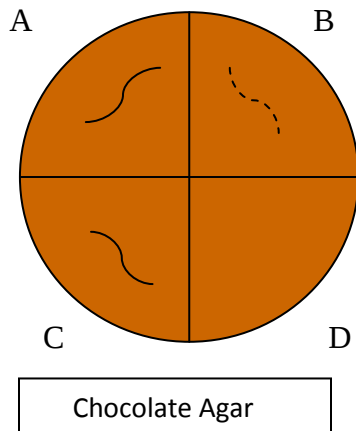
7. Which of the following statements is considered false in relation to the use of palladium catalysts?
- a. Metabolic by-products, such as H₂S, can render the catalysts ineffective.

- b. Catalysts can be rejuvenated by heating for two hours at 165°C.
- c. Catalysts must be rejuvenated after each use.
- d. There is no need for the use of a methylene blue strip.

ANSWER: d

(Level 2, Objective 3)

8. Using the aerotolerance testing plates provided, which of the following organisms suggests a strict anaerobe?



- a. A
- b. B
- c. C

d. D

ANSWER: d

(Level 3, Objective 3)

9. Which of the following organisms requires vitamin K and hemin for growth?

a. *Porphyromonas asaccharolyticus*

b. *Prevotella melaninogenica*

c. *Bacteroides thetaiotaomicron*

d. *Veillonella parvula*

ANSWER: b

(Level 1, Objective 4)

10. Given the following organisms, select all that will grow on laked-kanamycin-vancomycin (LKV) agar.

1. *Bacteroides vulgatus*

2. *Porphyromonas gingivalis*

3. *Fusobacterium nucleatum*

4. *Prevotella melaninogenica*

- a. 1 and 4
- b. 2 and 3
- c. 1, 3, and 4
- d. 1, 2, 3, and 4

ANSWER: a

(Level 2, Objective 4)

11. A peritoneal fluid displays heavy growth of a facultative anaerobic gram-negative rod and moderate growth of two colony types of anaerobic gram-negative rods. Workup of these organisms should include

- a. reporting as heavy growth of three morphologies of gram-negative rods.
- b. identification of the facultative gram-negative rod but not the two anaerobic gram-negative rods.
- c. identification of all three organisms.
- d. identification of the two anaerobic gram-negative rods but not the facultative gram-negative rod.

ANSWER: c

(Level 2, Objective 5)

12. Examination of anaerobic culture plates incubated in an anaerobic jar should first be done at

- a. 24 hours
- b. 48 hours
- c. 72 hours
- d. 5 days

ANSWER: b

(Level 1, Objective 5)

13. The catalase test for anaerobes is performed using a _____% solution of hydrogen peroxide due to its increased sensitivity.

- a. 3
- b. 10
- c. 15
- d. 30

ANSWER: c

(Level 1, Objective 6)

