

Thought Lab 4.1: Evolving “Superbugs” Answer Key

Answers to Analysis Questions

1. If a patient stops taking an antibiotic before the prescription is complete the patient may develop antibiotic resistance. The use (and misuse) of antibiotic drugs promotes the development of antibiotic-resistant bacteria. Resistance occurs when bacteria change on the genetic level, becoming resistant to the antibiotic.

Resistance reduces the effectiveness of antibiotics. Bacterial genes change when mutations occur or if a microbe acquires a gene from another individual. If this genetic change allows the organism to survive, it will reproduce and pass along the antibiotic-resistant gene, and quickly this gene will become dominant in the population. If a person does not finish a prescription, drug-resistant bacteria not killed in the first few days of treatment will proliferate.

2.
 - a) The overuse of antibiotics can cause bacteria to develop resistance not only in humans, but in agricultural animals as well. Bacteria are commonly spread from animals to humans. When these bacteria are antibiotic-resistant, the resistance can be passed to human pathogens, making the pathogen antibiotic-resistant. This causes problems for the treatment of the disease.
 - b) Agricultural practices introduce both plant and insect species to herbicides and insecticides respectively. Certain individuals within the populations of each species exposed to the chemicals will survive the applications. These individuals will now be the “most fit” and will pass on the heritable genotype that allowed them to survive through the applications. These genetic variations are also found on many bacteria as they are inadvertently being exposed to the chemicals used in antibiotics. As they develop resistance to these chemicals through exposure, this renders their ability to be used as possible antibiotic medicines useless.