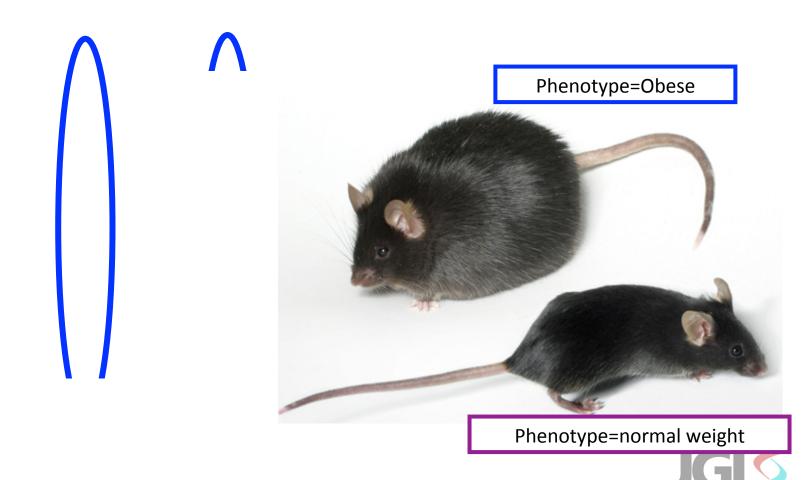
Resequencing at the JGI

Wendy Schackwitz Joel Martin Anna Lipzen Nicole Johnson

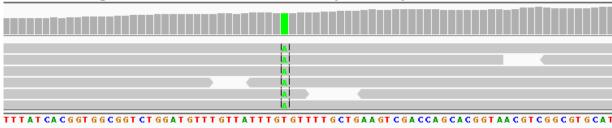
What is Resequencing?

How do differences in genotype cause differences in phenotype?

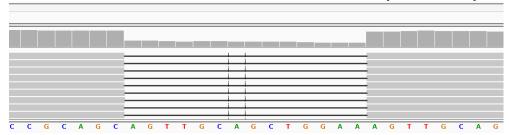


Types of differences

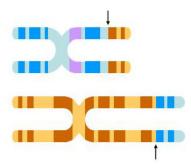
Single Nucleotide Polymorphisms (SNPs)



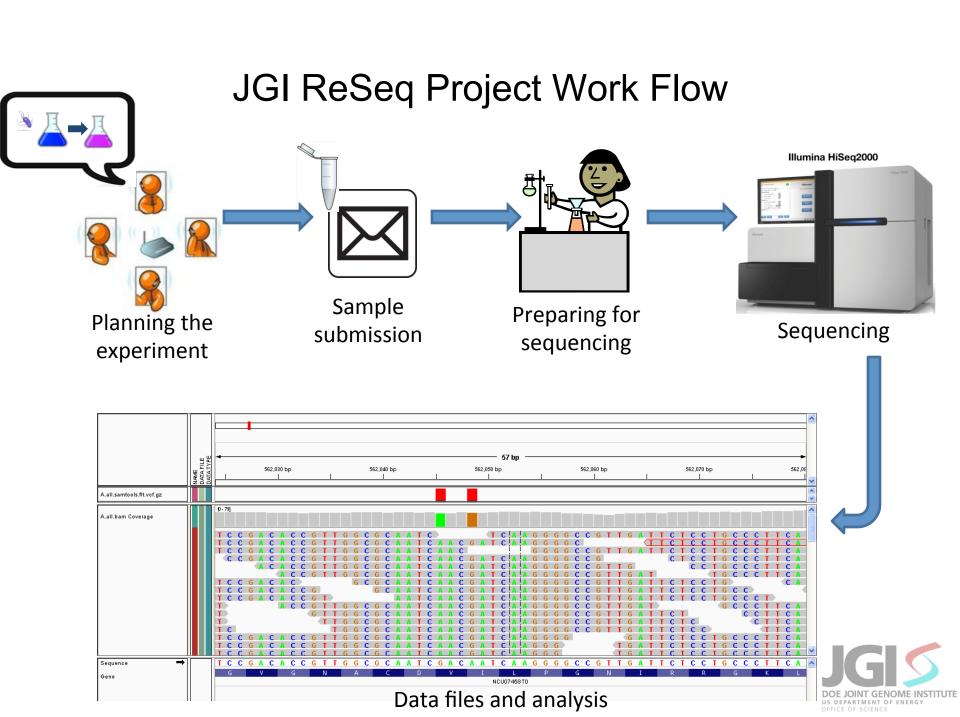
Insertion Deletion Events (InDels)



