Speciation
Biology 4559/7559
Location: Gilmer 225
Time: Tuesdays 9:00AM – 11:00AM
Prerequisites: BIOL 3010 + 3020 or Graduate Status
Course Materials on Collab

Professor: Dr. Ben Blackman
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Office: Gilmer Hall 063
Office Hours: By appointment

Course Description

Where do new species come from? Though Darwin once considered this question to be "that mystery of mysteries" and the field of speciation was not long ago lamented as "doomed to eternal speculation by untestable theories" (Coyne and Orr, 1989), our scientific understanding of this process has been spectacularly transformed by modern approaches in just the last two decades. Through critical reading of classic and contemporary studies, this course will consider where the field of speciation has been, where it is going, and where it should be going. Particular emphasis will be placed on evaluating the predictions of verbal and quantitative theory through empirical studies from a broad range of organisms.

Learning Objectives

By fully engaging with the material and class assignments, at the end of the semester you will be able to:

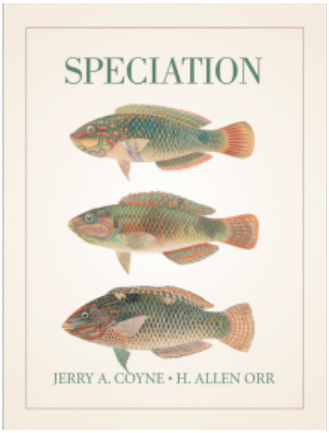
- Explain how an interdisciplinary approach involving genetics, evolutionary biology, and ecology can be used to understand the processes that lead to the origin of new species
- Describe and major questions, findings, and experimental approaches in the field of speciation
- Discuss biological research using specialized terminology and defend your opinions
- Critically evaluate and interpret peer-reviewed scientific literature
- Combine factual material with deductive reasoning to propose hypotheses and future research directions.

Course Format

This course will follow the format of graduate seminar. With the exception of the first lecture, all class meetings will begin with student-led discussions of the week's topic and readings. After a short-break, we will reconvene for a 15-20 minute lecture given by the student in charge of the next set of papers to be read for the following week.

Required Text: Speciation by J.A. Coyne and H.A. Orr. Sinauer Associates, Inc. (2004).

Class Expectations and Responsibilities



Weekly reading response (25%)
The success of our class discussions depends on the selection and sequencing of readings (for which I will be responsible) and the preparation of the participants. To ensure the latter, and especially to allow time for the discussion leaders time to plan an integrative discussion, I would like for each of you to submit a 'reading response' prior to coming to seminar. This response should be a 1-2 single-spaced page synthetic piece that comments on 3-6 salient points from the readings. This may include comments and critique of the ideas conveyed by the authors, the experimental design, aspects of the analysis and interpretation, or connections to prior readings. If there are particular methodological or biological questions that the readings raise for you, be sure to append these to your piece so that the discussion leaders tailor the class discussion to address them. Your reading responses should be posted on Collab by 10:00 AM on Mondays. The students leading discussion for the week are not responsible for submitting responses for that week. One additional "bye-week" to be taken at your choosing is also permitted. Because a major purpose of these pieces is to drive healthy class discussions, no credit or make-up work will be allowed for late submissions.

Short Lectures (10%) and Discussions (15%)
For each topic, a team of two students will be responsible for presenting a short 15-20 minute preparatory lecture one week and then leading class discussion on that topic the following week. The lecture should not be on the papers themselves. Instead, the lecture should present the overview of the general topic (largely from the Coyne and Orr text). This overview should include an outline of relevant theory, a synopsis of the history and current state of the field, and questions for your peers to consider in preparing for discussion. Students responsible for should meet with me at least 1 week prior to the short lecture (2 weeks prior to the week during with the papers are discussed) to go over the content of the lecture. I also suggest preparing a one-page outline of the lecture to handout in class for your classmates.

Before leading class discussions, the team should meet with me again to discuss your plans in the week prior to your assigned discussion. It would be ideal to have a broad-based discussion that relates the focal papers to the theory and background covered in your lecture. Visual aids should be limited to figures from the focal papers or other relevant literature. The discussion leaders are responsible for reading everyone else's response papers and drawing additional discussion points / questions from them. Often, in discussion, you may expect to spend part of the class going through empirical papers figure by figure, working your way through the content from start to finish to make sure everyone understands what was done, why, and how, and which results were obtained. Then, armed with questions, proceed to evaluating whether the authors adequately supported their claims, while soliciting, addressing, or re-directing questions posed from and by the rest of the class throughout. Opportunities to go to the board to diagram particular experiments or concepts should arise, and some portion of the class period may be devoted to an activity or breakout discussion. For more guidelines on leading a successful discussion, please refer to the attached information sheet.

