

# Genomics and *D. sukukii*

- Basic biology is key to understanding applied problems
- Genomics allows comprehensive attack on scientific problem
- Key to understanding variation between individuals and recent evolution of key traits
- Will draw student talent\*\*

# *D. suzukii* is related to the genetic model system, *D. melanogaster*

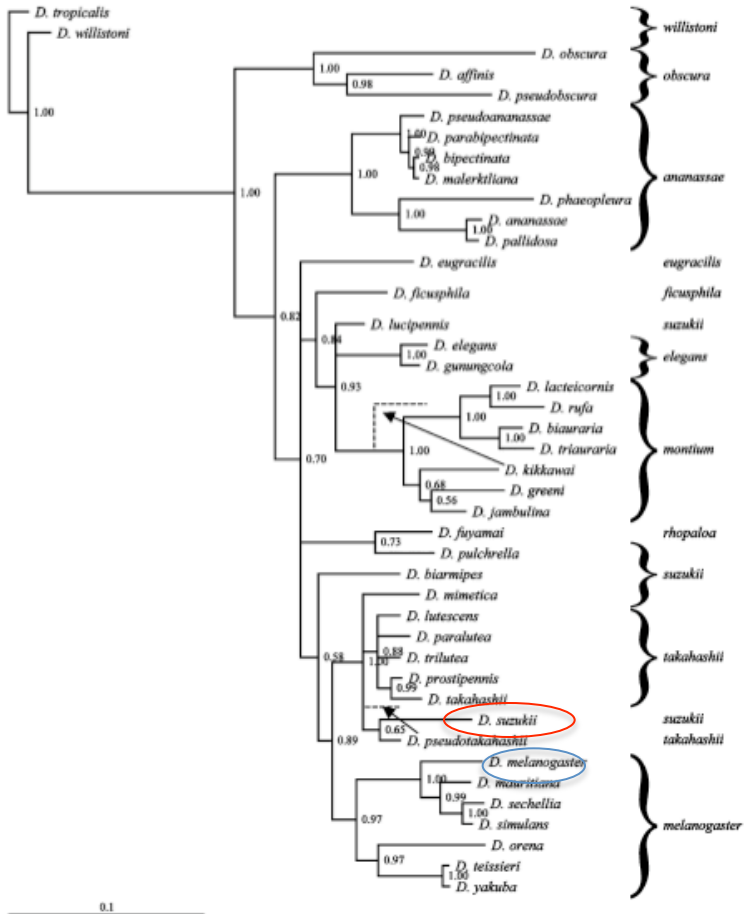


photo courtesy of N. Gompel



# Genomics in the *Drosophila* system

- *D. melanogaster* and 11+ others sequenced
- *D. melanogaster* annotation
  - Genes
  - Gene expression
  - Mutant phenotype
  - Pathways/interactions
  - Other functional information and literature

Genetic technologies being transported to other species

# Screenshot of gene in Flybase

FB2009\_09, released October 16th, 2009

**FlyBase** Gene Dmel\Pkd2

Home Tools Files Species Documents Resources News Help Archives Jump to Gene Go

Profile Manager

General Information			
Symbol	Dmel\Pkd2	Species	<i>D. melanogaster</i>
Name	Polycystic kidney disease gene-2	Annotation symbol	CG6504
Feature type	<a href="#">protein_coding_gene</a>	FlyBase ID	FBgn0041195
Gene Model Status	Current	Stock availability	4 publicly available

Genomic Location			
Chromosome (arm)	2L	Recombination map	
Cytogenetic map	33E3-33E3	Sequence location	2L:12,398,300..12,402,023 [+]

Genomic Maps

FlyBase [GBrowse](#)

modENCODE [GBrowse](#)

Decorated FastA

Gene region

- Summary Information
- Detailed Mapping Data
- Gene Model & Products
- Expression Data
- Alleles & Phenotypes
- Gene Ontology: Function, Process & Cellular Component ( 5 unique terms )
- Sequence Ontology: Class of Gene
- Interactions & Pathways
- Orthologs
- Stocks & Reagents
- Other Information
- External Crossreferences & Linkouts
- Synonyms & Secondary IDs ( 12 )
- References ( 27 )

