

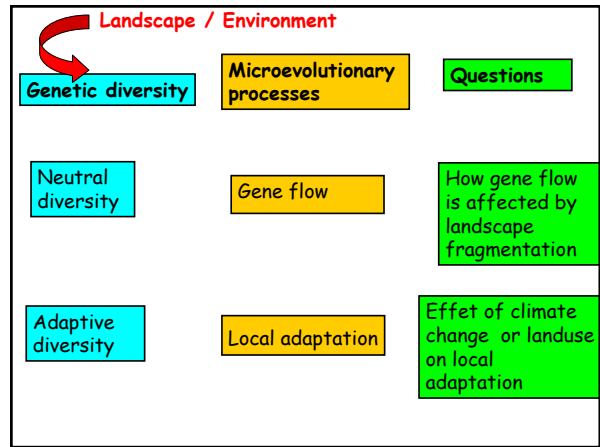
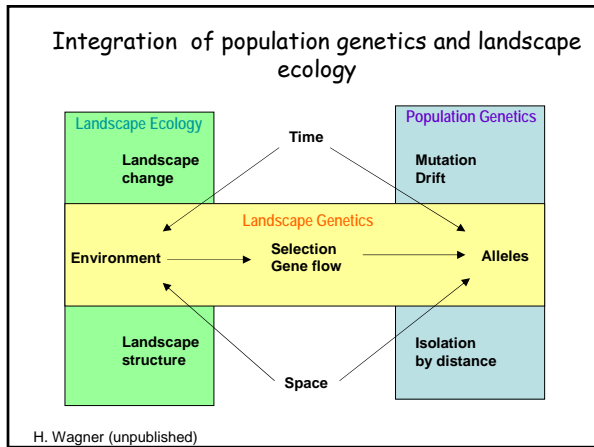
Landscape genetics

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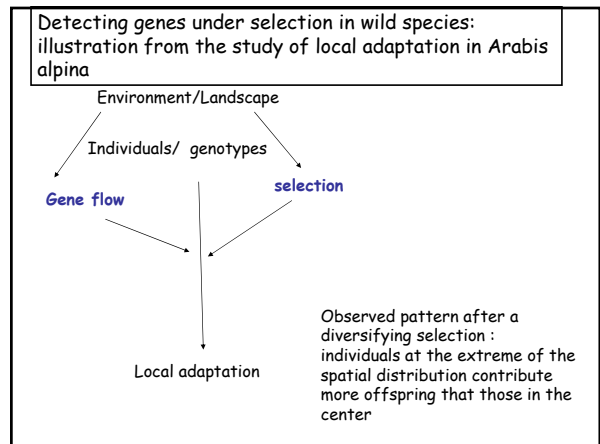
Landscape genetics: An emergent research field (Manel et al. 2003)

Aims to analyze the **interactions** between landscape and micro-evolutionary processes to better understand the two processes at the origin of genetic diversity and local adaptation : **gene flow, selection.**



Landscape Genetics: an active emergent field

- Workshop Landscape Genetics (funded by the ESF, oct 2008)
- Developing Best Practices For Testing Landscape Effects on Gene Flow - Distributed Graduate Seminar (H. Wagner, L. Waits) (The National Center for Ecological Analysis and Synthesis, 17-27 march 2009) NCEAS
- An Interdisciplinary Approach To Advancing Landscape Genetics" (Michael Rosenberg, Bryan Epperson, and Andrew Storfer)



Assumption
 Replicated clinal variation along parallel environmental gradients provide some of the most convincing evidence for natural selection in the wild (Endler 1986)

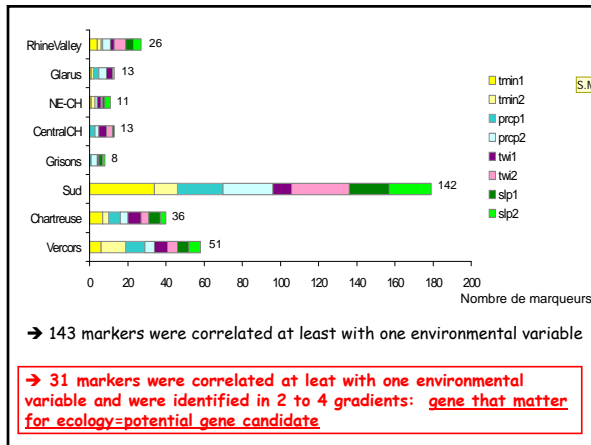
FIG. 1. Models of selection on specific traits in ecological genetics. Three different neutral models illustrate how genes that matter in ecology will show variation across gradients that are distinct from neutral loci. (A) Directional selection is implied at loci that track environmental gradients while neutral markers do not. (B) Stabilizing or balancing selection is implied at loci that fail to show isolation by distance where many neutral loci do. (C) Loci that show stronger clinal variation than neutral loci sampled across contact zones can imply habitat-specific selection, or selection against genetic incompatibilities. Statistical methods for identifying these loci are provided by Lewontin and Krakauer (1973) and Beaumont (2005).

(Schmidt et al 2008, Ecology)

Arabis alpina
 99 sites in Switzerland (Hoderegger R., WSL, Zurich)
 99 sites in France

8 replicated gradients
 1000 AFLP
 locus presence/absence
 environment
 Logistic regression

B. Poncet PhD



perspectives

- sequencing of genes that matter for ecology
- Comparison with reference sequences
- Known gene? Known functions?

It can help us to make putative assumption about the involvement of genes in local adaptation

And after?

- From an ecological perspective: potential to identify genes that matter from ecology - possibility to add a phenotypic information. Not done in our study...
- We start also field experimentations
- What are the **functions** of these gene? Are they candidate genes?
 → link this work to molecular / functional biology. We start this genomic work in Grenoble (a new recruited researcher).

Extending Genomics to Natural Communities and Ecosystems
 Whitham, et al. (2008) Science

Plant Genomes

Merging genomic and ecology (community-ecosystem) → Understanding of how ecosystem are maintained through evolutionary time

Focus on genome-based interactions among **foundation species**: ecology and evolution of complex system

S.M.1 RESULTATDES DIFF2RENTES CORRELATIONNS
Stéphanie Manel; 26/03/2009