Participation over the course of the semester (30%)
The presentations and discussion are led by your peers. Please show them the same courtesy and respect they show you by reading the papers carefully and coming prepared with questions. This is a small class, and it will be most successful if everyone is actively involved. Questions can be about anything: background, approach, methods, evaluation, implications, etc. The selected papers cover a huge range of biology. It is perfectly fine, in fact, it is assumed that you will not understand every part of every paper we will read. In this case, please bring this up in discussion. Chances are many of us will have the same problem. For guidelines about what constitutes A-, B-, or C-level participation, please refer to the attached handout.

Paper/Research Proposal and Presentation (20%)
The final assignment of the semester will give you the opportunity to synthesize what you have learned and apply it to a question and system of your choosing by writing a a brief (4-6 single spaced pages) written paper. The paper can either be:

1) a more general critical review of one current topic in speciation research, including a prospectus for what additional research might resolve this question
2) a specific research proposal (in NSF pre-proposal format), based on an open question about speciation, for which you are proposing an empirical and/or theoretical test.

The emphasis in your written paper/proposal should be critical thinking and analysis, and inventive biological questions, rather than simply re-phrasing the current literature. Each student with briefly (10 minutes or less) present their research program and/or idea(s) in the last week of class. A first draft will be due Friday, April 18th (Noon), which will then be peer reviewed by two classmates by Friday, April 25th (Noon). The final paper will be due Friday, May 2 (Noon). Ten points (on a 100 point scale) per day after the deadline will be deducted for late papers. Extensions will be allowed only in the event of a family or medical emergency.

How to Succeed in this Class:

1) Make ample notes while reading, summarizing the question being addressed and the take home message of each figure in your own words.
2) Reconsider the readings in light of thought pieces posted by your classmates before class so you will be prepared to talk about them.
3) Make connections with others in the class so you can work together to understand the assigned readings and swap notes in the event of an absence from class.
4) Take advantage of the framework provided by the proposal assignment to dig deep into one or more systems that excite you.
5) Help me (and the rest of the class), help you (and each other)! Bring your questions about the material to class, and if they go unanswered, post them on Collab or come to office hours.
6) Seek out more resources as needed to improve your research, writing and well being
    a. UVA Writing Center (http://www.engl.virginia.edu/undergraduate/writing/center)
    b. UVA Library (including document delivery and interlibrary loan services; http://www.library.virginia.edu/)
    c. Counseling and Psychological Services (http://www.virginia.edu/studenthealth/caps.html)

Attendance Policy
Because the aim is for everyone to learn from each other's insights, successful lecture activities and discussions depend on everyone's attendance and participation. If you have to miss a class, I request notification at least two classes prior to the planned absence. Unplanned absences from discussion will not be eligible for makeup credit except in the case of illness, injury, field trip, religious observance, or family emergency. Participation credit for excused absences will be earned through completion of a makeup written assignment.

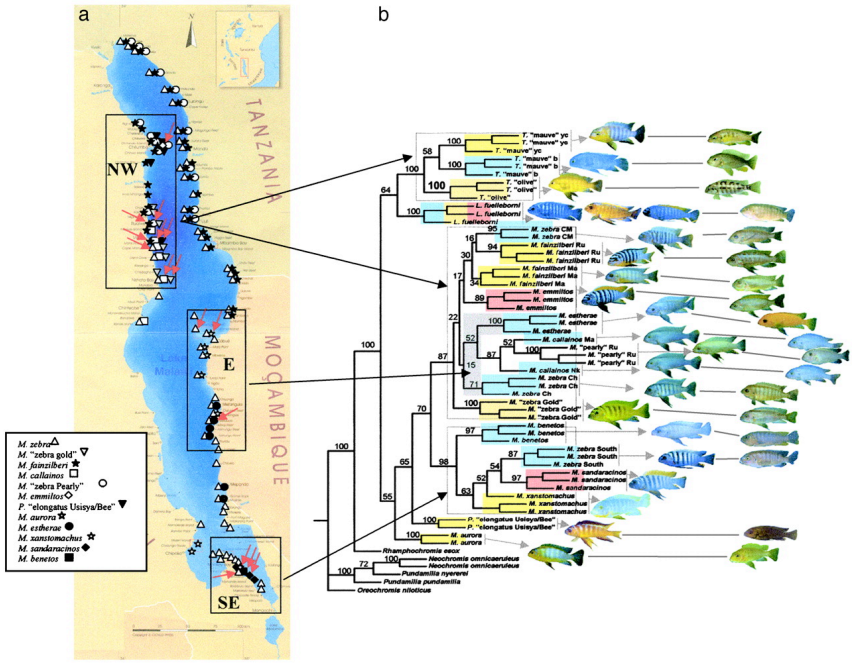
Academic Integrity
Placing your name on all assignments affirms that you have neither received nor given aid in completing the assignment or test and, especially in the case of written assignments, have acknowledged properly the scholarship of others. All students are expected to comply with the provisions on the UVa Honor System.

