

Life-History Evolution — General Info

Spring 1997

333 Science II

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Texts: Roff, D. A. 1992. The evolution of life histories: theory and analysis. Chapman and Hall, NY.

Stearns, S. C. 1992. The evolution of life histories. Oxford University Press, NY.

Course Content: The objective of this course is to develop a working understanding of current life-history theory and models. Life-history strategies are described by the set of reproductive rates and survival probabilities experienced over a lifespan. Of particular interest are the characters that contribute to the interaction between reproduction and survival. These characters include age or size at first reproduction, offspring size and number, parental care, senescence, and reproductive effort. We will begin the course with an introduction to life-history theory and build a framework from which we will be better able to understand the primary literature. Once we are comfortable with our understanding of the “basics”, we will explore the main topics of the evolution of life histories through readings from the recent primary literature.

Classes: Everyone will be responsible for choosing and leading at least one discussion. Attendance, preparation, and participation will be the bases for evaluation in this course.

Tentative Schedule and Topics

<u>WEEK</u>	<u>TOPIC</u>
1	Introduction and organization
2	The “Basics” [Chapter 3 of Roff] Partridge and Harvey. 1988. The ecological context of life history evolution. <i>Science</i> 241:1449-1455.
3	Constraints: Genetic and Phenotypic Partridge and Sibly. 1991. Constraints in the evolution of life histories. <i>Phil. Trans. R. Soc. Lond. B</i> 332:3-13. Olsson and Shine. 1997. The limits to reproductive output: offspring size versus number in the sand lizard (<i>Lacerta agilis</i>). <i>Am. Nat.</i> 149:179-188.
4	Age/Stage Structured Populations [Chapter 2 of Stearns] Brault and Caswell. 1993. Pod-specific demography of killer whales (<i>Orcinus orca</i>). <i>Ecology</i> 74:1444-1454.
5	Age or Size at First Reproduction [Chapter 6 of Stearns] Semlitsch et al. 1990. Paedomorphosis in <i>Ambystoma talpoideum</i> : maintenance of population variation and alternative life-history pathways. <i>Evolution</i> 44:1604-1613.
6	Reproductive Effort: Costs Reznick. 1985. Costs of reproduction: an evaluation of the empirical evidence. <i>Oikos</i> 44:257-267. Winfield and Townsend. 1983. The cost of copepod reproduction: increased susceptibility to fish predation. <i>Oecologia</i> 60:406-411.
7	Reproductive Effort: Effort [Chapter 8 of Roff]
8	Reproductive Schedules Bradshaw. 1986. Variable iteroparity as a life-history tactic in the pitcher plant mosquito <i>Wyeomyia smithii</i> . <i>Evolution</i> 40:471-478. Maltby and Calow. 1986. Intraspecific life-history variation in <i>Erpobdella octoculata</i> (Hirudinea: Erpobdellae). II. Testing theory on the evolution of semelparity and iteroparity. <i>J. Anim. Ecol.</i> 55:739-750.
9	Spring Break
10	Parental Care Parental tactics 1: variation in care in relation to benefits. Pp 155-172 in Clutton-Brock, T. 1991. <i>The evolution of parental care</i> . Princeton Univ. Press, New Jersey.

Smith. 1968. The advantage of being parasitized. *Nature* 219:690-694.

11 **Maternal Effects**

Bernardo. 1996. Maternal effects in animal ecology. *Am. Zool.* 36:83-105.

Kaplan. 1992. Greater maternal investment can decrease offspring survival in the frog *Bombina orientalis*. *Ecology* 73:280-288.

12 **Offspring Size/Clutch Size**

Ferguson and Fox. 1984. Annual variation of survival advantage of large juvenile side-blotched lizards, *Uta stansburiana*: its causes and evolutionary significance. *Evolution* 38:342-349.

Sinervo and Doughty. 1996. Interactive effects of offspring size and timing of reproduction on offspring reproduction: experimental, maternal, and quantitative genetic aspects. *Evolution* 50:1314-1327.

13 **Metamorphosis**

Newman. 1992. Adaptive plasticity in amphibian metamorphosis. *Bioscience* 42:671-678.

Pfennig. 1990. The adaptive significance of an environmentally-cued developmental switch in an anuran tadpole. *Oecologia* 85:101-107.

14 **Senescence**

Rose. 1984. The evolution of animal senescence. *Can J. Zool.* 62:1661-1667.

Tatar et al. 1993. Long-term cost of reproduction with and without accelerated senescence in *Callosobruchus maculatus*: analysis of age-specific mortality. *Evolution* 47:1302-1312.

15 **David Reznick's Recent Work**

Reznick and Bryga. 1996. Life-history evolution in guppies (*Poecilia reticulata*: Poeciliidae). V. Genetic basis of parallelism in life histories. *Am. Nat.* 147:339-359.

Reznick et al. 1997. Evaluation of the rate of evolution in natural populations of guppies (*Poecilia reticulata*). *Science*, in press.

16 **David Reznick Seminar**
4:10 Rates of life-history evolution