

## EEB 19: Evolutionary Medicine (Winter, 2008)

(Course webpage: <http://oski.lsic.ucla.edu/>)

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Meeting Time: Tuesday, 2:00-3:50 pm (Life Sciences Building 2320)

<u>DATE</u>	<u>Week</u>	<u>TOPIC</u>
Jan 8	1	Introduction to Natural Selection and how and why you will die!
Jan 29	4	Student presentations
Feb 5	5	Student presentations
Feb 19	7	Student presentations
Mar 4	9	Student presentation & Closing discussion: Is there a future for Evolutionary Medicine?

**Grading:** This course is graded P/NP. To pass you need to: (1) Attend each meeting (note we meet only 5 times / quarter!); (2) At least occasionally participate in the discussions or ask questions; and (3) Participate in one student presentation of a topic.

**Student Presentations:** You will be asked to form groups of two or three and pick a topic for a presentation scheduled in Weeks 3 through 9. You can choose from the following list of potential topics, or you can organize your own group and create your own topic. You will be expected to spend some time researching your topic. (If needed, I can provide some references to get you started and some guidance on how to search through library databases.) On your scheduled week, your group will give a 30-minute presentation on your findings and then have 30 minutes for questions and discussion (see Rubric for directions).

**Written Assignment:** After the presentation, each group member will write his or her own 1-page synopsis of the topic (can be turned in by e-mail). Be sure to answer the following two (2) questions: (1) What was the most interesting or important thing you learned while preparing your presentation, and (2) Will it change the way you live your life (and why or why not!). This assignment is due **one week** after your presentation.

**Readings:** For each week's student presentations, I will try to make available material relevant to that topic on the course webpage. Only the presenters, however, are expected to be familiar with the material. For everyone else, it is optional material and you can read it if you find it of interest. Also for interest, I will post some overview articles as to what evolution medicine is, and how it might be helpful. There is no textbook or set of required readings for the entire class, however.

### **Possible topics for student presentations:**

1. The evolution of combined virulence (virulence = rate at which the disease kills its host) and antibiotic resistance in disease organisms. Why are often the nastiest strains of germs found in hospitals? Is it a good idea to have all our household products be “antibacterial”?
2. The appearance of “new” diseases. Where do they come from? Have they always been present in human populations? Would you expect a new disease to be severe or relatively benign?
3. Environmentally induced allergies and asthma. Why were these almost non-existent a couple of hundred years ago? Recent research may suggest that you can be too clean (i.e., your immune system “expects” to be challenged and creates problems if there are no real ones.).
4. How natural is our current diet relative to what our ancestors ate over the last 100,000 years? Do the differences in diets affect our health?
5. Chemicals like caffeine, cocoa, nicotine, THC, cocaine, and opiates are all plant poisons designed to kill herbivorous insects. Yet humans can crave all of these to the point of addiction. Why?
6. Humans are one of the very few animal species in which females go through menopause. In almost all other species females are reproductively capable up to the day they die. Why are human females different? And why is there no male menopause?
7. If you cut off a salamander’s tail or leg, it will grow back. A human arm or leg will not. Why is there this difference? Will it one day be possible for medical research to find out how humans can regrow damaged limbs and organs? Will stem cells allow this to become commonplace?
8. The human fetus grows within its mother from nutrients she supplies to it. However, the fetus and the mother are not genetically identical. Perhaps the fetus and its mom disagree about such things as whether it should be aborted, how much food the mother should provide, and when birth should occur? How might mother-offspring conflict complicate the reproductive process?
9. Genetic engineering allows us to make “new” plants and animals that were never previously possible through directed breeding programs. For example, we could insert a gene into mosquitoes that would make them unable to transmit malaria. Would the benefits of such future technology outweigh their risks? What are the risks?
10. Homosexuality until recently was thought of as a disease. However, recent research suggests there is a strong genetic component to this behavior. If this is true, doesn’t this lead to an evolutionary paradox? Natural selection for a trait predicts a “homosexual” allele would only increase in a population if this allele increased reproductive success. But doesn’t attraction to the same sex work against this? So explain the evolution of genetic homosexuality.
11. Evolutionary psychology attempts to explain certain pathologies such as eating disorders and excessive anxiety or depression as by-products of usually adaptive behaviors. Can this make sense?

## **Presentation Rubric for EEB 19**

Each group has one (1) hour to present and discuss their topic. The hour should be split about equally between your oral presentation and the discussion involving the entire class. Your presentation should cover the following three areas:

1. “What, who, where & when”. Describe the health problem or disease that your group studied. What are the symptoms? What causes it (if known)? Who is most likely to be affected? Is it more or less likely to occur at some particular age? Are people living in certain areas or climates more or less likely to be afflicted?
2. “How”. How is this problem currently being treated in medicine? Are these treatments safe and effective (i.e., do they cure the condition)? Are there side effects of the treatment? Are there problems in treating people due to cost or reluctance of patients to accept treatment?
3. “Why”. Why do people suffer from this problem or disease? Why does it exist? Is there an evolutionary explanation for the condition(s)?

Plan on each of these three sections being about the same length (about 10 minutes). Each topic can be variable and sometimes one section will take slightly longer than the others. However, do not spend 20 minutes on one area and then rush through the others. If you are leading off for your group, be considerate of your group mates. Please do not use up their time. One goal of this class is to learn how to present the most important points, clearly, interestingly, and in a limited amount of time. If you want to make handouts or have any other visuals, I can help you prepare them (note: such things are optional and not required to do well). Please note for your presentation that although readings may be available, no one is required to do it! Prepare for an audience that is naïve about your topic!

The Discussion half of your presentation should first of all concentrate on answering questions from the rest of the class. You should be prepared, however, to answer questions or generate discussion along one or all of the following lines:

1. Are there any implications for medical science from considering an evolutionary approach? How might treatment regimes be changed? Should people change their lifestyles or personal habits in order to improve health?
2. Do the cures for the condition or disease you presented have any moral or societal implications? What are they? Are there ‘diseases’ we should not be trying to cure?
3. What are the political implications? How much (if any) money should the government be spending on this medical problem? What if the ‘cure’ is quite expensive? Do we ration medical care by ability to pay?