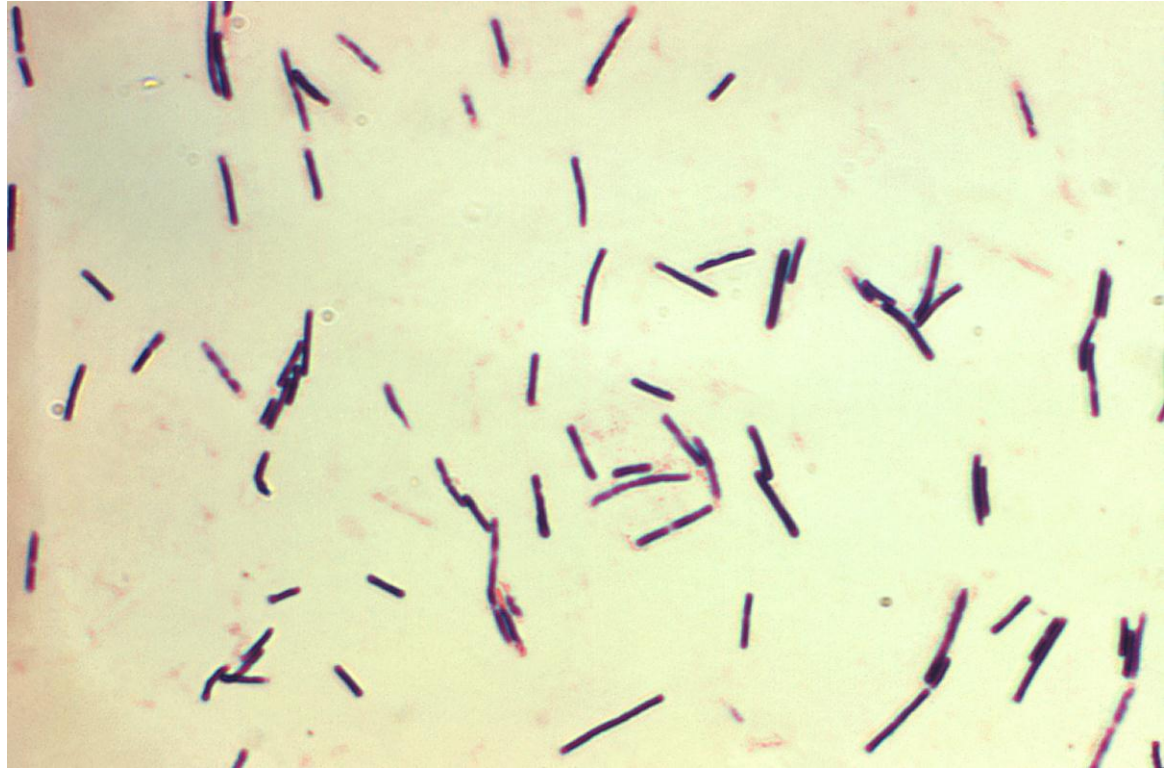
14. Which of the following identification tests demonstrates a rainbow sheen as a positive reaction?

- a. Lipase
- b. Lecithinase
- c. SPS
- d. Bile stimulation

ANSWER: a

(Level 1, Objective 6)

15. The culture of a deep puncture wound in a farmer's leg grew pinpoint gray colonies on sheep blood and medium colonies on reducible blood agars. The Gram stain, from the sheep blood agar, is illustrated here.



Source: CDC and Don Stalons

Given these results, you should

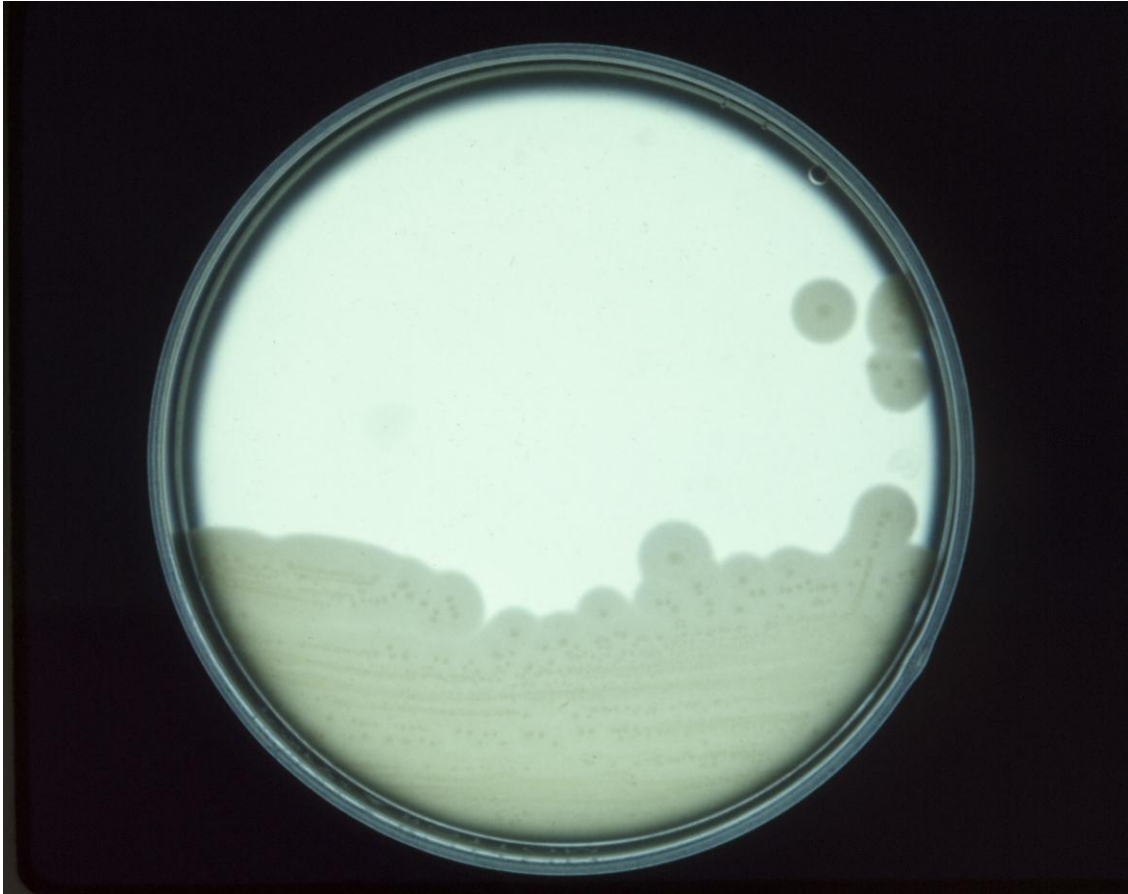
- a. perform a catalase test.
- b. examine colonies from both environments for the presence of spores.
- c. perform aerotolerance testing.
- d. both a and b.