# *D. sukuzii*

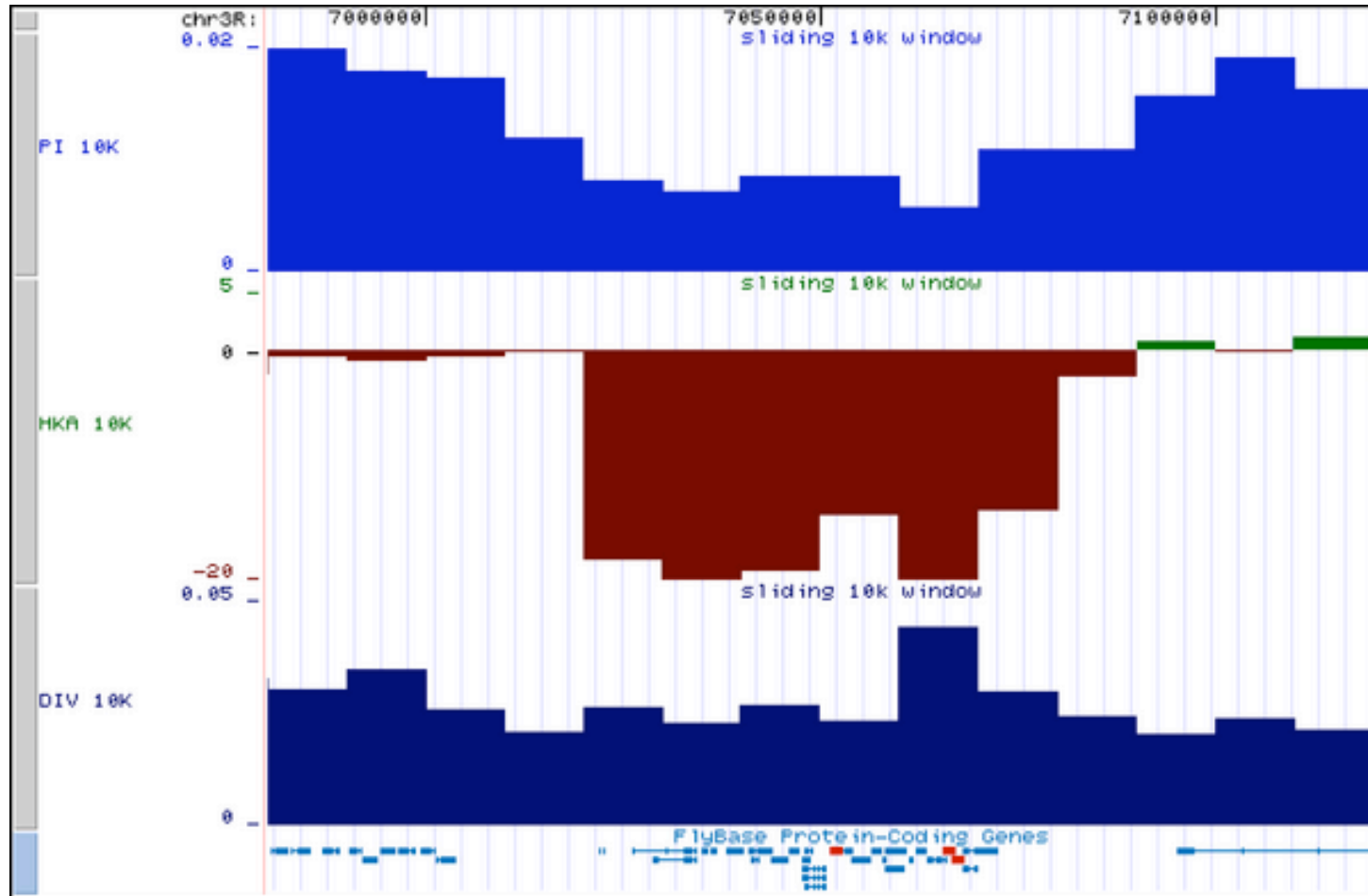
- Asian origin
  - What are properties of ancestral populations?
- Recent introduction to new habitats
  - How is it evolving to new selection pressures?
    - Higher temps
    - Insecticides
    - Many phenotypes likely evolving
- Basic biology poorly known

