Biology 370 Bevington
Senior Seminar Fall Term, 2007

EVOLUTION

TEXT: Kardong, Kenneth V. 2008. An Introduction to Biological Evolution. McGraw Hill. Second edition. 352 pp. ISBN: 978-0-07-305077-6

The underlying principle for all of biology is evolution - organisms changing over time in response to selection pressures in their environments. Since Darwin articulated the theory of evolution, this concept has unified the discipline of biology, serving as a lens through which biologists examine structure/function relationships in genes, organisms, and entire ecosystems. In this course students will examine topics of their choosing on evolutionary principles at the molecular level, in organisms, and in ecosystems. We want to understand why organisms change through time and what forces contribute to this change. Key concepts will include selection, adaptation and adaptive radiation, mutualism, coevolution, and extinction. In what ways have humans begun to alter the direction of evolution, both of other organisms and of ourselves? The course will involve seminar presentations, class discussions, and a written paper.

COURSE OBJECTIVES:

1. To become familiar with the biological literature and with on-line search strategies to access useful information from scientific data bases.
2. To develop good library research skills.
3. To acquire skills of critical data analysis.
4. To research and prepare effective oral presentations on topics of your choice.
5. To become acquainted with the field of evolutionary biology.
6. To improve your formal writing skills.

ORAL PRESENTATIONS:

The ability to effectively communicate one's ideas is the mark of an educated person. In science this skill is particularly important because information acquired by one scientist must be verified by others before it is accepted as part of the body of scientific knowledge. Scientists communicate research findings to their colleagues primarily in the form of journal papers to be read by the scientific community. This constitutes the primary literature. From the primary literature one or more authors may assemble the results of many scientists into a reference book on some specific topic. Another method of communicating with one's colleagues is an oral presentation of data where one speaks to an audience of peers, typically at a professional meeting. Scientists attending professional meetings exchange information about their current research efforts and often present their data before it has been published in the primary literature.

During the semester you will give two oral presentations to the class on topics in evolution. One of your topics should be plant-related and the other should be about an animal. Or, you could do one topic on an organism(s) of your choice and another topic on some aspect of evolution at the ecosystem level. Topics must be approved in advance by the instructor. The

first presentation should be 15 minutes in length. The second presentation will be longer (45 minutes), and it should be more detailed in scope and involve more extensive preparation. Both presentations will be followed by a period of questions from the audience. During the first class meeting the dates for seminars will be assigned by drawing lots, and potential topics will be discussed. While it is not a requirement that you do so, you are encouraged to use Power Point to prepare your presentations.

As you conduct the research for your seminar, select a scientific paper which seems to be central to the theme you plan to develop. This will serve as a **focus paper** for the rest of the class since they will read it before hearing your presentation. This article should be from the primary literature, and ideally it should have been published within the last 10 years.[1] One Xerox copy of the article is to be placed on reserve in Reeves Library and another copy is to be given to the instructor **one week prior to the date the seminar is to be given**. At the same time you will give the instructor a typed abstract of your seminar (not to exceed 300 words). Duplicate enough copies of your abstract so that you can distribute one copy to each member of the class. It is important that your abstract and the Xeroxed focus article be in on time. It is your responsibility to see that a copy of the article is on reserve in the library **and** in the hands of the instructor and other members of the class a full week before your talk.

CLASS PARTICIPATION:

It is your responsibility to come to class prepared to discuss the seminar topics. You have a standing, weekly assignment to go to the library and read the focus papers for each presentation. Prepare three (3) questions from the paper for the presenter, and bring them to class on the day the topic is to be discussed. You are also expected to ask questions about the oral presentation. Class participation makes up 20% of your grade, so it is an important component of the course.

VIDEO TAPING OF SEMINAR PRESENTATIONS:

One of the most effective ways to evaluate your presence before an audience is to see a video tape of your own presentation. This will give you an opportunity to see yourself after the seminar. Your first seminar will be video taped by the Media Center staff. It is your responsibility to make an appointment with the Media Center staff to view your tape during the week after it is given. The Media Center will prepare a CD or DVD for you for this purpose.

SEMESTER SCHEDULE:

A final version of the semester schedule including meeting dates, seminar topics, and assignments will be distributed in the second week of classes. See pp. 9-10.

[1] Some of the seminal papers or classic citations for your topic may be more than 10 years old. Generally, however, it is preferable to utilize more current literature unless you feel there is a compelling reason to do otherwise. Check with the instructor if you are in doubt.

CRITERIA FOR EVALUATING SEMINAR PRESENTATIONS:

1. Were the abstract and focus paper turned in on time?

2. Is there a central theme developed through the presentation?

3. Is the focus paper selected by the speaker representative of the topic, and does it focus on the theme?

4. Does the presentation indicate that the speaker has thoroughly researched the topic and has command of the literature?

5. Is the speaker neatly dressed?

6. Delivery of the presentation:

    A. Is there an introduction?

    B. Are the data clearly presented? Do they illustrate the points being made?

    C. Is the theme cohesive? Does the speaker ramble?

    D. Did the speaker analyze the data correctly?

    E. Was the use of visual aids effective?

        (1) Are figures and tables **properly labeled** (i.e. conspicuous titles, axes labeled and supplied with appropriate units)?