ANSWER: c

(Level 2, Objectives 6 and 7)

16. An anaerobic, spore-forming, gram-positive rod is subbed to an egg yolk agar.

Given the result provided on the EYA image provided, what organism do you suspect?



Source: CDC

- a. *Bifidobacterium* spp.
- b. *Lactobacillus* spp.
- c. *Clostridium septicum*

d. *C. perfringens*

ANSWER: d

(Level 2, Objective 7)

17. The direct Gram stain of an anaerobic wound culture reveals gram-positive cocci in clusters. The aerobic agar plates show no growth, while a small white colony grows on the reducible blood agar plate. The organism provides the following reactions:

Vancomycin (5 µg): 15 mm Indole: no color change

Colistin (10 µg): 2 mm Nitrate: red after zinc

15% Catalase: no bubbles Esculin: negative

SPS disk: 3 mm

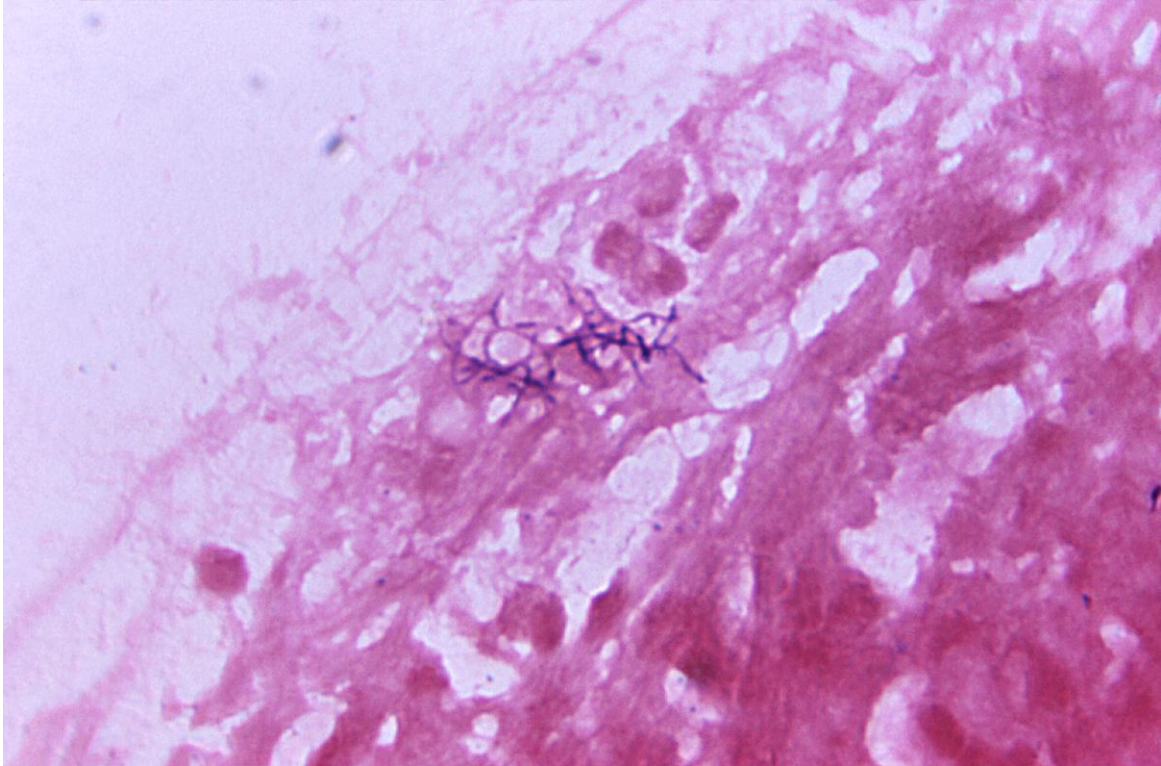
The organism is

- a. *Staphylococcus* spp.
