

## Pathogen Modeling in the Ecology Classroom

### Contact Information

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### Abstract

Lectures adapted from ICORE lectures will be used to introduce content in module. Students will be provided with examples of major pathogen groups and their effects in populations. Following the lecture each module will include a hands-on activity for students to model a characteristic of pathogens. The unit will end with a viewing of the movie Contagion and a discussion of the relationship of the movie to what the students have learned about pathogens during the module.

### Rationale

Students learn more effectively when they realize that understanding of the lecture material is critical to explaining phenomenon during hands-on activities such as laboratories. Therefore by creating each module as a hands-on activity followed by a lecture I ensure that the majority of students will be engaged in the lesson. Pathogen activity is an important ecological concept, which ties into many other units in our curriculum. The most meaningful connection is the notion that pathogens and their hosts coevolve in order to ensure successful reproduction in both groups.

### Description

The primary standards I will be addressing include:

[SC.912.L.15.13](#) Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.

- Explain the process of evolution by natural selection.
- Explain the concept of adaptation.
- Describe the steps by which a population becomes resistant to a pesticide.

[SC.912.L.15.3](#) Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.

- Name the six kingdoms of organisms and identify characteristics of each.

[SC.912.L.17.6](#) Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.

Students are expected to be able to:

- Explain how pathogens and their hosts have coevolved
- Define specific examples of pathogens in the major kingdoms

### Day One

Pretest

Adaptation of Dr. Monroe's bark beetle activity for rabbit survivorship in Australia  
Gizmo for bacterial immunity to antibiotics.

### Day Two

Introduction to evolution via natural selection using adapted PowerPoint lectures of Dr. Morris & Dr. McFadden.

### Day Three

PowerPoint lecture developed in 2011-2012 school year to address biological diversity and the six kingdoms. Add on introduction to emerging pathogens found within these kingdoms. Particular attention will be paid to the debate on viruses' status as living things, and students will engage in a partnered pro-con sharing activity centered on this theme.

### Day Four

Brief discussion of decreasing habitats and human exposure to new pathogens based on Dr. Pulliam's PowerPoint. Presentation of 2011-2012 PowerPoint lecture on relationships between organisms. Use of Glo Germ and UV lights to demonstrate how easily pathogens may spread through normal contact.

### Day Five

Introduction to Contagion Movie adapted from Dr. Pulliam's PowerPoint. Begin Contagion movie with distribution of Contagion worksheets.

### Day Six

Discuss progress of Contagion movie, continue movie.

### Day Seven

Discuss progress of Contagion movie, continue movie.

### Day Eight

Discuss Contagion movie and worksheet. Communicate careers seen during this unit. Students will be presented with an adaptation of the viral quest/mission biotech careers lesson that highlights the careers presented in the movie.

Posttest

### **Data Collection**

Data will be collected during classroom discussions using teacher journaling and pre-post test.

### **UF Connections**

PowerPoints:

Viruses and the Immune System: Who is the Pupil and Who is the Teacher? (Dr. Grant McFadden)

The Age of Pandemics (Dr. J. Glenn Morris)

Origins and spread of emerging viruses or, The science behind *Contagion* (Dr. Juliet Pulliam)

Contagion worksheet/lesson

Bark Beetle activity

The viral quest/mission biotech careers lesson

### **Budget and Budget Justification**

The following equipment will be needed for the ELISA simulation in the classroom.

8 portable UV lights \$73.83 <http://blacklight.com/items/CODE10>

4 oz container of Glo Germ \$24.20 [http://www.amazon.com/Glo-Germ-Powder-4-ounce/dp/B0006ZH45I/ref=sr\\_1\\_4?ie=UTF8&qid=1345598259&sr=8-4&keywords=glow+in+the+dark+powder](http://www.amazon.com/Glo-Germ-Powder-4-ounce/dp/B0006ZH45I/ref=sr_1_4?ie=UTF8&qid=1345598259&sr=8-4&keywords=glow+in+the+dark+powder)

### **Literature Cited**

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Boker, J. (2012). Medical Mystery of Epidemic Proportions!. Gainesville, University of Florida.

Darwiche, H. (2012). Dot Blot Laboratory Protocol. Gainesville, University of Florida.

McFadden, G. (2012). Viruses and The Immune System: Who is the Pupil and Who is the Teacher?. . PowerPoint Presentation presented at ICORE. Gainesville, University of Florida.

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Pulliam, J. (2012). The Science behind Contagion. PowerPoint Presentation presented at ICORE. Gainesville, University of Florida.

Soderbergh, S. (2012). Contagion. Warner Brothers Studios.