# Population genomics of colonization and adaptation

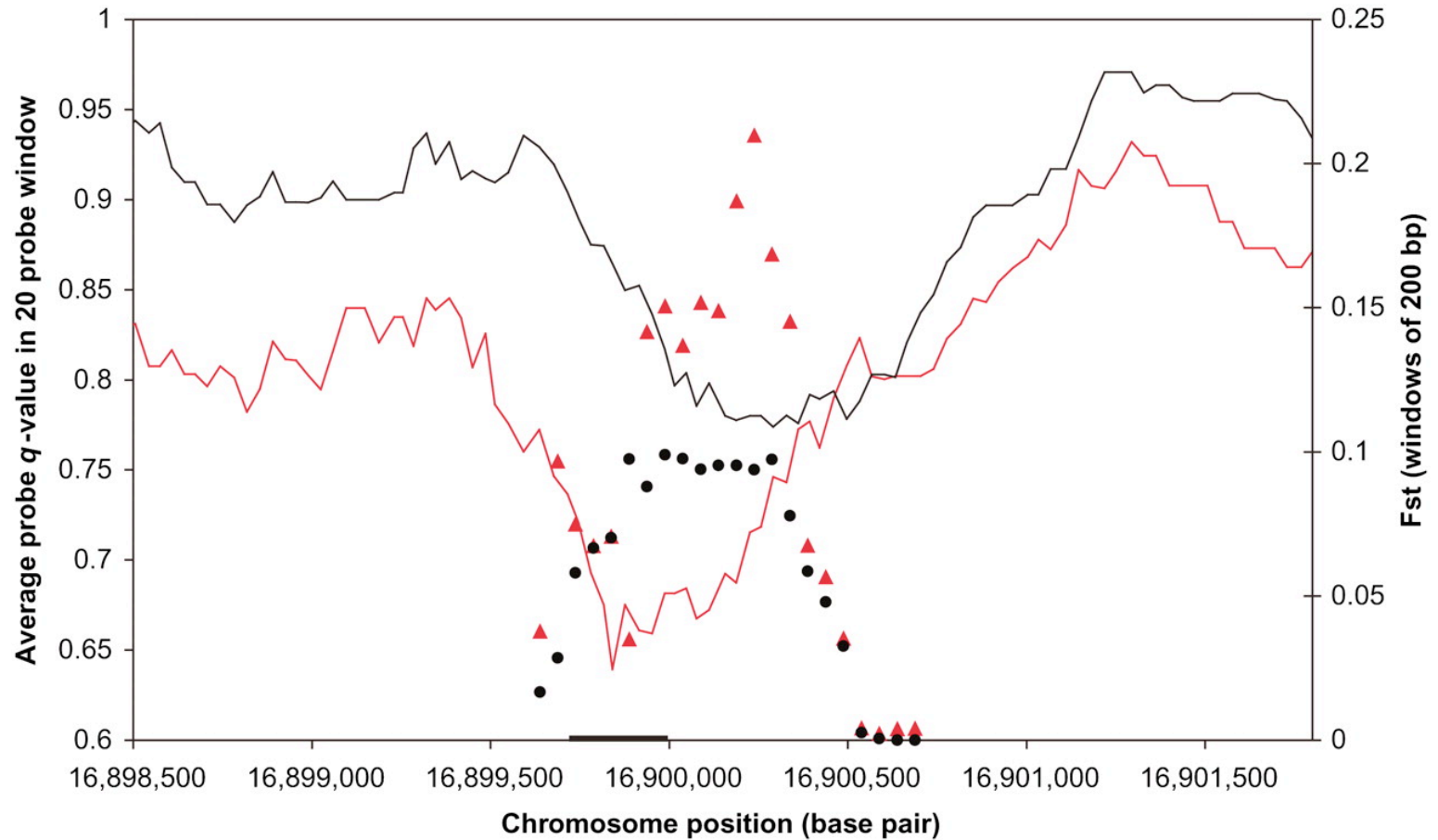
- *D. melanogaster* and *D. simulans* African in origin
- Recent spread to non-African regions associated with humans
- Measure variation within and species across genome
- Adaptation to new habitats
  - E.g., latitudinal clines for many phenotypes

These model system species and *D. sukikii* have recently expanded ranges and are under strong selection

# Detecting adaptive evolution



# Local adaptation in *D. melanogaster*





# Population genomics of colonization and adaptation

- What genomics can do for you:
  - Describe the broad scale patterns of genetic variation in ancestral vs. recently derived populations
  - Provide unbiased view of how selection in new populations is causing evolution
    - Generate new hypotheses on phenotypes
  - Provide tools for experimental investigation of phenotypes of interest
    - E.g., insecticide resistance

# Genomics and *D. sukuzii*

- Genomics allows comprehensive attack on scientific problem
- Key to understanding variation between individuals and recent evolution of key traits
- Will draw student talent\*\*