- b. *Fingoldia magna*.
- c. *Peptostreptococcus anaerobius*.
- d. *Peptoniphilus asaccharolyticus*.

ANSWER: b

(Level 2, Objectives 6 and 7)

18. A pelvic mass is aspirated from a 27-year-old female. The direct Gram stain of the aspirate is provided.



Source: CDC

The microaerotolerant organism isolated should be

- a. vancomycin susceptible, catalase and indole negative, and nitrate positive.
- b. vancomycin susceptible, catalase, indole, and nitrate positive.
- c. vancomycin susceptible, catalase, indole, and nitrate negative.

d. vancomycin resistant, catalase, indole, and nitrate negative.

ANSWER: a

(Level 2, Objectives 6 and 7)

19. *Bacteroides* spp., *Fusobacterium* spp., *Prevotella* spp., and *Porphyromonas* spp.

share the ability to be resistant to

a. metronidazole.

b. ceftiofur.

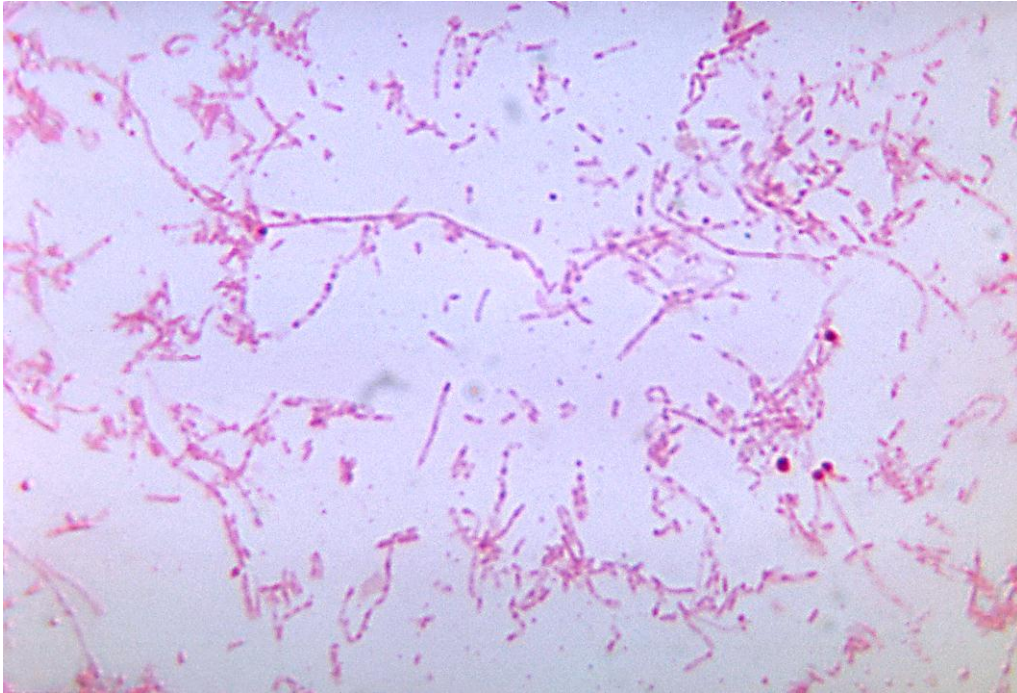
c. penicillin.

