Rutherford County Schools – Individual Learning Modules

Grade	Course
High School	Biology I

Unit Focus

Biological Change and Diversity (LS4)

Week of 5/11 – 5/15

Standard(s)

BIOI.LS4.1 – Evaluate scientific data collected from analysis of molecular sequences, fossil records, biogeography, and embryology. Identify chronological patterns of change and communicate that biological evolution is supported by multiple lines of empirical evidence that identify similarities inherited from a common ancestor (homologies).
BIOI.LS4.2 – Using a model that demonstrates the change in allele frequencies resulting in evolution of a population over many generations, identify causative agents of change.
BIOI.LS4.3 – Identify ecosystem services and assess the role of biodiversity in support of these services. Analyze the role human activities have on disruption of these services.

Resources

Evolution/Natural Selection

- (digital) - BioInteractive/ HHMI - Evolution**:** https://www.biointeractive.org/classroom-resources?f%5B0%5D=grade_levels%3A98&f%5B1%5D=topics%3A59&f%5B2%5D=topics%3A61
- (digital) – Evolution Lab/PBS: https://www.pbslearningmedia.org/resource/nvev-sci-mission1/nova-evolution-lab-interactive-lesson-mission-1/

Classification

- *(textbook) Build a Cladogram: Pearson. 634-635
- *(textbook) A Visual Guide to the Diversity of Life: Pearson. Appendix (directly following pg. 676)

Biodiversity

- (digital) – BioInteractive/ HHMI – Biodiversity**:** https://www.biointeractive.org/classroom-resources?keyword=biodiversity
- *(digital) –Khan Academy - Protecting Biodiversity: Local and Global Policies: https://www.khanacademy.org/science/high-school-biology/hs-ecology/hs-human-impact-on-ecosystems/v/protecting-biodiversity-local-and-global-policies
- *(digital/text) – National Climate Assessment (4th edition). Chapter 7: Ecosystems, Ecosystem Services, and Biodiversity: https://nca2018.globalchange.gov/chapter/7/

Overall

- SharePoint Folder from Bootcamp (ideas, video suggestions, additional resources): https://rcschools.sharepoint.com/sites/bio/EOC%20Bootcamp/Forms/AllItems.aspx

*** New resource to list**

Task/ Assignment

Scenario 1: Just a Spider Bite?

Modified from:
Just a Spider Bite? Antimicrobial Resistance and Susceptibility by Wayne O. Hatch Department of Biology Utah State University Eastern, Price, UT

On the first day back to class at the local university, Brent noticed a small abscess on his right elbow but didn't think much about it. Over the next couple days, however, the abscess became more swollen and painful. "Gross, this sore is looking nasty, and it hurts too," thought Brent. Brent decided to visit the school's health center to get it checked out, and hopefully get rid of it. "It looks like a nasty spider bite, but I can't recall getting any bites and haven't seen any spiders at home," he told the doctor. "I do see lots of cases of spider bites," replied the doctor. "I'm just going to take a swab of this lesion to check it out. Here's a prescription for an antibiotic cream. It looks infected. The cream should take care of that."

Another student, Kristen, had to have "routine" surgery on her right knee because of previous sports injuries. Everything about the surgery seemed to go smoothly, but just one week after the surgery Kristen wasn't feeling well. "I have a fever and my knee hurts," Kristen told her mom on the phone. "And it's all red around the incision." "Why don't we get you back to your doctor to ask him about it," Kristen's mom replied. After visiting the doctor, Kristen was frustrated. "Why can't they be more careful? I could die with this infection because they didn't clean their equipment," she told her mother. "Well the antibiotics should take care of it, and they should identify what the infection is soon," Kristen's mother responded.

Both Brent and Kristen were prescribed the drug oxacillin. Within a few days Brent's lesion was gone, but Kristen's symptoms didn't improve. She continued to have a high fever with increased lethargy; the antibiotics apparently weren't working for Kristen.

Questions

1. Record similarities and differences between the two patients.
2. What ideas do you have as to why the antibiotic did not work for Kristen?
3. What, if any, diagnoses could you make for Brent and Kristen?

Scenario 2: When Weeds Fight Back!

