

# Evolution and antibiotic resistance

When people go to the doctor's office, they expect to be cured. They don't like to be told, "Go home, drink lots of fluids and rest, and you will get better." They want a more proactive approach. Often, doctors prescribe antibiotics just to make their patients happy, even if the antibiotics cannot treat the illness at hand. As a result, antibiotics become more prevalent, the microbes they attack are more likely to develop resistance, and over time the antibiotics become ineffective. Learn about why some diseases have become antibiotic-resistant and how you can help address the problem.

Procedures

## Part A: Misuse of Antibiotics

1. View "Why Does Evolution Matter Now?"

([http://www.pbs.org/wgbh/evolution/library/11/2/quicktime/e\\_s\\_6\\_56.html](http://www.pbs.org/wgbh/evolution/library/11/2/quicktime/e_s_6_56.html)) Travel inside a Russian prison to see the impact of evolution on the lives of the inmates and the surrounding community. This video describes the transmission of tuberculosis and the evolution of multiple drug-resistant strains of TB.

2. View the animated video segment "The Evolution of Antibiotic Resistance"

[http://www.pbs.org/wgbh/evolution/library/10/4/1\\_104\\_03.html](http://www.pbs.org/wgbh/evolution/library/10/4/1_104_03.html) (this is a silent video that illustrates what happens with antibiotics), explain how this animation illustrates the development of antibiotic resistant bacteria) or read and summarize the interview of Dr. Paul Ewald.

[http://www.pbs.org/wgbh/evolution/library/01/6/text\\_pop/1\\_016\\_06.html](http://www.pbs.org/wgbh/evolution/library/01/6/text_pop/1_016_06.html)

## Part B: Spreading the Word

1. You and your teammates will work together as health professionals and researchers.

2. Your team has been hired to develop a public relations campaign to help inform the general public about the threat of antibiotic resistance. You will gather information and produce an educational piece (pamphlet, brochure, PowerPoint presentation, poster board, or video commercial) to inform the general population.

3. The following Web sites might be helpful in your search.

- Center for Disease Control: <http://www.cdc.gov/drugresistance/index.html>

A Public Health Action Plan to Combat Antimicrobial Resistance -The introduction to this extensive action plan provides a good overview of the state of antibiotic resistance and some information about what federal agencies are doing to address the problem.

- Alliance for the Prudent Use of Antibiotics: <http://www.tufts.edu/med/apua/>

This nonprofit, international organization provides information for consumers about what antibiotics are and how the public can help limit the development of antibiotic resistance.

- The Rise of Antibiotic-Resistant Infection:

<http://www.fda.gov/drugs/resourcesforyou/consumers/ucm143568.htm>

<http://www.fda.gov/forconsumers/consumerupdates/ucm092810.htm>

These articles from the U.S. Food and Drug Administration's consumer newsletter describe the threats and mechanisms of antibiotic resistance.

- The Challenge of Antibiotic Resistance:

<http://mvc.bioweb.dcccd.edu/weblinks/0398levy.html#box2>

This feature article discusses strains of a staph infection that have emerged that are resistant to their accustomed antidote.

4. Your research team needs to process the information you collect and design an informational product for presentation to the class or distribution to a general audience. It should include:

- An explanation of antibiotic resistance;
- An explanation of how natural selection influences the effectiveness of antibiotics and the virulence of infectious agents;
- Information about how national and international agencies combat antibiotic resistance; and
- Tips for how the public can help combat increased antibiotic resistance.

## Rubric for Evolution Project

	Excellent	Successful	Acceptable	Attempted
Content Accuracy	Describes both the “how” and the “when.” 10 9 8	Describes either the “how” or the “when.” 7 6 5	Does not describe either the “how” or the “when.” 4 3 2	Does not address the issue described. 1 0
Content depth	Evolutionary concepts are well explained and documented 10 9 8	Evolutionary concepts are explained but lack documentation 7 6 5	Evolutionary concepts are mentioned. 4 3 2	Evolutionary concepts are not mentioned. 1 0
Make inferences	Uses direct evidence from multiple sources to substantiate claims. 10 9 8	Uses only one source of direct evidence. 7 6 5	Uses only inference. 4 3 2	Does not use either direct evidence or inference. 1 0
Suggest other evidence to look for.	Identifies missing evidence to support and to disprove the claims. 10 9 8	Identifies evidence that could disprove the claims. 7 6 5	Identifies missing evidence that could support the claim. 4 3 2	Does not suggest other evidence to look for. 1 0
Be neat, well organized and communicate effectively.	Is neat and well organized with information clearly and effectively communicated. 10 9 8	Is mostly neat and organized and most information is clearly presented. 7 6 5	Parts are neat and organized with some information clearly presented. 4 3 2	Is not neat or well organized and/or lacks information. 1 0

Total Rubric Score: \_\_\_\_\_

50–41 = Excellent

40–31 = Successful

30–21 = Acceptable

20–0 = Poor