d. imipenem.

ANSWER: c

(Level 1, Objective 8)

20. A 17-year-old male presents with a deep and extensive tonsillar abscess. He shares with the physician that he has recently had a sore throat. A direct Gram stain reveals the image provided here.



Source: CDC and Dr. V. R. Dowell, Jr.

The anaerobic organism provides the following reactions:

Vancomycin (5 μ g): 0 mm

Indole: blue green

Kanamycin (1000 μ g): 20 mm

Bile: no growth

Colistin (10 μ g): 18 mm

Colony fluorescence: yellow green

Catalase: no bubbles

What additional test is needed to correctly identify this organism?

a. Esculin

b. Pigmentation

c. Lecithinase

d. Lipase

ANSWER: d

(Level 3, Objective 9)

21. A 79-year-old female is hospitalized with bacterial pneumonia. After seven days of intravenous antibiotics, she develops diarrhea. The physician submits a liquid stool specimen with orders for an aerobic and anaerobic culture. Upon receipt in the microbiology laboratory, your next step is to

a. reject the specimen.

b. contact the physician for an order for an EIA test.

c. plate the specimen to CCFA agar.

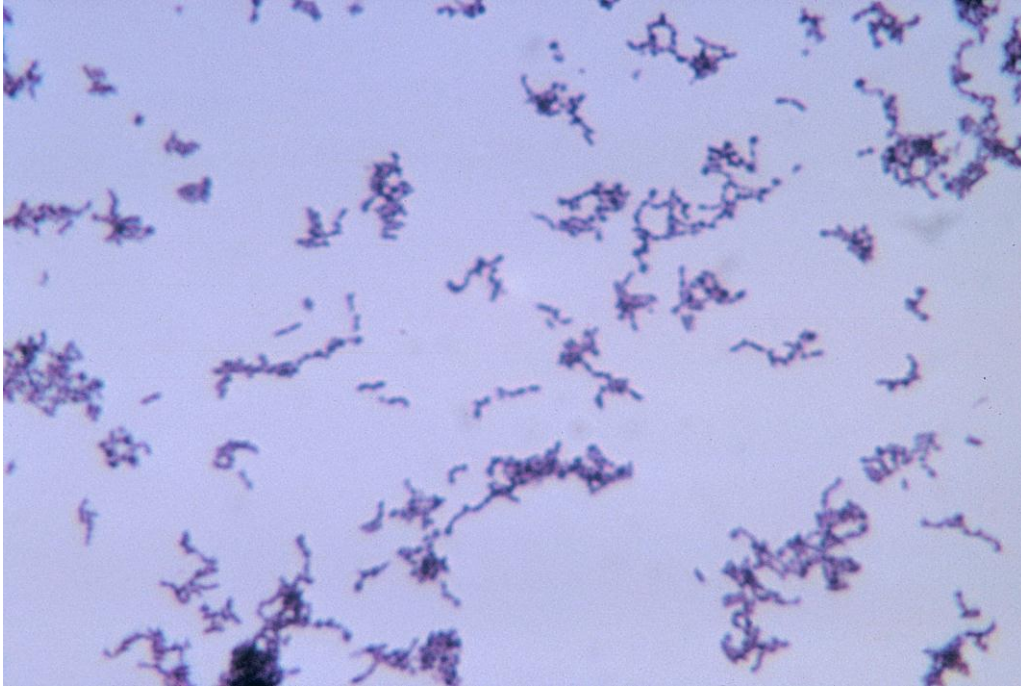
d. both b and c.

