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
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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