Genomics and *D. suzukii*

- 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*

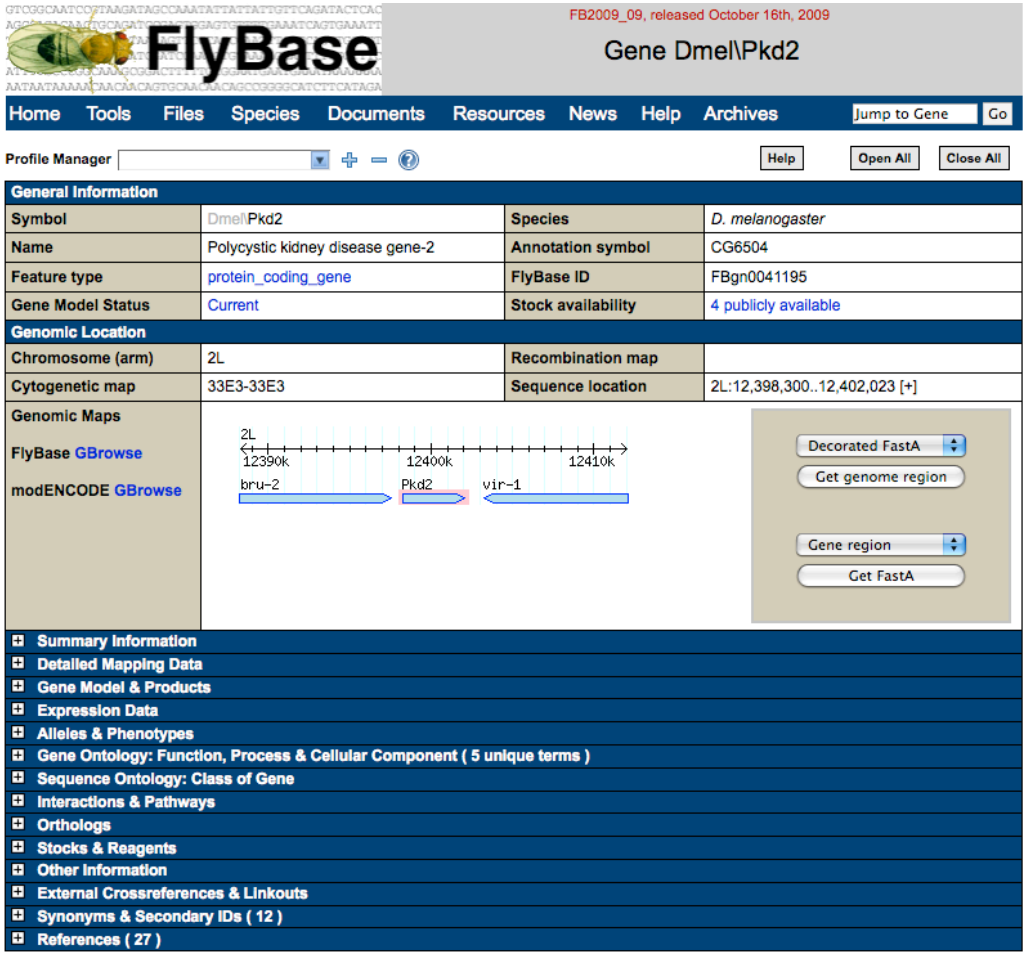
photo courtesy of N. Gompel

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



D. suzukii

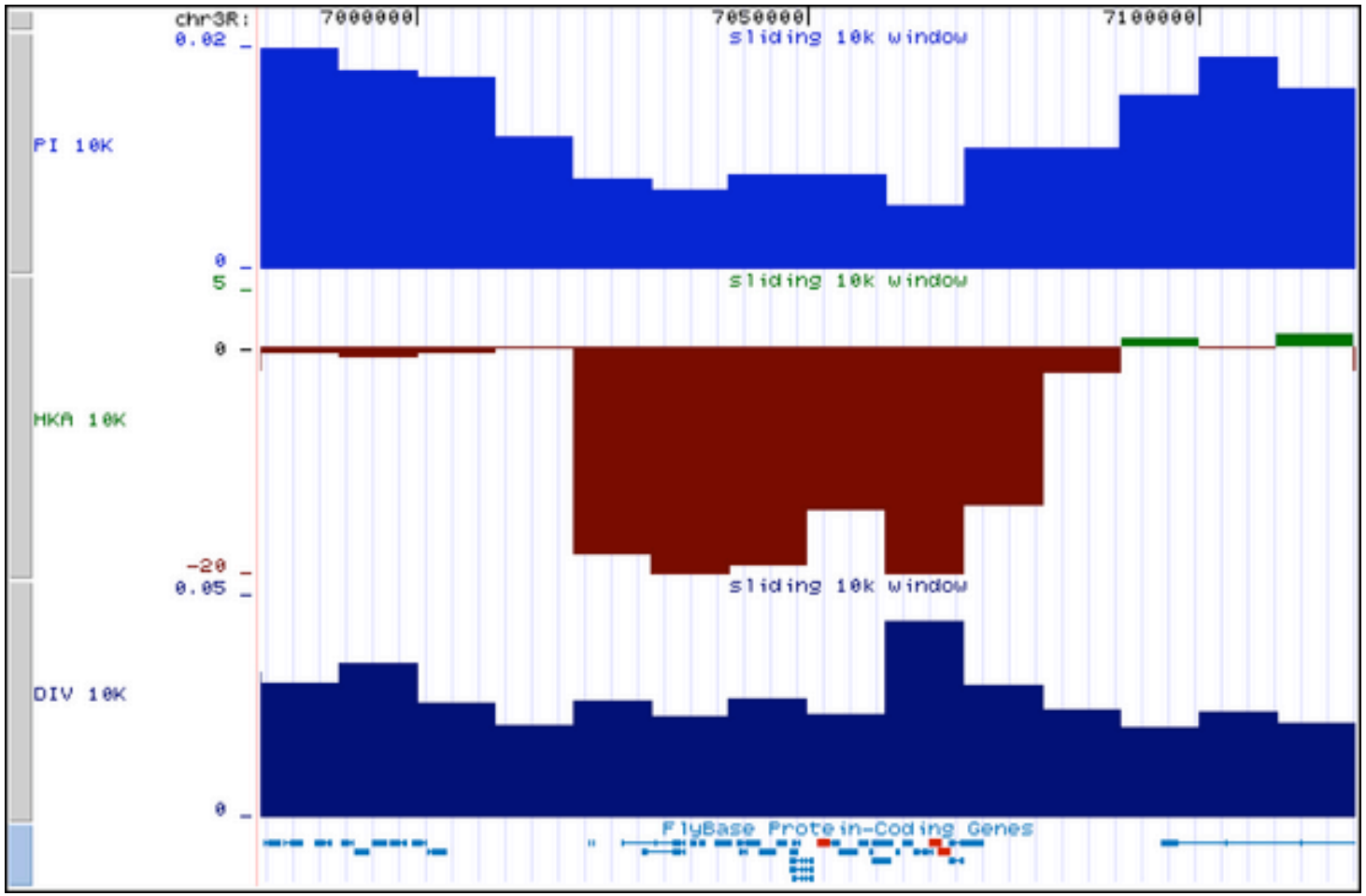
- Asian origin
  - What are properties of ancestral populations?
- Recent introduction to new habitats
  - How is it evolving to new selection pressures?
    - Higher temps
    - Insecticides
    - Many phenotypes likely evolving
- Basic biology poorly known

