SYLLABUS

Instructor: Eric DeChaine
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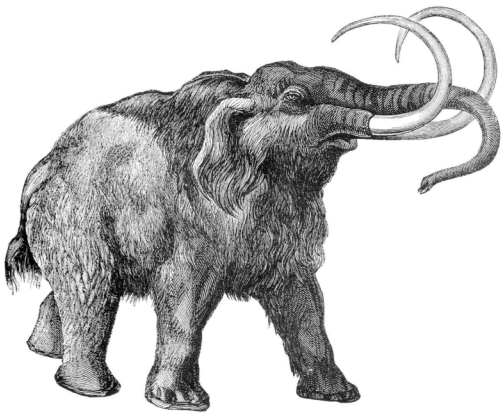
Class time: WF 2:30-3:50
Location: BI415
Office Hours: M 1-2pm and by appointment
B237



Prerequisites: Biol. 325 or equivalent.

Required textbook:. Pielou, E.C. 1991. After the Ice Age: The Return of Life to Glaciated North America. University of Chicago Press, Chicago.

Overview: This course examines the impact that climatic changes during the past 2 million years had on the distribution of biological diversity, with an emphasis on the flora and fauna of the Pacific Northwest.

The importance of the Quaternary: The Quaternary is a fascinating period of climatic upheaval, marked by recurring ice ages, an abundance of now-extinct megafauna, and the migration of humans across the globe. The glacial cycles of the Quaternary dramatically impacted the distribution and magnitude of diversity. During unfavorable climatic periods, populations were isolated in refugia and underwent genetic divergence and many populations probably went extinct. With the return of suitable climatic conditions, habitats expanded and became connected, and populations once again mixed. These cycles of population fragmentation and connection greatly impacted current levels of genetic and morphological diversity. Understanding how this time period impacted the distribution of species is fundamental to conservation biology, ecology, and earth system history.

Course objectives: In this course, you will become familiar with the ice-ages and their impact on biological diversity. Introductory lectures and readings will provide the necessary background for the time period as well as an understanding of the concepts and methodological approaches. The reading material for the course will be a combination of the text and articles from the primary literature, which we will discuss and critique as a group. This will not only provide you with an understanding of the current topics associated with Quaternary research, but also a familiarity with the scientific process of presenting and critically evaluating hypotheses. At the end of the quarter, you will understand the approaches used to infer paleoclimatic chronologies, why the earth has experienced glacial cycles, and how these climate cycles have impacted the distribution of biological diversity. Upon completion of the course you should be able to...

1. apply the principles of biogeography;
2. explain and apply your understanding of the importance of Quaternary biogeography;
3. identify questions that can be addressed scientifically and demonstrate the ability to read, understand and critically review scientific papers;
4. develop effective quantitative reasoning skills, such as using mathematical equations and models to represent and explain biological phenomena;
5. communicate precisely and analytically in written and oral forms.

Grading: Grading will be based a combination of participation in class discussions, presentation of research topics, a mid-term exam, and poster presentations (for graduate students).

Biology 433 (undergraduate students):

Requirement	Percentage of final grade
Class participation	20%
Presentation and leading discussion	40%
Midterm test	40%

Biology 533 (graduate students):

Requirement	Percentage of final grade
Class participation	15%
Presentation and leading discussion	30%
Midterm test	30%
Poster presentation	25%

1. Class participation.

Since this course is largely a discussion of the text and the primary literature, student participation in class is paramount to success. Undergraduate and graduate students are expected to contribute substantially to discussions. For each discussion day, everyone should come to class with 3 questions for each of the readings (chapters and articles) for that day in order to facilitate an active and interesting discussion. While reading, you will likely encounter a method or an approach that you do not understand, a concept that peaks your curiosity, or some aspect of the topic that relates to your broader interests (in areas such as ecology, environmental studies, evolution, and geology). You can develop any of these, as well as other interests, into questions for the group. Each student will be expected to draw upon her/his questions during the discussion. Participation points will not merely be based upon voicing one's opinion, but also on the student's level of interest, understanding of the material, and depth of inquiry. While the discussion leaders are expected to have a greater familiarity with the subject, questions should be directed to the group. On discussion days, each student will email the instructor his/her questions prior to class. Note: class participation scores are not only based on discussion days, but also on involvement in graduate student poster presentations.

2. Presentation and leading discussion.

Pairs of students will lead the discussion each week. Students will *meet with the instructor one week prior* to their presentation to review the subject and the format of their discussion. The students will be responsible for researching and providing background information on the topic subject (e.g., the importance of the topic/questions, a historical perspective, the techniques used to address the problem, the results, and where this research is going in the future), *providing the class with five questions for thought one week before* the presentation (that the instructor will post on Blackboard), giving an introduction to the readings (~20 min) and leading the discussion. In addition, the presenting students will provide the class with a bibliography of at least 10 articles associated with the topic (and used in the presentation) for further reading.