        (2) Is the amount of data presented adequate for the points being made?

        (3) Do PowerPoint slides or overhead transparencies have too much data so that they appear crowded and difficult to read, or has the speaker obviously taken care to make the data easy for the audience to understand? **This is especially important to a good seminar presentation**.

        (4) Are visual aids used to illustrate points, or just to consume time and "get the speaker through?"

        (5) Are PowerPoint slides or transparencies left on the screen long enough for the audience to grasp their contents, or are they removed too quickly due to the speaker's nervousness? **Another important point**.

F. The speaker's demeanor:

(1) Did the speaker maintain eye contact with the audience, or was the presentation read from a script?

(2) Was the delivery smooth or jerky?

(3) Were gestures used effectively, or were they distracting?

(4) Posture. Did the speaker stand up straight, or lean over the lectern or or against the blackboard?

G. Response to questions:

(1) How did the speaker handle himself/herself under fire (i.e. response to questions from the audience)?

(2) Were answers logical and analytical?

(3) Were questions answered directly, or did the speaker "beat around the bush?"

7. Was there a summary? Did it focus audience attention on the major points made during the presentation. **A summary is important**.

READING ASSIGNMENTS:

Readings come from the text by Kardong. They should be completed by the due dates as indicated below. Unannounced quizzes may be given from time to time on readings in the text and/or the focus papers assigned for your presentations.

Due Date	Assignment
Thurs. 30 August	Chapters 2 & 3
Tue. 4 September	Chapters 4 & 5
Thurs. 6 September	Chapter 6
Tue. 11 September	Chapters 1 & 7
Thurs. 13 September	Chapters 8 & 9
Tue 20 September	Chapter 10
Thurs. 25 September	Chapters 12 & 13
Tue. 27 September	Chapters 14 & 15

RESEARCH PAPER INSTRUCTIONS:

The research paper should be a major library research project, and as a result, it should be substantial in character.[2] Plan to write your paper on your first seminar presentation topic. You might want to keep in mind that toward the end of the semester deadlines and course assignments begin to pile up, so there is merit to writing a paper before the end-of-term chaos sets in.

The paper should summarize the current status of our understanding about your topic. **The paper must be written in college-level English**. Papers not meeting this standard will be returned ungraded to be rewritten.[3] Pay particular attention to spelling, grammar, and syntax. The paper should be written in a **critical** and **analytical** manner. As you work your way through the reference materials for your topic, ask yourself what important issues are unresolved. Where are the gaps in our knowledge about this topic? What issues should we know more about? What specific questions do you think should be answered?

When you construct the narrative for your paper, devote the last section of the paper to the specific questions you want to answer and describe how you propose to answer those questions. You can title this section "Unresolved Problems" or "Strategies to Address Unanswered Questions." I am asking you here to **go beyond** simply recounting what you have read by making value judgements about what additional work needs to be done and by explaining how you would go about doing it. In short, I am asking you to think scientifically. What experiments need to be done? How would you set them up? Lay out the rationale for them. How would you interpret the results from your experiments. I want you to identify interesting, unanswered questions and then show your reader how you propose to address them experimentally.

In the text of your paper **you must document statements with literature citations**. You may do this by number or by author's last name and date. In scientific writing documentation is necessary so that your reader can find the sources of the information to which you refer. Assemble your citations at the end of the paper, alphabetically by first author's last name according to the format on page 7. Note that this is not a bibliography of reference works which you consulted, but rather a list of specific papers from the primary literature and reference texts which you have cited directly in the text of your paper. **Follow the prescribed literature citation format carefully**.

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[2] Approximately 20-25 typewritten pages with normal margins in 12 point font. Statements referring directly or indirectly to scientific research should be properly documented with literature citations.

[3] Not a good thing at the end of the semester when you have 10^6 things to do.

GRADING:

Grades will be based on your seminar presentations, class participation, a written paper, and other library assignments. Unannounced quizzes may be given during the semester on reading materials for seminars for the day.

Seminar presentations (Short seminar 10%, Major seminar 25%)	35%
Class participation	20%
Research Paper	40%
Quizzes and/or library assignments	5%

TIME LINE FOR WRITING YOUR PAPER

Put these dates into your datebook calendar. It is important to stay on target with the progress of your paper. Since it is a major undertaking and involves a substantial amount of library research time, it is unlikely that you will do well on it if you put it off until late in the semester.

Date	Items Due
Thurs. 6 Sept.	Selection of first seminar topic
25 - 27 Sept.	1. Paper outline 2. List of literature citations and reference texts you plan to use 3. Xerox copies of all journal articles you have received through interlibrary loan.
Tue. 16 Oct.	1. Expanded outline. 2. Rough draft 3. A list of the gaps in our knowledge (i.e. unanswered questions) which you have identified about the topic. 4. Xerox copies of all journal articles you are using
Tue. 13 Nov.	Second draft (this is a **firm deadline**)
Tue. 4 Dec.	Paper due

HOW TO CITE LITERATURE IN YOUR PAPER:

Literature Cited

For journal articles:

Burke, C. 2001. Elevated rates of tree collisions by high-flying toucans in an Ecuadorian rain forest associated with increased dietary intake of *Erythroxylum coca*. Ecology. 102: 76-85.

