Citizen Science Anthology- 2012

Theme: Infectious Disease

Topics:

- Nature of Science/Experimental Design **
- Antimicrobial Resistance **
- HIV
- Tuberculosis
- Cholera
- Influenza
- Vaccination
- Plague
- Bioethics
- Bioterrorism/Anthrax
- Prion Disorders (Under construction)
- Lyme Disease (Under construction)

** Required
I. Nature of Science/Experimental Design **

IN BOLD ARE THE REQUIRED READING FOR THIS UNIT

A. Readings:

B. Case Studies:
1. Childbed fever: A nineteenth-century mystery (full case study does not have to be done but in class case type activity strongly recommended) Colyer, C. 2003 http://sciencecases.lib.buffalo.edu/cs/
3. Nanobacteria: Are they or aren’t they alive? A case study on what it means to be a biological organism Casem, ML. 2003 http://sciencecases.lib.buffalo.edu/cs/

C. Class Activities:
1. Mystery Tubes
2. Debate: Are Viruses Alive?
3. Science Olympiad Experimental Design activity
4. Really?: MythBusters team activity
5. Pirates and global warming activity
6. “The Story Behind the Science” Readings
   a. Adversity and perseverance: Alfred Russel Wallace
   b. A distinctly human quest: The demise of vitalism and the search for life’s origins
   c. Creativity and discovery: The work of Gregor Mendel
   d. The Realization of Global Warming
   e. Model Building: Piercing together the structure of DNA
   f. Charles Darwin: A gentle revolutionary

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D. Lab Activities:
   1. Design of Antibiotic Resistance Lab
   2. Use lab design to describe controls/variables/replicates (on paper)
   3. Kirby-Bauer: Testing antibiotic and antimicrobials
   4. Experimental design: Modified Kirby-Bauer tests
II. Antimicrobial Resistance **
IN BOLD ARE THE REQUIRED READING FOR THIS UNIT
A. Readings:

7. Sayre, L. The hidden link between factory farms and human illnesses. *Mother Earth News*.

B. Case Studies:

1. Dr. Collins and the case of the mysterious infection Lemons, PP, Huber, S. 2007 http://sciencecases.lib.buffalo.edu/cs/
2. Outsmarting a Superbug – written by Stephanie Stockwell

C. Class Activities:

1. MRSA: Produce warning PSA about bacterial infections
2. DVD Lecture: Microbe Hunters (D.E. Ganem) HHMI
3. DVD Lecture: Emerging Infections: How Epidemics Arise (D.E. Ganem) HHMI

D. Lab Activity:

1. Design a test for antimicrobial properties of atypical antimicrobials
III. HIV

A. Readings:

B. Case Studies:
2. AIDS and the Duesberg phenomenon Herreid, CF. 2010 http://sciencecases.lib.buffalo.edu/cs/
3. Resistance is Futile. . . or is it? The immunity system and HIV infection Prudhomme-Generreux, A. 2010 http://sciencecases.lib.buffalo.edu/cs/
4. You be the judge: Criminal transmission of HIV, HIV transmission: intentional, reckless, or accidental?, and Short summary of arguments in support of and against the criminalization of reckless HIV transmission – written by Stephanie Stockwell

C. Class Activities:
1. HIV Clock- SimBio lab
2. Duesberg Debate
4. HIV/AIDS HHMI DVD
   a. Lectures
   b. Basic Immunology
   c. Video clips

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IV. Tuberculosis **

A. Readings:


B. Case Study:

1. MDR tuberculosis: A case study for non-science majors focused on social justice

C. Class Activities:

1. DVD- Rx For Survival DOTS-Plus
2. DVD- “On The Lake” Documentary
V. Cholera **

A. Readings:


B. Case Study:

1. The mystery of the Blue Death: A case study in epidemiology and the history of science Muench, SB. 2010 http://sciencecases.lib.buffalo.edu/cs/

C. Class Activities:

1. GIS Mapping Activity: Recreating John Snow’s 1854 cholera map *(Developed by Annie Gatewood-Hoen)*
2. Production of clean water brochure explaining how to use data from lab experiment

D. Lab Activity:

1. Design, set up and execution of sari filtration experiment
VI. Influenza

A. Readings:


B. Case Study:

A case study involving influenza and an influenza vaccine Bennett, J. 2010 http://sciencecases.lib.buffalo.edu/cs/1.

