Syllabus for Biology 250, Special Topic in Biology, Fall 2008

EVOLUTION OF SPECIES INTERACTIONS
Tuesdays 1-3pm, Spieth Hall 3365

Instructor
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CLASS OVERVIEW:
This broad and integrative seminar will review seminal papers as well as recent research on the evolution of species interactions. We will discuss interactions across the tree of life, and topics will not be taxonomic in focus. Discussion topics include i) escalation/arms races, ii) predator-prey coevolution, iii) plant-herbivore coevolution, iv) pathogen virulence evolution, v) evolution of symbioses, vi) the evolution of inter-specific signals, vii) the evolution and breakdown of specialization and viii) phylogenetic approaches to the study of species interactions. In the first week of class I will introduce the subject in general, and following that participating students will lead discussion on one of the chosen papers for each meeting. For each week a classic paper or integrative review is often coupled with a relatively new empirical paper.

WEEKLY TOPICS

Week	*Date*	*Topic*
1	30, Sept	Introduction
2	7, Oct.	General theory: cooperation, conflict & escalation
3	14, Oct.	The predator versus prey arms race
4	21, Oct.	Plants versus herbivores
5	28, Oct.	Host-symbiont evolution ~ Guest Instructor
6	4, Nov.	Host-Pathogen evolution
	11, Nov.	University Holiday
7	18, Nov.	Mimicry, honesty & deception
8	25, Nov.	Evolution of specialization
9	2, Dec.	Coevolution: cophylogenies & trait mapping

ASSIGNED READINGS

Week	*Date*	*Readings*
1 *Introduction*	30, Sept	No readings
2 *General theory*	7, Oct. Sylvia Ale	• Vermeij (1994) The evolutionary interaction among species – Selection, escalation and coevolution *Ann. Rev. of Ecol. Syst.* 25:219-236 **(L)** • Sachs et al. (2004) The evolution of cooperation *Q. Rev. Biol.* 79:135-160 **(L)**.
3 *Predator prey Arms races*	14, Oct. Anne Kyle	• Abrams (2000) The evolution of predator-prey interactions: theory and evidence *Ann. Rev. of Ecol. Syst.* 31: 79-105 **(L)** • Hanifin et al. (2008) Phenotypic mismatches reveal escape from arms-race co-evolution *PLoS Biology* 6: 471-482 **(L)**
4 *Plants vs. herbivores*	21, Oct. Carla Andrew	• Berenbaum et al. (1986) Constraints on chemical coevolution – wild parsnips and the parsnip webworm *Evolution* 40: 1215-1228 **(L)** • Fine et al. (2004) Herbivores promote habitat specialization by trees in Amazonian forests *Science* 305: 663-665
5 *Symbionts*	28, Oct. Laura Allison	• Maynard Smith & Szathmary (1995) 'Symbiosis' in *The Major Transitions in Evolution.* Chapter 11, *pp.* 187-199 **(L)** • McCutcheon & Moran (2007) Parallel genomic evolution and metabolic interdependence in an ancient symbiosis *PNAS* 104: 19392-19397
6 *Pathogens*	4, Nov. Anne Mart	• Ebert & Herre (1996) The evolution of parasitic diseases. *Parasitology today* 12: 96-101 • de Roode et al. (2008) Virulence-transmission tradeoffs and population divergence in virulence in a naturally occurring butterfly parasite *PNAS* 105: 7489-7494
	11, Nov.	No Class ~ University Holiday
7 *Mimicry, honesty & deception*	18, Nov. Mart Andrew Kyle	• Mallet & Joron (1999) Diversity in mimicry: paradox or paradigm? *TREE* 13: 461-466 • Alatalo & Mappes (1996) Tracking the evolution of warning signals *Nature* 382:708-710 • Marchetti (1992) Costs to host defense and the persistence of parasitic cuckoos *Proc. Roy. Soc. B.* 248: 41-45
8 *Evolution of specialization*	25, Nov. Ale Adena Carla	• Bernays & Graham (1988) On the evolution of host specificity in phytophagous arthropods *Ecology* 69: 886-892 • Kelley & Farrell (1998) Is specialization a dead end? The phylogeny of host use in the Dendroctonus bark beetles (Scolytidae) *Evolution* 52-1731-1743 • Johnson & Steiner (2000) Generalization versus specialization in plant pollination systems *TREE* 15: 140-143
9 *Coevolution*	2, Dec. Swanne Allison	• Page & Charleston (1998) Trees within trees: phylogeny and historical association *Tree* 13: 356-359 • Currie et al. (2003) Ancient tripartite coevolution in the attine ant-microbe symbiosis *Science* 299: 386-389