Gasparetti, L. 1902. An initial study of the adaptive strategies of the green iguana. I. Swan-diving from tall trees, it only hurts for a while. Journal of Herpetology. 26: 243-249.

Gennace, M. and K. Goehring. 1987. Pollination failure in tropical vines affected by hummingbird intoxication and its correlation with the period of party activity by the birds during the previous night. Ecological Monographs. 26: 89-103.

Goodbred, A. 2004. Why bats sometimes fly into walls. Collision Science. 16: 2017-2023.

Hess, R, J. Mazurik, and T. Mireski. 1992. How to enjoy termite ecology while they eat you out of house and home. Journal of Irreproducible Results. 54: 22-47.

For a chapter or an article in a reference book:

Roccamo, C, D. Scavone, and N. Tussey. 1994. Migratory tropical birds flying at low altitudes have difficulty discriminating between open windows and closed ones. In: C. Burke and L. Gasparetti. Fun and games with migratory birds. Macmillian Publishing Co, Inc., New York. pp. 223-227.

Gennace, M. and K. Goehring. 2000. The sloth and the hare: a new paradim. In: A. Goodbred and R. Hess. Winning is Everything. Bench Press, Inc. Bogota. pp. 235-253.

Suggestions for Topics in Evolution

This is a short list of ideas to get you thinking about potential topics. You can find additional topics which may be more interesting by consulting the list of selected references at the end of each chapter in Kardong's text.

Sexual selection
Darwin's finches
Evolution of photosynthetic metabolism
Role of polyploidy in speciation
Introgression (introgressive hybridization)
Punctuated equilibrium theory
Pleistocene refugia and speciation
Ecotypic differentiation
Latitudinal gradients in species diversity (Why are there more species in the tropics than in the temperate zone?)
Coevolution
Evolution in protein structure
Origins of eucaryotic organelles – endosymbiont theory
Evolution of migration patterns in animals (birds, fish)
Kin selection
Sibling species
Evolutionary forces which shape ecosystems (deserts, rain forests, savanna, etc)
Island biogeography and extinction
Human evolution
What makes us human?
Are we changing the course of our own evolution?
Evolution of parasitism
Obligate parasites: When is being too successful the same as being unsuccessful?
Evolution at the level of the genome
Gene structure
Evolution of evelopmental control
Monoecious vs dioecious plants
Chemical evolution (pheromones in animals, defensive secondary metabolites in plants, etc.)
Evolution of territorial behavior (peeing on a fire hydrant?)
Extremeophiles
Thermoregulation in animals
Drought or freezing tolerance in plants
Convergent evolution
Adaptive radiation

SEMESTER SCHEDULE

Tue.	28 Aug.	Orientation, course objectives, discussion of topics	
Thur.	30 Aug.	Evolution, discussion of topics	
Tue.	4 Sept.	Structuring your presentation. Presentation skills	
Thur.	6 Sept.	Library session: online searching strategies	
Tue.	11 Sept.	History and the evolution of evolution, selection	
Thur.	13 Sept.	Variation	
Tue.	18 Sept.	Variation, speciation	
Thur.	20 Sept.	Complete speciation, coevolution	
Tue.	25 Sept.	Life in groups, extinction	
Thur.	27 Sept.	Surprise	

Tue.	2 Oct.	Short seminars 1 and 2:	Marisa Gennace, Kevin Goehring
Thur.	4 Oct.	Short seminars 3 and 4:	Jen Mazurik, Dan Scavone
Sat. 6 Oct. – Tue. 9 Oct.		Fall Recess	
Thur.	11 Oct.	Short seminars 5 and 6:	Andy Goodbred, Christina Roccamo
Tue.	16 Oct.	Short seminars 7 and 8:	Tegan Mireski, Nate Tussey
Thur.	18 Oct.	Short seminars 9 and 10:	Christa Burke, Ryan Hess

Tue.	23 Oct.	Short seminar 11:	Lauren Gasparetti

Thur.	25 Oct.	Major seminar 1:	Kevin Goehring
Tue.	30 Oct.	Major seminar 2:	Marisa Gennace
Thur.	1 Nov.	Major seminar 3:	Dan Scavone
Tue.	6 Nov.	Major seminar 4:	Jen Mazurik
Thur.	8 Nov.	Major seminar 5:	Christina Roccamo
Tue.	13 Nov.	Major seminar 6:	Andy Goodbred
Thurs.	15 Nov.	Major seminar 7:	Nate Tussey
Tue.	20 Nov.	Major seminar 8:	Tegan Mireski
Wed. 21 Nov. – Sun. 25 Nov.		Thanksgiving Recess	
Tue.	27 Nov.	Major seminar 9:	Ryan Hess
Thurs.	29 Nov.	Major seminar 10:	Christa Burke
Tue.	4 Dec.	Major seminar 11:	Lauren Gasparetti
Thurs.	6 Dec.	ETS exam	
Mon.	10 Dec.	Last day of classes	