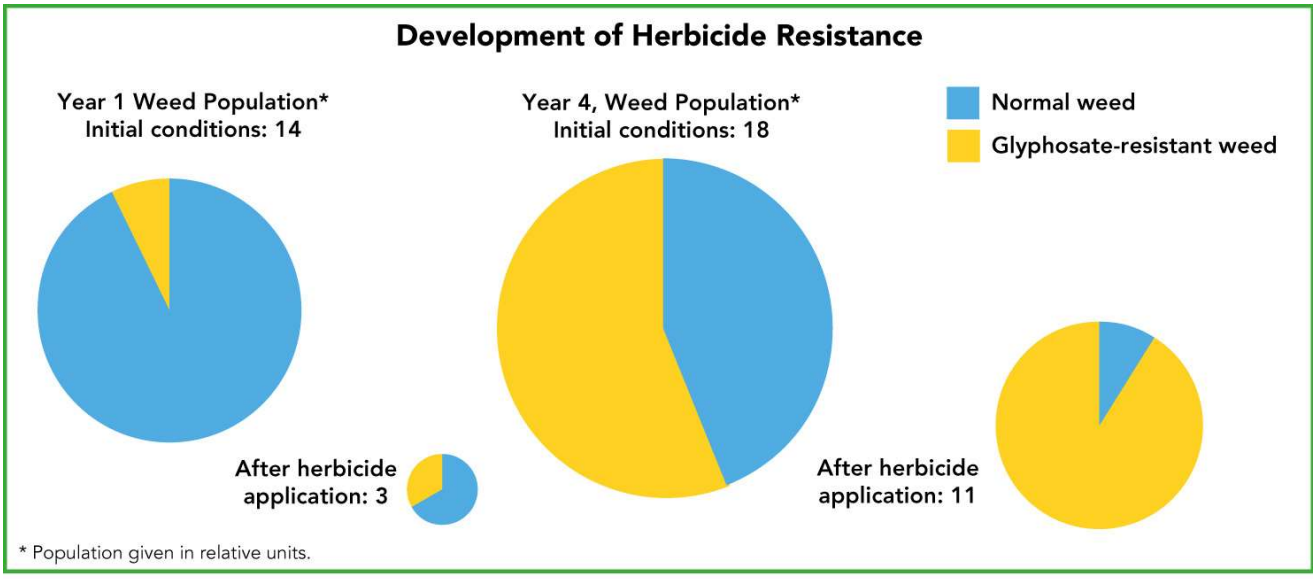
(Source: Tennessee Biology, Miller & Levine, Pearson, pg. 604-605)

For cotton farmers, a green tassel-like weed called Palmer amaranth is bad news. This invasive weed, native to the southwest, spread across the Midwest and into the southeast. Each female plant can produce up to 600,000 seeds, which germinates throughout the season. It completes with cotton for space, light, soil, water, and nutrients.

During the 1970s, cotton farmers began using a weed-killing chemical called glyphosate, which is sold for both the commercial and consumer market. It worked temporarily to keep weed growth down, and to slow the invasive weed's spread. It wasn't a perfect solution, as weed-killing chemicals can have negative effects on the environment, and on human health. But even that imperfect solution didn't last.

In 2004, a farmer in Georgia reported glyphosate resistant weeds. That resistance spread rapidly. By 2011, weeds were decreasing cotton yields by 50 percent. Today, farmers must use a variety of herbicides. Still Palmer amaranth remains a nuisance.

The series of circle graphs describe a model of a weed population that evolves resistance to an herbicide. The width of each circle shows the relative size of the weed population, and the colors show the percentages of normal and herbicide-resistant weeds. Study the graphs, and then apply your knowledge of evolution by natural selection to answer these questions.



Based on information from Grains Research & Development Corporation

Final Product(s): What will you answer? What will you create? What will you communicate?

1. What do the circle graphs show about the effect of herbicide on the weed population in the model?

2. Consider this explanation of natural selection:

   When a heritable trait provides some individuals in a population with higher fitness under specific conditions, organisms with that trait tend to become more common.

   Support this explanation using the data shown in the circle graphs, and by applying concepts of statistics and probability.

3. One company has recently been given approval to produce genetically modified varieties of cotton and soybeans that are resistant to the weeds. Research these new weed-resistant varieties. What are the pros and cons of the commercial use of these genetically modified crops?

4. Prepare a poster, a written report, or a computer presentation to communicate your findings.