**Antibiotic Resistance and Pesticide Resistance**

Part 1: Antibiotic resistant bacteria (bacteria that isn’t killed by certain medicines) come from natural selection and evolution.

Go to the website below and answer the questions below to learn more.

<http://outreach.mcb.harvard.edu/animations/resistance7.swf> or <http://goo.gl/8In3Ae>

1. What do antibiotics do?
2. Why are drug resistant bacteria bad?
3. How is TB spread?
4. How long does someone with TB have to take antibiotics?
5. What kind of infection can you get in a locker room or gym?
6. What are some more common illnesses that are becoming antibiotic resistant?
7. Why is it important to always finish all the drugs that your doctor prescribes to you?

Part 2: Pesticide Resistance (insects/ pests that aren’t killed by certain chemicals come from natural selection and then evolution.

Go to the website blow and answer the questions to learn more.

<http://www.pbs.org/wgbh/evolution/library/10/1/l_101_02.html>

1. How are the “super rats” different than regular rats?

2. What are pests developing to protect them from poisons from humans?

3. What rule of evolution are the pests following?

4. How are humans hastening (speeding up) the problem?

5. What are farmers trying to do to outsmart the pests?

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What is Resistance to Antibiotics?

In this task, you are challenged to understand exactly what is going on in a bacterial population that is now resistant to an antibiotic to which it had previously been susceptible. Work through the following questions.

1) You are infected with a bacterial disease. Your sister had this same illness last week, and took a full cycle of antibiotics. She quickly became better. You started taking the same antibiotic, but they had no effect. In fact, you had to return to the doctor after a week, because you did not feel better. What has happened? Why did you remain sick after taking antibiotics, while your sister quickly recovered? There are three possible hypotheses:

A) you developed a tolerance for the antibiotic (i.e. you experienced a non-genetic change that made you less sensitive to the effects of the antibiotic).

B) the bacteria infecting you developed a tolerance for the antibiotic (i.e. individual bacteria experienced a non-genetic change that made them less sensitive to the effects of the antibiotic).

C) the bacteria infecting you evolved to be resistant to the antibiotic (i.e. a genetic mutation for resistance occurred in a bacterial cell, it had a reproductive advantage and increased in the population).

a) Which hypothesis (A, B, or C) do you think is most likely? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) Explain why you chose this one.

2) When you first visited your doctor, she told you that she is conducting research on antibiotics, and asked you to be a part of the study. You agree. As part of the study, you go to the doctor every day and let her take a new sample from your infection, which she then conducts tests on. She discovered that on the first day, your bacteria were susceptible to the antibiotic (i.e. the bacteria were killed by the antibiotic). She then prescribed the antibiotic to you, which you immediately began taking. Later in the week, the bacteria from your infection were found to be resistant to the antibiotic (i.e. the bacteria were not killed by the antibiotic).

a) This result rules out which of the three hypotheses (A, B, or C)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) Why does this result rule out this particular hypothesis?

3) Another result from the study is that initially, all the bacteria were susceptible to the antibiotic, but by the third day, some of the bacteria were resistant to the antibiotic. With each passing day, more of the bacteria were resistant, until finally all of the bacteria were resistant.

a) Does this result support either (or both) of the remaining hypotheses? \_\_\_\_\_\_\_\_

b) Does it allow you to rule out either of them? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

c) Explain your answers to a) and b).

What is Pesticide Resistance?

Use a Chromebook to search for the answers to these questions.

1. What does pesticide resistance mean?

2. How has pesticide resistance developed?

3. How are humans trying to stop pesticide resistance?