

Taught by professor Bitty Roy, Tuesday/Thursday 8:30-9:50, room 16 Pacific

Official Office Hour: 2:00-3:00 Mondays, and by appointment (346 4520 or bit@uoregon.edu)

- A book on statistics is required for all: PDQ Statistics by G. R. Norman and D. L. Streiner. Third Edition. 2003. B.C. Decker, Inc.

- A PACKET containing all the assigned readings is available at the bookstore.

Date	Wk	Lecture Topic	Assignment (do discussion readings <u>before</u> the lecture listed for; readings will be discussed in the second half of the period)
30 Sept. Tues.	1	Why take an evolutionary approach?	Background: Stearns, S.C., 1999. Introducing evolutionary thinking. In: S.C. Stearns (Editor), Evolution in Health and Disease. Oxford University Press, pp. 3-15.
2 Oct. Thurs.	1	Introduction to Evolutionary Epidemiology	Background: Anderson, R. M., and R. M. May. 1979. Population biology of infectious diseases: Part I. <i>Nature</i> 280 :361-367. Discussion: Dobson, A. P. and E. R. Carper (1996). Infectious diseases and human population history. <i>BioScience</i> 46 (2): 115-125 Reference (PDQ): Regression (pp 53-56, Nominal variables (pp 2-3), survival analysis (pp116-121) correlation (pp105-106).
7 Oct. Tues.	2	Case Study: Malaria Virulence I tradeoffs	Background: Mackinnon, M. J. and A. F. Read (2004). Virulence in malaria: an evolutionary viewpoint." <i>Philosophical Transactions of the Royal Society London B</i> 359 : 965-986 Discussion: Long, G. H., B. H. K. Chan, et al. (2008). "Experimental manipulation of immune-mediated disease and its fitness costs for rodent malaria parasites." <i>Bmc Evolutionary Biology</i> 8 . Reference: Streiner (PDQ statistics): ANOVA (pp.41-52), ANCOVA (pp. 62-66), survival analysis (pp116-121) correlation (pp105-106). Article Review #1 Due (refer to this short article, in your packet, for advice on writing reviews: Waser, N. M., Price, M. V. and R. K. Grosberg. 1992. Writing an effective manuscript review. <i>Bioscience</i> 42 : 621-623.)

9 Oct. Thurs.	2	Case Study: Malaria Virulence II Competition among strains	<p>Background: Read, A. F. and L. H. Taylor (2001). The ecology of genetically diverse infections. <i>Science</i> 292(5519): 1099-1102.</p> <p>Discussion: Bell, A. S., J. C. De Roode, et al. (2006). Within-host competition in genetically diverse malaria infections: Parasite virulence and competitive success. <i>Evolution</i> 60(7): 1358-1371.</p> <p>Reference: Streiner (PDQ statistics): ANOVA (pp.41-52), ANCOVA (pp. 62-66)</p>
14 Oct Tues.	3	Case Study: Malaria Virulence III Vectors	<p>Background: Ebert, D. (1998). Experimental evolution of parasites. <i>Science</i> 282(5393): 1432-1435.</p> <p>Background: Elliot, S. L., F. R. Adler, et al. (2003). How virulent should a parasite be to its vector? <i>Ecology</i> 84(10): 2568-2574.</p> <p>Discussion: Ferguson, H. M., M. J. MacKinnon, et al. (2003). Mosquito mortality and the evolution of malaria virulence. <i>Evolution</i> 57(12): 2792-2804.</p> <p>Reference: Streiner (PDQ statistics): ANOVA (pp.41-52), ANCOVA (pp. 62-66), GLM (pp. 71-72),</p> <p>Title of paper due Grad students only: find & review extra paper</p>
16 Oct Thurs.	3	Case Study: Malaria Evolutionary History	<p>Background: Hafner, M. S. (1995). Molecular phylogenies and host-parasite cospeciation: Gophers and lice as a model system. <i>Philosophical Transactions of the Royal Society B</i> 349: 77-83.</p> <p>Discussion: Martinsen, E. S., S. L. Perkins, et al. (2008). A three-genome phylogeny of malaria parasites (<i>Plasmodium</i> and closely related genera): Evolution of life-history traits and host switches. <i>Molecular Phylogenetics and Evolution</i> 47(1): 261-273.</p>
21 Oct Tues.	4	Case Study: Malaria Control	<p>Discussion: Boete, C. and J. C. Koella (2003). Evolutionary ideas about genetically manipulated mosquitoes and malaria control. <i>Trends in Parasitology</i> 19(1): 32-38.</p> <p>MORE ON NEXT PAGE</p>