Discussion Rubric: The Discussion will be scored on a 50 point scale as follows:

	Thorough	Sufficient	Limited	Attempted
Presentation Content: Provided background information for placing the topic in the broader context of Quaternary Biogeography, related the readings to what had previously been covered in class, summarized the readings (presented hypotheses and predictions, results) while bringing up points for later discussion.	20	16	14	12
Presentation Clarity: Clear and understandable presentation, familiar with material (i.e., did not read from notes), provided images that helped to convey the concepts, explain results, and identify organisms.	10	8	7	6
Questions for Thought/Bibliography: On-time and insightful questions that directed readers to specific, important points and delved into deeper issues in Quaternary Biogeography. Helpful and relevant references for further reading.	5	3	2	1
Leading Discussion: Leaders were prepared with many questions to lead an engaging discussion in several directions, were able to answer questions about the readings and in a broader context, gave relevant summary to conclude discussions.	15	12	10	9

3. Midterm test.

For the first three weeks of the course, the instructor will provide background material on Quaternary biogeography to introduce the students to concepts and methodologies that will be brought up later during discussions. In order to evaluate the level of understanding prior to the student-led discussions, a background test will be given. Make-up exams will only be given in rare cases if the student is excused from the exam prior to the scheduled date and time.

Schedule: The course will meet twice a week to discuss the text and peer-reviewed articles on a wide range of issues in Quaternary Biogeography. During the first 4 weeks, the instructor will lecture and lead discussions on the fundamentals of Quaternary biogeography. In the subsequent 4 weeks, students will be expected to present the reading topics (as described above). The course will close with an in depth examination of regional histories.

Week	Wednesday	Friday
1 9/23, 25	*Introduction to Quaternary Biogeography* Reading: Ch. 1	*Proxy Climate Data* Reading: Ch. 2: 39-56
2 9/30,10/2	*Drivers of Climate Cycles* Reading: Ch. 2: 57-60	*Palynology & paleoenvironments* Reading: Ch. 2: 47-56; 3: 61-68
3 10/7,9	*Middens & Macrofossils* Reading: Ch. 2: 39-47	*Shifting Biomes* Reading: Ch. 3: 69-80; 4: 81-103 Thompson & Anderson 2000; Williams et al. 2003
4 10/14,16	***DeChaine in Spokaine***	***DeChaine in Spokaine***
5 10/21,23	**Mid-term Exam**	*Species-specific responses* Reading: Jackson & Overpeck 2000; Graham et al. 1996
6 10/28,30	*Phylogeography* Reading: Brunsfeld et al. 2001; Swenson & Howard 2005	*Inferences from Ancient DNA* Shapiro et al. 2004; Hofreiter 2008
7 11/4,6	*Adapting to Changing Climates* Reading: Davis and Shaw 2001; Gienapp et al. 2008	*Speciation during the Quaternary?* Reading: Willis & Niklas 2004; Weir & Schluter 2004
8 11/11,13	***No Class – Veteran's Day***	*Human migration* Reading: Hoffecker et al. 1993; Carto et al. 2008
9 11/18,20	*Mass Extinctions* Reading Ch. 12; Barnosky et al. 2004; Gillespie 2008	*The Holarctic*
10 11/25,27	***No Class - Thanksgiving***	***No Class Thanksgiving***
11 12/2,4	*The rest of the world*	**Poster presentations**

4. Graduate Research Poster.

Graduate students will have the opportunity to design a poster on a topic of her/his choosing that explores the impact of Quaternary environmental change on the distribution and diversity of a taxon (some monophyletic clade such as a species, family, etc.) or an ecosystem/region (i.e., Beringia or the PNW). Your text and the primary literature should provide many ideas for interesting topics. Typically, a poster presents research results and includes the following sections: Title, Introduction, Materials/Methods, Results, Conclusions, and Literature Cited. Because yours will be a review poster, you should format it in the same way, but you will be presenting hypotheses, methods, and data from the literature, and then concluding which hypothesis is best supported after evaluating all the evidence. Under the heading of your chosen topic, you should present a question of biological interest, provide an introduction that places your question in the broader context of Quaternary biogeography, clearly state the hypotheses (and their predictions) argued in the primary literature, a thorough discussion of the evidence supporting/refuting the hypotheses (including how those questions have been studied), and what conclusions you can draw from the review of the literature as well as the questions that still remain. Your poster should include citations (10-15) from the primary literature (which you have read and could answer questions about), such as *Evolution, Molecular Ecology, Quaternary Research,* and etc. For more info, visit the excellent advice on designing scientific posters at: www.swarthmore.edu/NatSci/cpurrin1/posteradvice.htm**.**

Poster Rubric: The poster will be scored on a 150 point scale.

	Thorough	Sufficient	Limited	Attempted
Background: Addresses the evolutionary question posed, presents hypotheses and predictions, gives background info and reasoning to explain and support argument, and provides the author's own conclusions	75	60	53	45
Data: Gives details and examples from the primary literature to explain and support ideas	20	16	14	12
Design: Concise, clear, easy to understand writing and organization of figures that flow logically, provide insight, and relates examples elegantly	15	12	10	9
Errorless grammar and spelling	5	3	2	1
Bibliography: 10-15 citations from the primary literature (not the web), appropriate format in text and bibliography	5	3	2	1
Presentation: Strong understanding of material, able to answer questions and relate study to broader issues.	30	24	21	18