BIOL-PHIL F493/693 "Conceptual Issues in Evolutionary Biology"

Spring 2004
Time: MWF; 11:45 am – 12:45 pm
Room: IRV I #201

Eduardo Wilner
405A F.A.C.
474-7398
ffemw@uaf.edu

Office Hours: to be announced

Overview

Scientific theories are difficult things to deal with, mainly because they not only explain the way things are, but they also restrict the way things can be. Evolutionary theory, for instance, tells us that there cannot be functional structures that spring into existence without ancestry (if there are eye structures, there had to be ancestral eye-like structures). We do not expect either to see adaptations that promote their own genetic demise (it is very unlikely that the urge to kill relatives, or to prefer mating with siblings will evolve). Similarly, adaptations that have nothing to do with fitness cannot evolve by natural selection. To make matters worse, theoretical constraints are not always obvious or clear. For instance, we are still not sure about whether or not there are such things as biological species, group level adaptations, or why should (or should not be) sexual reproduction.

One might wish to think that these are academic nuances that need not bother the researcher in the lab or the field. But this is not the case. Science works because scientists can derive hypotheses, predictions, and experiments from a theoretical framework. Consequently, only a solid understanding of such theoretical framework can generate good research. It also follows that, for science to advance, it needs theoretical development and (obviously) that the latter requires theoretical understanding. All in all, for the biologist, a solid understanding of the processes that shape life (those described in evolutionary theory) is a necessary requirement. This is why you should understand the conceptual nooks and crannies of evolutionary theory.

Possible Topics to Cover

The following list is a possible list for two reasons. First, topics are cumulative, that is, they are grounded on their predecessors. So, there’s very little sense in moving on if I’m failing to get the point across. Second, each topic is of foundational importance to evolutionary biology. So, even if we cover only the first third of the list, both you and I should be pleased. This course is about understanding the material, not just covering it.
The role of models, laws, and theories in science.
The Scientific Method.
Models, Laws, & Theories.

**Darwin’s theory**
Newtonian Science and Darwin’s Ideals
The "long argument" in The Origin

**Modern Evolutionary Biology & Scientific Explanation in General**
Biology & Physics.
Patterns and Processes.
Historical Explanations.

**Just a Theory? The Creationism Case**
Paley’s Watchmaker.
The Argument from Design.
Hume’s answer.
Selection and Chance.

**Fitness**
Probability interpretation.
Measuring fitness.
Tautology Problem.
Adventageousness.
Teleology.
Teleology Naturalized.

**The Units of Selection**
Hierarchies.
Benefit versus Adaptation.
Parts and Wholes.
Red Herrings.
Correlation.

**Adaptation**
Adaptationism
Genes For.
Untestability?
Complex Systems.
Optimality.
Game Theory.

**Biological Determinism**
Determinism.
Genes and Robots.

**Sociobiology**
Science and Ideology.
Human Nature.

**Cultural Evolution**
Memes.
"Culture and Other "Evolvers."

**Texts**
- *Essay Collection* – prepared by the instructor.

**Requirements**
Readings for each class will be assigned in advance. You will be expected to critically study this material *before* class (i.e. read it seriously enough to be able to participate in class discussions by answering and having questions regarding the material). My lectures will *not* repeat the reading material but *critically analyze* and *supplement* it. Attendance to class is mandatory and class participation is highly recommended.

**Evaluation**

*Three Exams (20% each for undergraduates, 10% each for graduates)*
These exams will consist of short essay questions. Exams will cover:
- the reading material,
- the supplements provided during class discussions and
- the creative application of all of the above.
These exams will be about four weeks apart and refer to the material discussed in their particular (+/-) four-week period.

*Final Exam (30% -- for undergraduates, 20% for graduates).* This exam will cover material of the entire course.

*Research Paper (40% -- for graduates).* This will be supervised by the professor – via email and office hours. Topics, readings, and a schedule for an outline, drafts, and final version will be individually discussed. We will begin discussions regarding the research paper after the third week of class.

*Attendance & Class Participation (10%).* Attendance will be taken regularly. Only 6 unjustified absences will be permitted -- more will result in 0 attendance/class participation points.