ANSWER: b

(Level 2, Objectives 2, 4, and 7)

22. A 59-year-old female, with fever of unknown origin, has three sets of blood culture bottles drawn within a 24-hour period. At 24 hours incubation, one anaerobic blood

culture bottle reveals the organism seen in the Gram stained image provided.



Source: CDC and Bobby Strong

The small, white, anaerobic colony that grows proves to be catalase, indole-positive, and resistant to SPS. This organism can be

1. presumptively identified as *Propionibacterium acnes*.
2. presumptively identified as *Peptostreptococcus anaerobius*.
3. considered a probable contaminant in this case.
4. considered clinically significant in this case.

a. 1 and 3

b. 1 and 4

c. 2 and 3

d. 2 and 4

ANSWER: a

(Level 3, Objective 9)

Chapter 25 Spirochetes

1. Which of the following spirochetes is associated with renal failure?

a. *Borrelia burgdorferi*

b. *B. recurrentis*

c. *Leptospira interrogans*

d. *Treponema pallidum* ssp. *pertenue*

ANSWER: c

(Level 1, Objective 1)

2. A 27-year-old male discovers a tick attached to his waist three days after he returns

from camping in the Rocky Mountains. He removes it and forgets about it until an

area of redness appears at the same site as the tick bite. Because he develops a fever, he decides to visit his physician. His infection is most likely caused by

- a. *Borrelia burgdorferi*.
- b. *B. recurrentis*.
- c. *Leptospira interrogans*.
- d. *Treponema pallidum* ssp. *pertenue*.

ANSWER: a

(Level 2, Objective 1)

3. Each of the following causes a nonvenereal skin disease **except**

- a. *Treponema pallidum* ssp. *pertenue*.
- b. *T. pallidum* ssp. *endemicum*.
- c. *T. pallidum* ssp. *pallidum*.
- d. *T. carateum*.

ANSWER: c

(Level 1, Objective 1)

4. *Leptospira* spp., *Borrelia* spp., and *Treponema* spp. share all of the following

characteristics **except**

- a. motility.
- b. possession of a sheath.
- c. corkscrew shape.
- d. ability to cause human disease.

ANSWER: b

(Level 1, Objective 2)

5. The spirochete *Leptospira* spp. differs morphologically from *Borrelia* and *Treponema* spp. by its

- a. hooked ends.
- b. sheath.
- c. growth in liquid medium.
- d. motility in a wet mount of peripheral blood.

ANSWER: a

(Level 1, Objective 2)

6. Which of the following cannot be cultured in-vitro?

- a. *Borrelia burgdorferi*
- b. *B. recurrentis*
- c. *Treponema carateum*
- d. *Leptospira interrogans*

ANSWER: c

(Level 1, Objective 2)

7. Which stage of syphilis demonstrates no clinical manifestations but is characterized by seroreactivity?

- a. Primary
- b. Secondary
- c. Latent
- d. Tertiary

ANSWER: c

(Level 1, Objective 3)

8. Nontreponemal tests can be used to diagnose all stages of syphilis **except**

- a. primary.

b. secondary.

c. latent.

d. tertiary.

ANSWER: d

(Level 1, Objective 3)

9. The appearance of erythema migrans in individuals who have infection with Lyme disease occurs

a. immediately after removal of the tick.

b. during stage 1.

c. during stage 2.

d. during stage 3.

ANSWER: b

(Level 1, Objective 3)

10. Serologic testing is a viable option for the diagnosis of infection with *Borrelia burgdorferi* for all disease stages **except**

a. Stage 1.

- b. Stage 2.
- c. Stage 3.
- d. when the individual exhibits CSF symptoms.

