

# Bad Bugs- The Microbe Menace

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## Part One- Pathogenic Bacteria

A comparison of beneficial and pathogenic bacteria

### An Internet Adventure in Microbiology

Problem: To determine the beneficial and harmful effects of bacteria

Activity: Today you will tour the Internet to collect information on the world of microorganisms. As you tour this microbe world, collect data to weight the harmful effects vs. the beneficial contributions of bacteria in our lives.

Part One. The pathogens

**Tour Stop One:** <http://www.bacteriamuseum.org/niches/pbacteria/pathogens.shtml>

Our tour begins at the Virtual Museum of Bacteria located at the Waksman Institute at Rutgers University.

How do bacteria make us ill? This is referred to as pathogenicity. Collect data at the museum and answer the following questions using critical thinking and synthesis.

What is pathogenicity?

What are virulence factors?

What is an epidemic?

You have heard that the museum has some information on the five " bad bugs". List the names of the microorganisms pictured in the gallery of bugs.

A.

B.

C.

D.

E.

5. After the fear of Anthrax attack in the fall of 2001, you want to know more about this disease. Select the picture, print, and paste it in the space below.

6. What is unusual about Cornybacterium diptheriae ?

7. What diseases are caused by *Clostridium tetani* and *Clostridium botulinum*?

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A. What shape are these bacteria?

B. Are they gram negative or gram positive?

**Tour Stop Two:**

The Black Death or plague decimated human populations during the Middle Ages in Europe. What is the plague and what organism caused this epidemic?

<http://www.bacteriamuseum.org/species/ypestis.shtml>

What " bug" causes the plague?

Outline the Life cycle of the "bug" that causes the plague.

You plan to travel to Africa to study endangered species. Do you need to be concerned about the plague?

**Tour Stop Three:** You are a resident of New Jersey. You live in the midst of the pinelands. It is impossible to walk in the woods, have a picnic, play soccer, or pick flowers without thinking about acquiring ticks on your body. You have read that ticks carry Lyme disease. Stop at the CDC in Atlanta, Georgia to learn more about tick borne diseases.

<http://www.cdc.gov/ncidod/dvbid/lyme>

Describe the characteristics of the organisms that cause Lyme disease.

Describe the vector of the disease.

How can you protect yourself from this vector-borne bug?

What other diseases do ticks carry?

**Tour Stop Four:** The Super "bugs"

You have read about bacterial resistance to infections. You wish to acquire some data on the bacteria that are resistant to antibiotics. Stop at

<http://www.cdc.gov/ncidod/dastlr/qcdir/gono.html>

What bug is pictured on the page?

What is antibiotic resistance?

How does antibiotic resistance develop? How is resistance passed from bacterium to bacterium?

What other information can you find at the CDC on the resistance to antibiotics in bacteria.

Time for Lunch. As you sit down, to eat your lunch you learn that "bugs" may be found in your food. "YUK!!!!!!!!!!!!!!!" Go to the Bad Bug Book.

The Food Bugs

<http://www2.ntu.ac.uk/life/sh/modules/hlf249/lectures%5C249-5.htm> - all about bad bugs  
[Gallery of microbes](#)

Make a list of "bugs" that can be found in your food. Check out the *Enterobacteriaceae*

Investigate two of the following in depth and record the information on your worksheet.

*E. coli*

*Salmonella species*

*Listeria*

*Shigella*  
*Campylobacter*

**Tour Stop Five:** After lunch the tour guide takes you to get a TB test. OUCH! Check the information on your TB test at the following site.

<http://www.cpmc.columbia.edu/tbcpp/>

Why is important to keep have a TB test ?