Population genomics of colonization and adaptation

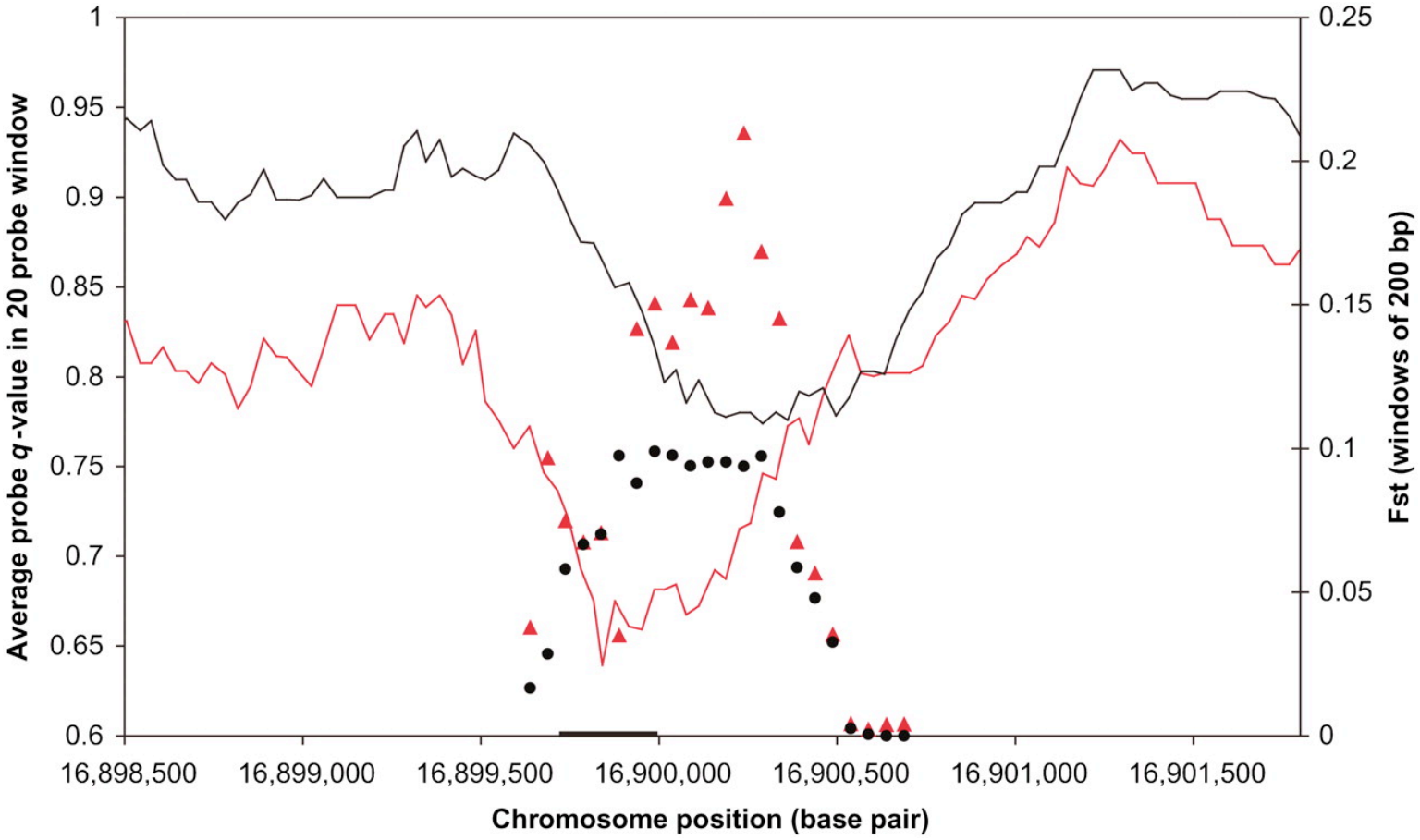
- *D. melanogaster* and *D. simulans* African in origin
- Recent spread to non-African regions associated with humans
- Measure variation within and species across genome
- Adaptation to new habitats
  - E.g., latitudinal clines for many phenotypes

These model system species and *D. suzukii* 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

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