

Kattia Comprehensive Exam topics  
From Steve Keller

Main themes I'll focus on:

1. Local adaptation

What is it (how defined)? How is it measured experimentally? How is local adaptation expected to vary with different kinds of distance (geographic, ecological, phylogenetic...)?

2. Genetic architecture of trait variation under admixture / hybridization / inbreeding & outbreeding

What is the genetic basis of trait divergence among pops? How is genetic architecture revealed by among-pop or species crosses? What are the potential consequences of admixture/hybridization? Under what conditions would you predict these different outcomes?

3. Study system (*A. thaliana* -- adaptation, history, genetics...)

What do we know about the ecology of *A. thaliana* -- its breeding system, population structure, extent of adaptation among pops, demographic history?

Some important references:

Theme 1: Genetics of local adaptation

Kawecki, Tadeusz J., and Dieter Ebert. "Conceptual issues in local adaptation." *Ecology letters* 7.12 (2004): 1225-1241.

Linhart, Yan B., and Michael C. Grant. "Evolutionary significance of local genetic differentiation in plants." *Annual Review of Ecology and Systematics* (1996): 237-277.

Galloway, Laura F., and Charles B. Fenster. "Population differentiation in an annual legume: local adaptation." *Evolution* 54.4 (2000): 1173-1181.

optional:

Anderson, Jill T., John H. Willis, and Thomas Mitchell-Olds. "Evolutionary genetics of plant adaptation." *Trends in Genetics* 27.7 (2011): 258-266.

Theme 2: Genetic consequences of admixture/introgression/hybridization

Lynch, Michael. "The genetic interpretation of inbreeding depression and outbreeding depression." *Evolution* (1991): 622-629.

Fenster, C.B. and Galloway, L.F. (2000) Population differentiation in an annual legume: genetic architecture. *Evolution* 54, 1157–1172

Verhoeven, Koen JF, et al. "Population admixture, biological invasions and the balance between local adaptation and inbreeding depression." *Proceedings of the Royal Society B: Biological Sciences* 278.1702 (2011): 2-8.

Rieseberg, Loren H., Margaret A. Archer, and Robert K. Wayne. "Transgressive segregation, adaptation and speciation." *Heredity* 83.4 (1999): 363-372.

optional:

Etterson, Julie R., Stephen R. Keller, and Laura F. Galloway. "Epistatic and cytonuclear interactions govern outbreeding depression in the autotetraploid *Campanulastrum americanum*." *Evolution* 61.11 (2007): 2671-2683.

Rieseberg, Loren H., and Shanna E. Carney. "Plant hybridization." *New phytologist* 140.4 (1998): 599-624.

Rieseberg, Loren H., et al. "The genetic architecture necessary for transgressive segregation is common in both natural and domesticated populations." *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences* 358.1434 (2003): 1141-1147.

Theme 3: Arabidopsis and its history

Platt, Alexander, et al. "The scale of population structure in *Arabidopsis thaliana*." *PLoS genetics* 6.2 (2010): e1000843.

François, Olivier, et al. "Demographic history of European populations of *Arabidopsis thaliana*." *PLoS genetics* 4.5 (2008): e1000075.

Hancock, Angela M., et al. "Adaptation to climate across the *Arabidopsis thaliana* genome." *Science* 334.6052 (2011): 83-86.

Sharbel, T.F. et al. (2000) Genetic isolation by distance in *Arabidopsis thaliana*: biogeography and post-glacial colonization of Europe. *Mol. Ecol.* 9, 2109–2118

Mitchell-Olds, Thomas. *Arabidopsis thaliana* and its wild relatives: a model system for ecology and evolution." *Trends in Ecology & Evolution* 16.12 (2001): 693-700.