C. Class Activities:

1. PBS DVD- Influenza 1918
2. Who should live if not all can? - written by Stephanie Stockwell
3. Impacts of pandemic influenza – written by Stephanie Stockwell
5. Video: 60 Minutes “Inside look at the flu vaccine production” (2 minutes): http://www.cbsnews.com/video/watch/?id=5450993n
VII. Vaccination **

A. Readings:
   10. Pertussis rates - Data from the public health laboratory service communicable diseases surveillance centre.

B. Case Study:
   1. To vaccinate or not to vaccinate: That is the question Shapiro, C. 2003 http://sciencecases.lib.buffalo.edu/cs/

C. Class Activities:
   1. The Vaccine War- PBS Frontline
   2. Autism Debate- examine retracted papers from Wakefield Lab
   5. The end of Smallpox PBS videos (two parts 6 and 5 minutes each) http://www.pbs.org/wqbh/rxforsurvival/series/diseases/smallpox.html.
   6. POX – the game Tiltfactor Lab, Dartmouth College
VIII. Plague

A. Readings:


B. Case Studies:

C. Class Activities:

D. Lab Activities:
IX. Bioethics

A. Readings:


B. Case Studies:

3. Case Study: The Speaker Incident
4. Infamous cases in the history of science to spur discussion:  
   a. The Tuskegee experiment of untreated syphilis  
   b. Authority figures  
   c. The Stanford prison experiment

C. Class Activity:

1. View Food, Inc. / Examine food industry, antibiotic resistance
X. Bioterrorism/Anthrax

A. Readings:


B. Case Studies:

Anthrax attack! A case on bioterrorism [http://sciencecases.lib.buffalo.edu/cs/](http://sciencecases.lib.buffalo.edu/cs/)

1. Team problem set – A biological arms race (Stockwell Activity)

C. Class Activities:

1. Outbreak/viral computer game
2. Pandemic board game
3. POX – the game Tiltfactor Lab, Dartmouth College
4. Screening of “Contagion”

D. Lab Activities:

1. Phage Assay
2. Identify phage resistant bacteria
Aznar, I, McGrath, G, Murphy, D, Corner, LA, Gormley, E, Frankena, K, More, SJ, Martin, W, O’keeffe, J, Jong, MCD. 2011. Trial design to estimate the effect of vaccination on tuberculosis incidence in badgers. Veterinary Microbiology 1–8.
Barclay, E. 2010. Scientific American- U.S. pig farms may be ‘flu factories.' NPR's Health Blog.
Bennett, J. 2010a. A Case Study Involving Influenza and the Influenza Vaccine. 1–5.
Bennett, J. 2010b. Case Teaching Notes for “A Case Study Involving Influenza and the Influenza Vaccine”. 1–3.
Bennett, J. 2011. Answer Key for A Case Study Involving Influenza. 1–4.
Carter, CC, McNamara, LA, Onafuwa-Nuga…, A. 2011. HIV-1 Utilizes the CXCR4 Chemokine Receptor to Infect Multipotent Hematopoietic Stem and Progenitor Cells. Cell Host & Microbe
Chamany, K. 2006. MDR Tuberculosis: A case study for non majors focused on social justice. 1–9.
Chamany, K. 2011a. Answer Key for MDR Tuberculosis. 1–12.
Doyle, M. Dealing with antimicrobial-resistance. From www.ift.org, 08.06, 22-29.
Falco, M. 2009. CDC: Production of H1n1 flu vaccine lagging. CNN Health.
Huq, A, Yunus, M, Sohle, SS, Bhuiya, A, Emch, M, Luby, SP, Russek-Cohen, E, Nair, GB, Sack, RB, Colwell, RR. 2010. Simple sari cloth filtration of water is sustainable and continues to protect villagers from cholera in Matlab, Bangladesh. MBio 1
Lemons, PP, Huber, S. 2011. Answer Key for Dr. Collins. 1–2.
Muench, SB. 2011. Answer Key for The Mystery of the Blue Death. 1–6.
Patil, RR. 2011. MMR vaccination and autism: Learnings and implications. Hum Vaccin 7

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Sack, DA. 2011. How many cholera deaths can be averted in Haiti? Lancet

Sayre, L. The hidden link between factory farms and human illnesses. Mother Earth News.


Shapiro, C. 2003. Case Teaching Notes for "To Vaccinate, or not to Vaccinate: That is the Question". 1–4.


Triggle, N. 2010. MMR doctor 'broke research rules' BBC News.


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