

## *DEATH THREAT*

### Correspondence:

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### Abstract:

Death Threat is an emerging concept into today's society due to the War in Iraq. How close are we to the threat of death and can it affect us in a small community? Students need to be aware of what is happening in the world and how these problems can affect their way of life. One way to achieve this is to provide the students with a bioterrorism event and have them make adjustments to their way of life. Students will be exposed to the different agents and will need to determine which infectious agent is responsible for the sickness in their community. They will need to accomplish this before their family or themselves die.

### Mission Statement:

To provide students with an understanding of the effects of a bioterrorism event.

### Description of teaching unit:

Students will become disease detectives to solve the mystery of why people are dying from an unknown pathogen. Students will be given a basic introduction on "what are diseases" and how they are transmitted through lectures and hands-on experiences. An understanding of how epidemiologists determine what is causing the epidemic and how to control the epidemic will be gained through lectures, notes, and experiences.

Based on a given scenario of a bioterrorism outbreak, students will be divided into groups of three to explore and solve the mystery of the epidemic. Each individual in the group will work together by testing samples (simulate samples) from different victims to determine the infectious agent. Testing will involve an ELISA and DNA electrophoresis.

Students will research bioterrorism agents and dispersal methods. From the experiments and research, a conclusion will be determined regarding the outbreak of the epidemic.

### Expected outcomes:

Students will explain how the epidemic spread from person to person, what can be done to control the epidemic, and how to prevent it in the future.

### Extensions on Unit:

Discussions on other outbreaks and vectors for transmission such as the following: Avian Flu, West Nile Virus, And Citrus Greening.

### Literature used to develop lesson plans:

[www.cdc.gov](http://www.cdc.gov); [www.outbreak.org](http://www.outbreak.org); HHMI Handout on Emerging Pathogens; Biology the Dynamics of Life.

Expertise:

2008 Attended ICORE (Interdisciplinary Center for Research / Education) Emerging Pathogens Program at University of Florida

Biology Teacher Certification

2007 Attended Mini Medical Conference on Genetics at University of Florida

2006 Attended Mini Medical Conference on Emerging Pathogens at University of Florida

Developed, organized, and incorporated a Forensic Science Curriculum at Keystone Heights High School

2000-2005 Employed as a forensic scientist at Florida Department of Law Enforcement where PCR techniques, RFLP techniques, and capillary electrophoresis were utilized

Trained new employees at Florida Department of Law Enforcement on PCR techniques and capillary electrophoresis

Biology degree from Jacksonville University

Budget:

Elisa Reactions Kit	\$97.90
Detection of a simulated Infectious Agent as a Biological Weapon Kit	\$82.10
Size Determination of DNA Restriction Fragments Kit	\$65.95
Joy on the students face when they save the community	priceless

Outreach:

I would like to expand on the lesson by having my students extract DNA from a substance and use different methods to sequence the DNA. To do this, I need DNA extraction kits, reagents, and buffers. I want to do a Southern Blot and need to purchase the materials for this technique. I need to purchase micropipettes, microcentrifuge tubes, and racks to hold the tubes. I intend to seek more funding opportunities.

Lesson Plans  
Amye D. Goff  
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Title: Death Threat  
Forensic Science  
Grade Level: 10<sup>th</sup> to 12<sup>th</sup> grade

State Standards:

SCF 2.4.3 understand mechanism of change

SCG 1.4.1 Know the great diversity and interdependence of living things

SCH 3.4.3 Know that scientists can bring insight to matters of public concern and help people understand the possible causes and effects of events.

SCH 3.4.6 Know that scientific knowledge is used by those who engage in technology to solve practical problems.

Objectives: Students will be able to .....

Explain the differences between viruses and bacteria

Describe the relationship between the environment, host, and agent

List the steps epidemiologist use to control an outbreak in a community

Name and explain pathogens used as biological weapons

Materials: resource information on different biological agents, computer with internet access, pen, pencil, paper, electrophoresis equipment, gels, buffers, NaOH, water, cups or beakers, transfer pipettes, bioterrorism video, Elisa Reactions Kit, Detection of a simulated Infectious Agent as a Biological Weapon Kit, Size Determination of DNA Restriction Fragments Kit, phenolphthalein

Time Estimate: 10 to 15 days

Procedure:

1. Lesson will begin with a pre-test to determine previous knowledge of the students.
2. Lecture and notes on differences between viruses and bacteria. Students will draw and label the different shapes of a bacterium and a virus.
3. Lecture and notes on what are diseases and methods of disease transmission to include body fluid exchange, exposure to contaminated surfaces or through the air.
4. Activity: Simulation transmission lab. Students will obtain a beaker with either NaOH or Water. (NaOH means infected with virus). Students will exchange body fluids (i.e. the contents of beaker) with one another by pouring content of their beaker into another person's beaker and then separating into two equal amounts. Students may share fluids with each other as many times as possible or not at all. They should keep track of who they exchanged with and when. After completion of body fluid exchange, a small amount of phenolphthalein is added to each beaker. The presence of a pink color indicates the presence of NaOH which indicates student is infected.
5. Discussion questions on presence of infection, exchanging of body fluids, prevention of disease, why do infections spread, and how fast do infections spread.

6. Lecture and notes on outbreaks and the function of epidemiologists. Students will be given different scenarios regarding an outbreak where they must determine the agent, host and environment.
7. Video on Bioterrorism and questions to answer based on the video contents.
8. Lecture and Notes on bioterrorism events, CDC assistance and control of the event.
9. Students given basic scenario:

Within the past 48 hours, 75 people from Keystone Heights High School have become deathly ill with fever, chills, diarrhea, rashes, and vomiting. Of these 75 people, 15 have died. We believe the link to the source is Dr. Susan Sailor, principal of Keystone Heights High School.

At 0800 hours, two days ago, Dr. Sailor opened a suspicious package outside of the main office. Within hours of making contact with the package, she arrived at the doctor's office with chills and unexplained vomiting. She was transported to the hospital where she is stabilized in the ICU.

Keystone Heights High School is under Quarantine until the cause is known. Today as disease detectives, our job is to determine the pathogen that caused this epidemic.

Students are divided into teams of three. The first team assignment is to discuss quarantine and what would they miss from their lives outside of school and classroom. A list from this assignment should be generated to indicate how they feel regarding quarantine.

10. Student teams are to research 8 different bioterrorism agents and write a short explanation based on their findings.
11. An Elisa lab will be performed to determine if victims have an antibody/antigen reaction to 8 different bioterrorism agents.
12. A DNA electrophoresis will be ran on victims samples (hopefully at UF lab)
13. Students will utilize the detection of a biological weapon simulation lab kit to identify which bioterrorism agent caused the event.
14. Student teams will write a formal report based on their findings.

Assessments:

Formal report based on lab results

Test on bioterrorism and infectious diseases.

Resources: [www.cdc.gov](http://www.cdc.gov); [www.outbreak.org](http://www.outbreak.org); HHMI Handout on Emerging Pathogens; Biology the Dynamics of Life.