ANSWER: a

(Level 1, Objective 3)

11. A positive VDRL test

- a. indicates immunity against *Treponema pallidum* ssp. *pallidum*.
- b. indicates tertiary disease.
- c. must be confirmed with a nontreponemal test.
- d. must be confirmed with a treponemal test.

ANSWER: d

(Level 1, Objective 4)

12. An individual with Lyme disease can present with a false positive reaction with the _____ test.

- a. TPHA
- b. VDRL

c. RPR

d. darkfield microscopy

ANSWER: a

(Level 1, Objective 4)

13. A physician requests a darkfield examination for syphilis on an oral lesion of a 33-year-old male. The image provided demonstrates the results of the test.



Source: CDC and Schwartz

How should this darkfield examination be interpreted?

- a. Positive for *Treponema pallidum* ssp. *pallidum*
- b. Negative for *T. pallidum* ssp. *pallidum*
- c. Unable to interpret
- d. Positive for primary syphilis

ANSWER: c

(Level 3, Objectives 1, 2, 3, and 6)

14. A 33-year-old female, at 10 weeks gestation, tests positive using a nontreponemal test but negative when tested using a treponemal test. What could account for the difference in results?

- a. Previous therapy for syphilis
- b. Pregnancy
- c. Lyme disease
- d. Reinfection after treatment

ANSWER: b

(Level 2, Objective 4)

15. A 10-year-old male from Africa presents with skin lesions as seen in the image

provided.



Source: CDC and Dr. Peter Perine

The lesions demonstrate spirochetes on darkfield examination. The treponemal serologic tests are also positive. You suspect the infection is due to

- a. *Treponema pallidum* ssp. *pallidum*.
- b. *T. pallidum* ssp. *endemicum*.

c. *T. carateum*.

d. *T. pallidum* ssp. *pertenue*.

ANSWER: d

(Level 2, Objectives 4 and 5)

16. A 20-year-old male from South America, presents with blue-gray colored skin lesions on his legs. His hands show areas that lack pigmentation. His blood tests positive for both nontreponemal and treponemal tests. A darkfield examination image of one of the lesions is provided.



Source: CDC

What disease do you suspect in this individual?

- a. Endemic syphilis
- b. Pinta
- c. Yaws
- d. Venereal syphilis

ANSWER: b

(Level 2, Objectives 4 and 5)

17. Liquid Barbour-Stoenner-Kelly medium incubated at 30°C in the dark is used for culture of

a. *Leptospira interrogans*.

b. *Borrelia* spp.

c. Nonvenereal treponemes.

d. a and b.

e. b and c.

ANSWER: d

(Level 1, Objective 6)

18. Which of the following case histories best correlates with the presence of *Leptospira interrogans* in the urine?

a. A boy scout who played with field mice he caught while on a camping trip.

b. A hiker bitten by a tick on his last trip to the mountains.

c. A homeless female with poor personal hygiene.

- d. A park ranger who presents with an erythema migrans on her leg.

ANSWER: a

(Level 2, Objectives 1, 2, 3, and 6)

19. A 37-year-old veterinarian had to travel into the brush on her last farm visit to help deliver a calf. Once home, she discovered a tick attached to the back of her knee. She developed fever about two weeks after the incident. The fever broke after about four days but then returned. She visits her physician, and he orders blood cultures and a complete blood count where a hematologist notes the presence of spiral organisms on the fixed, stained blood smear.

In addition to observation of the organism, what other testing is recommended for determination of the causative agent?

- a. No other testing is necessary
- b. ELISA
- c. Culture in BSK medium
- d. Darkfield examination

ANSWER: b

(Level 1, Objectives 1, 2, 3, and 6)

20. A physician asks you if the microbiology department has Fletcher's medium in stock.

What organism does she suspect based on this request?

- a. *Borrelia burgdorferi*
- b. *B. recurrentis*
- c. *Leptospira interrogans*
- d. Nonvenereal *Treponema* spp.

ANSWER: c

(Level 1, Objectives 2 and 6)