Structural Variation (Inversions, Translocations, Duplications)





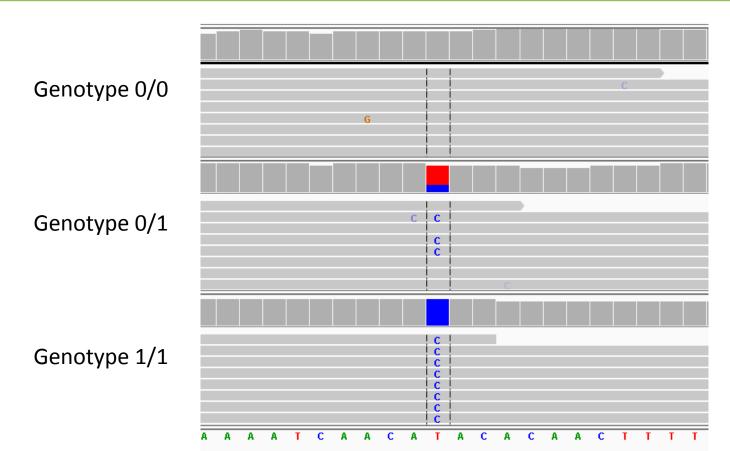


Resequencing Pipeline

Aligning Reads to Ref Finding and documenting variants Tool: Samtools/bcftools Outputs: Task: SNP & Strain#1.vcf.gz Small Indels Strain#2.vcf.gz merged.vcf.gz Task: Align Starting Inputs: Tool: BWA ref.fasta Outputs: Strain#1.fastq.gz · Strain#1.bam Tool: BreakDancer Strain#2.fastq.gz Strain#2.bam Outputs: Strain#1.bd.max.filtered.xls Strain#2.bd.max.filtered.xls Tool: Pindel Tool: depth under 3 Tool: vcf-merge Task: Structural Outputs: Outputs: Output: Variation Strain#1.depth.under.3 Strain#1.pindel.vcf.gz merged.pindel.vcf.gz Strain#2.depth.under.3 Strain#2.pindel.vcf.gz Tool: Non-starters Outputs: Strain#1.nonstarter.txt Strain#2.nonstarter.txt

Documenting Variation: Variant Call Format (vcf) reports

#CHROM	POS	ID	REF	ALT	QUAL	FILTER	INFO	FORMAT	Sample 1	Sample 2	Sample 3
Chr01	32172		Т	С	999	PASS	DP=409;	GT:PL	0/0:	0/1:	1/1:
Chr01	33744		G	Α	999	PASS	DP=474;	GT:PL	1/1:	1/1:	0/0:
Chr01	33909		GCACAC	GCACACAC	999	PASS	INDEL	GT:PL	1/1:	1/1:	1/1:





Genetic Diversity in Wild Poplar

Sample 1,000 Trees



= Common Garden = Original Sample Establish Common Gardens



Susceptibility to Disease



Collect Phenotypes

Reseg Each Tree

Tree A

Tree B

Correlate
Phenotype w/
genotype



Poplar and Laccaria A ReSeq success story



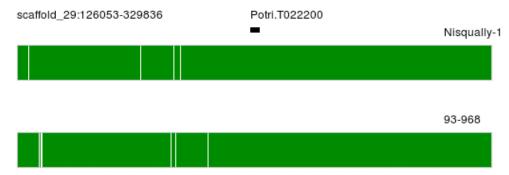




Not all poplar can interact w/ Laccaria

- Populus trichocarpa <->
- Populus deltoides X nope

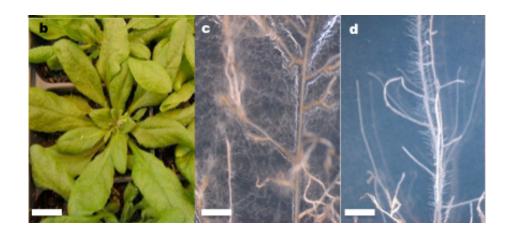






Proving Causative Variant

- Arabidopsis
 - does not have gene,
 - cannot interact with Laccaria
- Inserted gene Potri.T022200 into Arabidopsis and Viola!





Conclusion





Acknowledgements

- ReSeq team
 - Joel Martin
 - Anna Lipzen
 - Nicole Johnson
- Poplar Team
 - Jerry Tuskan et al