Plagiarism is not acceptable. This includes both direct excerpts without quotes and citation as well as paraphrasing without attribution. For a better understanding of what constitutes plagiarism, please read this document:
http://www.virginia.edu/honor/wp-content/uploads/2012/09/PlagiarismSupplement2011.pdf

Grading Scale:

100-97	A+
96-93	A
92-90	A-
89-87	B+
86-83	B
82-80	B-
79-77	C+
76-73	C
72-70	C-
69-67	D+
66-63	D
63-60	D-
<60	F

Rounding: 96.5 = 97,
96.4999999999 = 96



Tips on Leading Class Discussion
by Rachel Seidman

1. First, read the readings for that day very carefully, preferably more than once.

2. Think about what you want to get across to your classmates. What is the most important point in each of the readings? What insights do you have about how the readings relate to each other? Does one reading shed new light on the other? What questions do they raise about each other?

3. Once you have decided *what* you want to convey, think about *how* you want to convey it. Think about what method might get your ideas across best. Do you want to divide the class into small groups for discussion? Can you think of a role playing assignment that would get people to think about different perspectives of an issue? Do you want to give a short introduction and then moderate a large-group discussion?

4. If there is more than one discussion leader, decide how you want to divide up the tasks involved in leading the discussion. Will one person give the introduction, and the other(s) ask questions? Will you each take charge of parts of the class in small groups, then meet as a whole and discuss comparative conclusions the second half of the class time? Do you want to split up the readings each person is responsible for leading discussion about, or do you want to share responsibility jointly for all of them? (In any case, ALL of the leaders should read and understand ALL of the readings thoroughly.)

5. Things to think about:
- Try not to spill all of your beans at once. A discussion should build gradually, should move forward from point to point. If you explain your whole interpretation of the readings at the very beginning, there is nowhere to go. Save some of the good stuff for later!
- Try not to answer your own questions before you even ask them. For example, people tend to say something like, "We thought that XXX's analysis really did a bad job of taking YYYY into consideration. What did you think about XXX's use of YYYY?"
- Try not ask "yes" or "no" questions; you want to ask open-ended questions that will get people to share their own ideas about the readings. Questions that begin with "Do you think" can easily be answered "yes" or "no." Questions that begin with "what, why, and how," generally will spark discussion nicely.
- It is a good idea to have a general sense of the points you want to be sure to cover, and you can sketch out a general map of how you think the discussion might go, but don't expect it to follow your map exactly--and don't try to force it to do so. Sometimes the best parts of a discussion are the unexpected turns it takes. Having said that, keep it on course by being well-organized.
- To be well-organized, know what is going to be said (by you or someone in the discussion group), and in what order. Work from organized notes. Do not rely on flipping through your highlighted readings looking for the interesting parts. But be a little bit flexible and allow a few moments here and there for the unexpected turns mentioned in the last point.

Finally, think about your "presentation of self." Be confident, upbeat, engaged, and focused. Make eye contact, speak clearly, and don't rush. Regarding rushing: if you find that you cannot fit all of the points you want to make into the discussion, it will not end the world if you omit some of them. More is gained by everyone if you cover the interesting points thoroughly than if you rush through your list of discussion questions.

Source (with a few tweaks):
TIPS ON LEADING CLASS DISCUSSIONS by Rachel Seidman
http://apps.carleton.edu/curricular/history/resources/study/leaddiscussion/

A guide to reflecting on your class participation

A-level participation:

- You demonstrate excellent preparation, having taken notes inside or outside the articles about what strikes you, your interpretations, your questions.
- Your comments and questions show that you have read the assigned articles and supplementary material and/or commentaries and considered that material thoughtfully.
- You analyze readings and synthesize new information with other knowledge (from your experiences, discussions outside class, lecture material, other readings, etc.).
- You make original points.
- During class, you write notes about others' ideas.
- You synthesize discussion points to develop new approaches that take the class further. You respond thoughtfully to others' comments with ideas and questions.
- You sometimes engage the other students in dialogue, perhaps challenging them to develop their ideas more deeply, perhaps debating with them a different position.
- You build convincing arguments by working with what others say; but you also do not hesitate to question others or the majority view when you have a different understanding or interpretation.
- You stay focused on the topic under discussion.
- You volunteer regularly but do not dominate discussions.
- In group conversations, you stay on topic and work toward balanced participation by all.
- If your supported interpretation is not a popular one, you are able to make a case for your position, rather than yielding to the majority.

