



a place of mind

FACULTY OF EDUCATION

Department of
Curriculum and Pedagogy

Biology

Microbiology:

Bacteria II

Science and Mathematics
Education Research Group

Bacteria II



Bacteria II

Information regarding previous slide:

The image represents:

Yeast in Petri dish

Photograph Courtesy OF NYU Langone Medical Centre

For more information,

visit the **“Scientists Move Closer to Inventing Artificial Life”**

<http://news.nationalgeographic.com/news/2014/03/140327-functional-designer-chromosome-synthetic-biology/>

Question 1

Which of the following food is NOT prepared with the help of microbes (bacteria)?

- A. Chocolate.
- B. Rice pudding.
- C. Cheese and Yogurt.
- D. Bread and beer.
- E. Dried, fermented meat products.

Solution I

Answer: B

Justification:

Bacteria are used to make a wide range of food products. Some examples of food include:

- Dairy products such as yogurt and cheese (fermentation by bacteria).
- Dried and fermented meat products such as salami, pepperoni, chorizo and dried ham.
- Wine, beer and bread (fermentation).
- Health foods such as probiotic supplements.
- Chocolate (cacao seeds are fermented).

Solution I Continued

FYI...

The most important bacteria in food manufacturing are lactic bacteria.

A starter culture of bacteria is required to make dairy products such as yogurt, cheese and products. In recent years, probiotic cultures have become popular in dairy products because of their health benefits.

Meat starter cultures are used to make dried fermented meat products such as salami, pepperoni, chorizo and dried ham. The lactic bacteria produces the delicious taste of the dried meat through the process of fermentation.

Yeasts are responsible for the fermentation process which produces alcohol in wine.

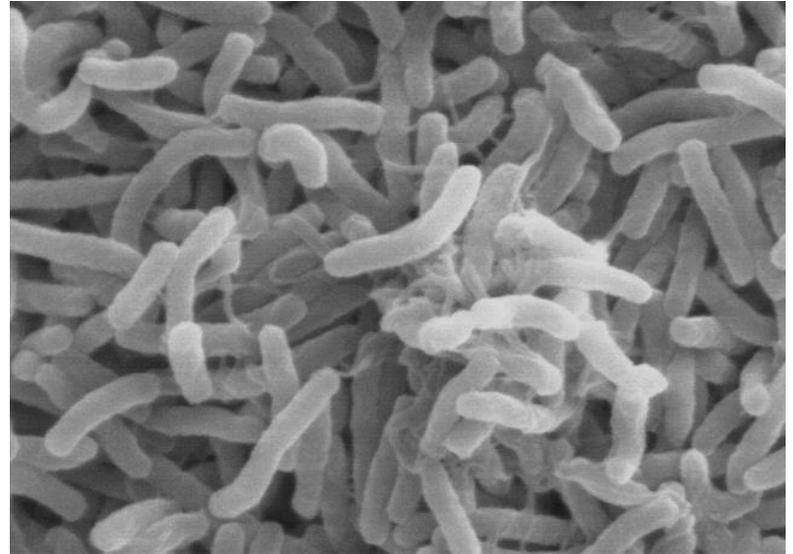
Lactic bacteria are used in many different tablets and capsules sold as supplements in the health food industry.

Lactic bacteria also help the process of cocoa fermentation.

Question II

Which of the following is an example of a disease caused by a bacterium?

- A. Measles.
- B. Chickenpox.
- C. Shingles.
- D. Cholera.
- E. Ebola.



Retrieved from <http://en.wikipedia.org>

Solution II

Answer: D

Justification:

Measles, chickenpox, shingles and Ebola are the infectious diseases caused by viruses. However, cholera is an infection of the small intestine caused by the bacterium *Vibrio Cholerae*.

The main symptoms are watery diarrhea and vomiting which result in dehydration and electrolyte imbalance, and death in some cases. Worldwide, it still affects 3 – 5 million people and causes 100,000 – 130,000 deaths a year. Cholera is typically transmitted to humans by either contaminated food or water.

