

Readings for week 5 – **Adaptation/Phenotypic Plasticity**Useful and Classic References on the Definition and Measurement of Adaptation:

- Brandon, R.N. 1990. *Adaptation and Environment*. Princeton University Press, Princeton, NJ.
- Burian, R. M. 1983. Adaptation. Pp. 287-314 in *Dimensions of Darwinism: themes and counterthemes in twentieth-century evolutionary theory*, M. Green (ed.). Cambridge U. Press, Cambridge, UK. [How important is history and an engineering perspective in defining fitness and adaptation?]
- Gould, S.J., and R.C. Lewontin. 1979. The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme. *Proc. R. Soc. Lond. B* 205:581-598. [Are all traits adaptive, or are we just inventing “just-so-stories”?]
- Gould, S.J., and E.S. Vrba. 1982. Exaptation – a missing term in the science of form. *Paleobiology* 1:4-15. [Do adaptive phenotypes necessarily evolve in response to current function?]
- Mitchell-Olds, T., and R.G. Shaw. 1990. Comments on the causes of natural selection. *Evolution* 44(8):2158. [a pointed reply to Wade and Kalisz (1990)]
- Reeve, H.K., and P.W. Sherman. 1993. Adaptation and the goals of evolutionary research. *Quarterly Review of Biology* 68(1):1-32. [Challenges the historical perspective on the definition of adaptation and proposes a simple definition of adaptation based on current, realized relative fitness]
- Wade, M.J., and S. Kalisz. 1990. The causes of natural selection. *Evolution* 44(8):1947-1955. [Integrates current methods of estimating natural selection (selection gradients) into a testable definition of adaptation]
- Williams, G.C. 1966. *Adaptation and natural selection: a critique of some current evolutionary thought*. Princeton U. Press, Princeton, NJ. [an early classic treatment of the problem of defining adaptation and fitness. Williams’ (1966) seminal, “Adaptation and Natural Selection” marks a turning point in our thinking about the study of evolution by natural selection, and set the stage for the advances made (particularly by behavioral ecologists in countering group selectionist ideas) in the 1970’s by Hamilton, Trivers, Wilson, *et al.*]
- Williams, G.C. 1992. *Natural Selection: Domains, Levels and Challenges*. Oxford University Press, Oxford, UK. [Updates and expands many of the ideas in Williams (1966)]

Some (mostly recent, empirical) References on Phenotypic Plasticity and Local Adaptation

- Agrawal, A.A. 1998. Induced responses to herbivory and increased plant performance. *Science* 279:1201-1202.
- Agrawal, A.A., J.K. Conner, M.T.C. Johnson, and R. Wallsgrove. 2002. Ecological genetics of an induced plant defense against herbivores: additive genetic variance and costs of phenotypic plasticity. *Evolution* 56(11):2206-2213.
- Baldwin, I.T. 1998. Jasmonate-induced responses are costly but benefit plants under attack in native populations. *PNAS* 95:8113-8118.
- Donohue, K., et al. 2001. Adaptive divergence in plasticity in natural populations of *Impatiens capensis* and its consequences for performance in novel habitats. *Evolution* 55(4):692-702.

- Dudley, S.A. 1996a. Differing selection on plant physiological traits in response to environmental water availability: a test of adaptive hypotheses. *Evolution* 50(1):92-102.
- Dudley, S.A. 1996b. The response to differing selection on plant physiological traits: evidence for local adaptation. *Evolution* 50(1):103-110.
- Dudley, S.A., and J. Schmitt. 1996. Testing the adaptive plasticity hypothesis: density-dependent selection on manipulated stem length in *Impatiens capensis*. *American Naturalist* 147:445-465.
- Greene, E. 1989. A diet-induced developmental polymorphism in a caterpillar. *Science* 243:643-646.
- Harvell, C.D. 1998. Genetic variation and polymorphism in the inducible spines of a marine bryozoan. *Evolution* 52(1):80-86.
- Losos, J.B., et al. 2000. Evolutionary implications of phenotypic plasticity in the hindlimb of the lizard *Anolis sagrei*. *Evolution* 54(1):301-305.
- Pfennig, D.W., P.J. Murphy. 2002. How fluctuating competition and phenotypic plasticity mediate species divergence. *Evolution*: 56(6):1217-1228.
- Pigliucci, M. 2001. *Phenotypic Plasticity: Beyond Nature and Nurture*. Johns Hopkins Univ. Press, Baltimore, MD.
- Rodriguez, R.L., and M.D. Greenfield. 2003. Genetic variance and phenotypic plasticity in a component of female mate choice in an ultrasonic moth. *Evolution* 57(6):1304-1311.
- Schlichting, C.D., and M. Pigliucci. 1998. *Phenotypic Evolution: A Reaction Norm Perspective*. Sinauer Assoc., Inc., Sunderland, MA.
- Sultan, S.E., and H.G. Spencer. 2002. Metapopulation structure favors plasticity over local adaptation. *American Naturalist* 160:271-283.
- Via, S. 1994. The evolution of phenotypic plasticity: what do we really know? Pp. 35-57 in L.A. Real (ed.), *Ecological Genetics*. Princeton Univ. Press, Princeton, NJ. [a very good summary of this topic as of 1994 – a good supplement to Pigliucci's chapter in the *Evolutionary Ecology* text]