			<p>Discussion: Blanford, S., B. H. K. Chan, et al. (2005). Fungal pathogen reduces potential for malaria transmission. <i>Science</i> 308(5728): 1638-1641.</p> <p>Discussion: Gould, F. (2008). Broadening the application of evolutionarily based genetic pest management. <i>Evolution</i> 62(2): 500-510.</p> <p>Reference: Streiner (PDQ statistics): survival analysis (pp116-121),</p> <p>Article Review #2 Due (pick one of the three discussion papers)</p>
23 Oct Thurs	4	Zoonoses/ Emerging disease	<p>Background: Antia, R., R. R. Regoes, et al. (2003). The role of evolution in the emergence of infectious diseases. <i>Nature</i> 426(6967): 658-661</p> <p>Discussion: Jones, K. E., N. G. Patel, et al. (2008). Global trends in emerging infectious diseases. <i>Nature</i> 451(7181): 990-U4</p> <p>Reference: Streiner (PDQ statistics): logistic regression (pp 67-71), GLM (pp 71-72)</p> <p>Grad students only: find & review extra paper</p>
28 Oct. Tues.	5	Zoonoses/ Emerging disease	<p>Discussion: Dobson, A., I. Cattadori, et al. (2006). Sacred Cows and Sympathetic Squirrels: The Importance of Biological Diversity to Human Health. <i>Plos Medicine</i> 3(6): 714-718.</p> <p>Discussion: Ostfeld, R. S. and R. D. Holt (2004). Are predators good for your health? Evaluating evidence for top-down regulation of zoonotic disease reservoirs. <i>Frontiers in Ecology and the Environment</i> 2(1): 13-20.</p> <p>Article Review #3 Due</p>
30 Oct. Thurs.	5	Case Study: Flu	<p>Background: Earn, D. J. D., J. Dushoff, et al. (2002). Ecology and Evolution of the flu. <i>Trends in Ecology and Evolution</i> 17(7): 334-340.</p> <p>Discussion: how to analyze data from the cemetery to gain information about the 1919 flu.</p> <p>First draft of paper due (to your classmate)</p>

4 Nov. Tues.	6	Case Study: Flu	Meet in the Computer Lab (Klamath 33). We will be analyzing flu data today.
6 Nov. Thurs.	6	Case Study: Flu	<p>Discussion: Taubenberger JK, Reid AH, Lourens RM, Wang R, Jin G, Fanning TG (2005) Characterization of the 1918 influenza virus polymerase genes. <i>Nature</i> 437:889-893</p> <p>Discussion: Gibbs MJ, Gibbs AJ (2006) Molecular virology - Was the 1918 pandemic caused by a bird flu? <i>Nature</i> 440: E8-E8</p> <p>Discussion: Antonovics J, Hood ME, Baker C (2006) Was the 1919 flu avian in origin? <i>Nature</i> 440:E9</p> <p>Discussion: Taubenberger JK, Reid AH, Lourens RM, Wang R, Jin G, Fanning TG (2006) Tabenberger et. al. reply. <i>Nature</i> 440: E9-E10</p> <p>Analysis of cemetery flu data due</p>
11 Nov. Tues.	7	Costs of Resistance	<p>Discussion: Lohse, K., A. Gutierrez, et al. (2006). Experimental evolution of resistance in <i>Paramecium caudatum</i> against the bacterial parasite <i>Holospira undulata</i>. <i>Evolution</i> 60(6): 1177-1186.</p> <p>Reference: Streiner (PDQ statistics): logistic regression (pp 67-71), non parametric statistics (pp 101-112)</p> <p>Due, Grad students only: review of Lohse.</p>
13 Nov. Thurs.	7	Resistance in plants	<p>Background: Nurnberger, T., F. Brunner, et al. (2004). Innate immunity in plants and animals: striking similarities and obvious differences. <i>Immunological_Reviews</i> 198: 249-266.</p> <p>Discussion: Bergelson, J., M. Kreitman, et al. (2001). Evolutionary dynamics of plant R-genes. <i>Science</i> 292(5525): 2281-2285</p> <p>Return drafts to classmates</p>
18 Nov. Tues.	8	Pathogen spillover and host shifts	<p>Guest Lecture by Kai Blaisdell</p> <p>Discussion: Antonovics, J., M. Hood, et al. (2002). The ecology and genetics of a host shift: <i>Microbotryum</i> as a model system. <i>American_Naturalist</i> 160(S): S40-S53.</p> <p>Article Review #4 Due</p>