More information: The story of cholera,
<https://www.youtube.com/watch?v=jG1VNSCsP5Q>

Question III

Penicillin is an antibiotic that inhibits enzymes from catalyzing the synthesis of peptidoglycan. It is one of the first drugs to be used effectively to treat many previously serious bacterial infections and is still widely used today. Which of the following prokaryotes should be most effectively inhibited by penicillin?

- A. Spore-bearing bacteria.
- B. Gram-negative bacteria.
- C. Gram-positive bacteria.
- D. Archaea.
- E. Endospores.

Solution III

Answer: C

Justification:

Penicillin is a β – lactam antibiotic and is used in the treatment of bacterial infections caused by susceptible, usually Gram-positive, organisms.

An endospore is reproductive structure which is produced by a small number of bacteria.

Archaea is a domain of single-celled microorganisms.

A spore-bearing bacteria is a type of bacteria which is capable of forming spores.

Gram-positive bacteria are bacteria that give a positive result in the Gram stain test.

Gram-negative bacteria are bacteria that give a negative result in the Gram stain test.

Solution III continued

More information:

β -lactam antibiotics (beta-lactam antibiotics) are a broad class of [antibiotics](#), consisting of all antibiotic agents that contain a [\$\beta\$ -lactam](#) ring in their molecular structures. β -lactam antibiotics are used in the treatment of [bacterial](#) infections caused by susceptible organisms. β -lactam antibiotics are mainly active only against [Gram-positive](#) bacteria

(Retrieved from Wikipedia - http://en.wikipedia.org/wiki/%CE%92-lactam_antibiotic)

FYI...

Penicillin

<http://www.sciencechannel.com/tv-shows/greatest-discoveries/videos/100-greatest-discoveries-shorts-penicillin/>

The discovery of Penicillin

<http://www.sciencechannel.com/tv-shows/greatest-discoveries/videos/100-greatest-discoveries-the-discovery-of-penicillin/>

Question IV

Which of the following is NOT a characteristic of antibiotic resistant bacteria?

- A. They cannot be controlled or killed by antibiotics.
- B. They are not able to multiply in the presence of an host.
- C. They are able to multiply in the presence of an antibiotic.
- D. They may become resistant to almost all of the easily available antibiotics.
- E. They have developed to resist antibiotics that were once commonly used to treat them.

Solution IV

Answer: B

Justification:

The characteristics of antibiotic resistance bacteria are

- The bacteria cannot be controlled or killed by antibiotics.
- The bacteria are able to multiply in the presence of an antibiotic.
- The bacteria may become resistant to almost all of the easily available antibiotics.
- The bacteria have developed to resist antibiotics that were once commonly used to treat them.

These bacteria ARE able to multiply in the presence of a host, therefore option B is the correct answer

Question V

One of the strains of *Escherichia coli* (*E. coli*), O157:H7, causes food poisoning, serious illness or death in the elderly, the very young, or the immunocompromised. However, some harmless strains of *E. coli* can be beneficial to humans. Which of the following is NOT a correct statement about the strains of *E. coli* found in the human body?

- A. They are Gram-negative bacteria.
- B. They are commonly found in the lower intestines of warm-blooded organisms.
- C. They benefit their hosts by producing vitamin K2.
- D. They benefit their hosts by producing nutrients.
- E. They can prevent colonization of the intestine by pathogenic bacteria.

Solution V

Answer: D

Justification:

Escherichia coli (E. coli) is a Gram negative bacteria which is commonly found in the lower intestine of warm-blooded organisms. Most E. coli strains are harmless, and benefit their hosts by producing vitamin K2 and preventing colonization of the intestine by pathogenic bacteria.

A few strains of E. coli (such as 0157:H7) can cause food poisoning or serious illness or death in the elderly, the very young, or the immunocompromised.

Answer D is incorrect. E. coli strains do not produce nutrients to aid their host, in fact they use nutrients that the host consumes in order to survive.

Extra information on Bacteria

Animal Planet:

Killer Outbreaks - E. Coli 0157

https://www.youtube.com/watch?v=3ps_Kw4EX7A

EasternVaMedSchool:

Nightmare Bacteria: The Discovery of Penicillin and the Emergence of MRSA

<https://www.youtube.com/watch?v=CO9hVr6t3nE>