Emerging Infectious Diseases: Biology, Historical Significance and Public Policy

Interim Report

December 8, 2006

Name of Person(s) Submitting Report: Paula B. Lessem, Ph.D., Maren B. Reiner, M.S.
E-mail: plessem@richmond.edu; mreiner@richmond.edu
Phone: Lessem – 804.287.6691 Reiner – 804.289.8954
Institution: University of Richmond
Title of Project: Emerging Infectious Diseases: Biology, Historical Significance and Public Policy
Date(s) of Project: Course offered Fall term 2006, Spring term 2007 & May term 2007
Amount Awarded: $7800.00

Original Goals and Objectives: Emerging infectious diseases will be used to teach biological concepts needed to understand how microbes cause disease. The intention of this course is to expose students to the clear and present danger posed by these infectious agents, in order for them to understand the impact these microbes can have on the world community. Additionally, they will learn the difficulties inherent in constructing and implementing a comprehensive and successful public policy response. The possibility of an outbreak, whether it occurs naturally or as biowar event, is real; therefore, it is critical for undergraduates to be able to evaluate and understand the ramifications of such an event. A further goal is to pique their interest sufficiently that they will continue to read relevant stories and investigate future outbreaks.

Activities underway and/or completed to date: This course was offered Fall term 2006 and enrolled 68 students representing all four years of undergraduates. The pre-test assessment was done during the first week with an average performance of 25 % correct.

- Ancillary materials used for this course:
  "The Power of Plagues" by Irwin W. Sherman
  "The Cobra Event" by Richard Preston
- Lecture topics included –
  - Epidemiology
  - Basic bacterial physiology
  - Basic viral physiology
  - Immunology
  - Malaria

- Cholera, syphilis, tuberculosis, leprosy, the plague
- HIV, smallpox, influenza

- Laboratory Investigations included –
  - Use of micropipettors and dilutions
  - Spontaneous mutation detected by the generation of nalidixic acid *E. coli*
  - Determination of the Minimal Inhibitory Concentration (MIC) of a lab strain of *Staphylococcus aureus* to macrolides (tylosin, erythromycin, azithromycin and roxithromycin.)
  - Induction with sub-MIC levels of tylosin to investigate the possibility of generating greater resistance and cross resistance to other macrolides
  - Agarose gel electrophoresis to differentiate between monkeypox and smallpox (Edvotek simulation)
  - Exchange of fluids (simulation) to demonstrate the spread of HIV
  - Enzyme Linked Immunosorbent Assay to investigate vaccine preparedness (simulation)
- Simulated and/or computer based activities
  - Maps & Microbes – an epidemiological exercise
  - Tracking the source of HIV
  - Antibiotic sensitivity patterns of multiple strains of *Mycobacterium tuberculosis* to 5 antibiotics
  - Determination of the active site of these 5 antibiotics in the life cycle of *Mycobacterium tuberculosis*
  - Making tough decisions: students will examine epidemiological data from AIDS, measles and vancomycin resistant *Staphylococcus aureus* and then determine which disease program they want to fund.
- Classroom student-generated presentations: samples of topics included:
  - Bioterror
  - *E. coli*: spinach
  - Eugenics
  - Tuskegee study
  - Legionnaires' disease
  - HIV policy in Cuba
- Assessment: We did a pre-course evaluation with a multiple choice test and the students got 25% correct. The post-test will be given with the final exam (18 & 19 December).

Any snags or unanticipated delays encountered: Our only problem was that we are not able to cover the breadth of material we selected. This, however, is not a negative outcome. Due to student interest and probing questions, we had to slow down the

dissemination of material to facilitate discussion. Those classes, with extended discussions, were very informative and enjoyable to us and to the students. So, as we plan for next semester, we are leaving room for extended class discussions.

Financial Accounting:

Micropipettors:	$4226.57
Summer Salary	$1500.00
Gel boxes	$ 513.40
Power Supply	$ 212.90
TOTAL	$6452.87

Remainder of grant funds, $1347.13 will be used for travel to meetings.

Other Information:

- During the last week of class, we will have a speaker from the Virginia Health Department speaking on the development of new vaccines. Several students will be joining the speaker (and the instructors) for lunch after the talk.
- Three women in the class are developing an independent study project to investigate HIV in the Hispanic community in Richmond, VA. They have recruited a biology student to assist them. we will be working with them as they develop the questions and experiences they want. We are working with the Center for Civic Engagement on the UR campus.
- We have received numerous topically appropriate articles, emails, and links from the students in this course.
- Registration for the spring semester resulted in this class filling quickly with predominantly juniors and seniors. We are filled (64) and will present this material in two lecture sessions and four laboratory classes.
- For the spring semester we are revising the order of topics presented, adding two wet laboratory experiments, requiring an additional reading assignment where the students will have their choice of two books ("Mountains Beyond Mountains by Tracy Kidder or "The Demon in the Freezer" by Richard Preston), and providing an extra in-class interactive exercise. We are also revising the final lab project to allow the students to construct a student-directed multi-disciplinary approach to a question central to an emerging infectious disease.