20 Nov. Thurs.	8	Experimental Evolution of Parasites	Guest Lecture by Levi Moran Discussion: Wong, D., D. Bazopoulos, et al. (2007). Genome-wide investigation reveals pathogen-specific and shared signatures in the response of <i>Caenorhabditis elegans</i> to infection. <i>Genome Biology</i> 8 (9): Art. No. R194.
25 Nov. Tues.	9	Resistance versus Tolerance	Background: Roy, B. A. and J. W. Kirchner (2000). Evolutionary dynamics of pathogen resistance and tolerance. <i>Evolution</i> 54 (1): 51-63. Discussion: Råberg, L., D. Sim, et al. (2007). Disentangling genetic variation for resistance and tolerance to infectious diseases in animals. <i>Science</i> 318 (5851): 812-814. Paper due to me, BOTH VERSIONS!
27 Nov. Thurs.	9	Holiday	Thanksgiving Holiday, No Class
2 Dec. Tues.	10	Parasite – mediated host changes	Background: Roy, B. A. (1993). Floral mimicry by a plant pathogen. <i>Nature</i> 362(6415): 56-58. Discussion: Lacroix, R., W. R. Mukabana, et al. (2005). Malaria infection increases attractiveness of humans to mosquitoes. <i>Plos Biology</i> 3 (9): 1590-1593.
4 Dec. Thurs	10	Presentations	Grad. Student presentations Take Home Final Exam handed out
12 Dec Friday		FINAL EXAM	8:00 a.m. Take home exam due by 10:00 today email to me: bit@uoregon.edu

Grading

Undergraduates

4 Article reviews 32% (=8% each)

1 statistical analysis 8%

Paper 40%

Final 20%

Graduate Students

7 Article reviews for 40%

1 statistical analysis 8%

Paper 20%

Oral Presentation of your term paper topic 20%

Final 20%

Papers, homework, and exams are due on the date stated in the Syllabus. **There will be no credit given for late work.** The only possible excuses are documented illness or death in the family. You are expected to do your own work; plagiarism will not be tolerated.

Discussion readings will be discussed during the class they are listed for. Read them before coming!

Background readings should also be done for the class they are listed for. This material is likely to be discussed in the lecture, and it will usually contain information that will make the other papers more useable. You will be examined on this material as well as the discussion material, so don't neglect it.

The paper is a large (40%) part of your grade. It is important that you write well, both for this class and as scientists. Therefore, you will also have to re-write your paper after a classmate has commented on it and before I see it.

General Rules for the paper: It will be a review of a topic related to the evolution of pathogens, parasites, or disease. The format of the review will be the same as is used by Trends in Ecology and Evolution (examples are on file with the reserve desk). It should have a title page, followed by a 100 word abstract, followed by 2,000-2,500 words of text (=10 pages of double-spaced text). Illustrations and boxes (see examples) do not count in the page total, and are encouraged. You must refer to at least 20 scientific papers or books. If the text is longer than 10 pages, or shorter than 8 pages, I will not accept it. The literature cited section (which is NOT part of the ten pages of text) should be done in the same style as TREE: in-text references are numbered (i.e., 1,2,3), and the references are then organized in the bibliography by number. Use the following format for your references:

- 1 Reymond, P. *et al.* (2000) *Differential gene expression in response to mechanical wounding and insect feeding in Arabidopsis*, *The Plant Cell* 12, 707-719

Rules for first Draft:

1. You must turn in a complete first draft on the due date 30, October 2008. If you do not turn in a draft on that day you automatically lose 10 points (25% of the total) on your paper. I will look at each paper and assess its completeness. Papers will lose points if they are too short, too long, or do not have at least 20 references.
2. I will check off the items mentioned in rule #3, shuffle the papers, and hand them back to a classmate.
3. Everyone in the class is then responsible for reading and making constructive criticisms of somebody else's paper. 8/40 points, or 20% of each person's paper grade will depend on their review of the other person's paper. I expect that you will help each other substantially. Here are some things to look for:

■ Abstract

- Does the abstract accurately summarize the paper?
- Is it short and clear?
- Does it make you interested in the paper?

■ Text organization, flow and clarity

- Does each paragraph begin with topic sentences?
- Does each paragraph present a coherent idea, and is this linked to the previous and following paragraphs?
- Does the order of idea presentation make sense? Could it be better?

- Is there anything that should be deleted?
 - Are there things (ideas, explanations, figures) that should be added?
 - **Figures**
 - Are they needed?
 - Are they clear?
 - **References**
 - Sufficient? Scholarship means referencing those who came before!
 - Should be a mixture of old (giving credit for the idea) and new (recent work)
 - Are they properly formatted in the bibliography?
 - **Writing style**
 - Are the explanations straightforward?
 - Are sentences too often long and complicated?
 - Is there too much jargon?
 - Did the author use parallel construction?
 - Check and repair grammar, spelling, and punctuation
 - Identify and delete passive voice
4. Exchange papers with your editor on 13 November 2008.
 5. Revise your paper. You don't have to follow your editor's suggestions, but you need to respond to them in a written document (see 6)
 6. Turn in the final version, plus a short "response to the reviews" in which you detail your response to the editor (sometimes you will agree with their comments, sometimes not), plus the first draft to me on: 25 November 2008.

A few Ideas for Paper Topics

- How has West Nile Virus evolved since its introduction to the New World?
- Are hybrids sources, sinks or bridges for disease?
- The evolution of Mutualism, does it necessarily evolve from Parasitism?
- Why do so many parasites have complex lifecycles?