

## Super Females and Killer Males: Release of Modified Mosquitoes – Jason Pitts

- a) Sterile Insect Technique (SIT)
  - 1) Developed in the 1930s
  - 2) EF Knipling and RC Bushland
  - 3) Procedure
    - (i) Mass rear and sterilize males (irradiation)
    - (ii) Release in wild population
    - (iii) Mating competition
    - (iv) Sterile females
  - 4) Example –
    - (i) New world screwworm  
([https://www.aphis.usda.gov/publications/animal\\_health/2014/fs\\_new\\_world\\_screwworm.pdf](https://www.aphis.usda.gov/publications/animal_health/2014/fs_new_world_screwworm.pdf))
    - (ii) Mediterranean fruit fly
    - (iii) Mexican fruit fly
- b) *Wolbachia* (<https://www.rochester.edu/College/BIO/labs/WerrenLab/WerrenLab-WolbachiaBiology.html>)
  - 1) Intracellular symbiont
  - 2) Induces cytoplasmic incompatibility
    - (i) W+ male – W- female = no offspring
    - (ii) All other crossings result in offspring
  - 3) Issues
    - (i) Requires a long period of time
    - (ii) If female mosquito is infected with *Wolbachia*, the male must have a different strain or there will be offspring
  - 4) *Aedes aegypti* control
    - (i) Suppresses populations
    - (ii) Also prevents the replication of DEN virus  
(<http://www.eliminatedengue.com/our-research/wolbachia>)
    - (iii) *Aedes aegypti* does not have a naturally-occurring *Wolbachia*
    - (iv) O'Connor et al, PLoS Neglected Tropical Diseases 2012  
(<http://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0001797>)
- c) RIDL (Release of Insects carrying a Dominant Lethal gene) – <http://www.oxitec.com/ridl-science/>
  - 1) Males are fertile
  - 2) Offspring die late in development
  - 3) Tetracycline suppresses lethal gene in lab
  - 4) Cost effectiveness??
  - 5) Potentially very effective at reducing disease transmission in release area
  - 6) Refinement allows male mosquitoes to live and emerge to carry transgene to new matings
  - 7) <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0062711>