B-level participation:

- You demonstrate good preparation, perhaps having written some notes before class.
- You interpret and analyze course material.
- Your take-aways demonstrate that you have sometimes listened carefully to others' comments and ideas.
- You volunteer regularly in class, with interesting ideas.
- You think through your own points, respond to others' ideas, and question others in a constructive way.
- You may occasionally question others' views and/or engage in dialogue with others.
- You raise good questions about readings.
- You stay focused on topic during whole-class discussions and in group conversations.

C-level participation:

- You demonstrate adequate preparation.
- You understand the readings but show little analysis.
- You respond well or moderately well when called upon, but you rarely volunteer; or you talk without advancing the discussion.
- You might not stay consistently focused on topic.
- You do not demonstrate that you have listened well to others' ideas or incorporated them into your analysis or interpretations.

Our in-person, in-class discussions and reflections should help you pursue the goals of practicing and developing . . .

- your ability to listen deeply to others' ideas
- your skill in making an argument, that is, knowing why you hold an opinion and how to find and use reasoning and evidence to support it and convince your listeners
- your facility in sharing your ideas verbally with others
- your skill in helping others work out their ideas
- your ability to understand others' ideas in conversation and weigh them deliberately, appreciatively
- better appreciation and awareness for how ideas develop, grow, and improve in conversation with others
- your skill in sharing your thoughts and in offering civil, positive, clear comments

Week	Date	Topic	Activities
1	01/14	Overview and Course Organization	
2	01/21	Nature of Species and Species Concepts	Reading: Coyne + Orr, Ch. 1 + Appendix Ehrlich and Raven 1969 Achtman 2008 Lowry 2012 Optional Reading: Mishler and Donoghue 1982, Wu 2001 Assignment: Reading Response
3	01/28	Studying Speciation and Pre-zygotic Isolation	Reading: Coyne + Orr, Ch. 2, Ch. 5 + Ch. 6 p. 211-13 Martin 2007 Cruaud 2012 Assignment: Reading Response
4	02/04	Postzygotic Isolation	Reading: Coyne + Orr, Ch. 7 Cutter 2012 Faria 2010 Moyle 2010 Optional Reading: Kirkpatrick and Barton 2006 Assignment: Reading Response
5	02/11	Genetics of Postzygotic Isolation	Reading: Coyne + Orr, Ch. 8 Presgraves 2010 Bikard 2009 Phadnis 2009 Assignment: Reading Response
6	02/18	Geography and Speciation	Reading: Coyne + Orr, Ch. 3 Jordan 1905 Kozak and Wiens 2006

			Florin and Odeen 2002 Assignment: Reading Response
7	02/25	Speciation with Gene Flow	Reading: Coyne + Orr, Ch. 4 Bolnick 2007 Savolainen 2006 Shapiro 2012 Sousa 2013 Assignment: Reading Response
8	03/04	Ecological vs. Non-Ecological Speciation	Reading: Coyne + Orr, Ch. 11 Nosil 2013 Dettman 2007 McKinnon 2004 Optional Reading: Rice and Hostert 1993 Assignment: Reading Response
9	03/11	SPRING BREAK	
10	03/18	NO CLASS	Assignment: Paper Topic Choice
11	03/25	Hybridization and Speciation	Reading: Abbott 2013 and Responses Mavarez 2006 Assignment: Reading Response
12	04/01	Reinforcement	Reading: Coyne + Orr, Ch. 10 Hopkins 2013 Saetre 1997 Assignment: Reading Response
13	04/08	Polyploidy	Reading: Coyne + Orr, Ch. 9, p 321-337 Chester 2012 Wood 2011 Mayrose 2011

			Yant 2013 Assignment: Reading Response
14	04/15	Social or Sexual Selection, Culture, and Plasticity in Speciation	Reading: Richie 2007 Grant 2009 Pfennig 2010 Sorenson 2003 Assignment: Short Response First Paper Draft Due Apr. 18th (Noon)
15	04/22	Macroevolution and Speciation	Reading: Coyne + Orr, Ch. 12 Weir 2007 Phillimore 2008 Rabosky 2013 Optional Reading: Nee 2006 Assignment: Short Response Peer Review Due Apr. 25th (Noon)
16	04/29	Student Presentations	Assignment: Class Presentation First Paper Draft Due May 2nd (Noon)