

# Wolbachia (WO) and bacteriophage WO to control spread of animal diseases

## What are they?

### Bacteriophage Wolbachia (WO)



**Bacteriophage WO** is a virus which can be used as an active ingredient to kill *Wolbachia* directly, or harnessed to modify the *Wolbachia* genome in order to reduce insect populations or promote the spread of desired traits.



### Wolbachia (WO)



*Wolbachia* are intracellular symbiotic bacteria infecting 40% of all insects, and most nematodes. *Wolbachia* act as reproductive parasites, thus are good targets for disease control. *Wolbachia* are maternally inherited and can hijack insect reproduction to expand its own population.

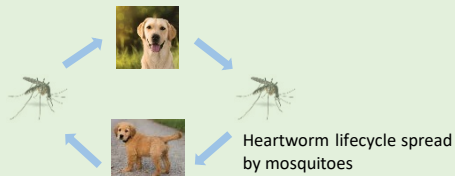


### Insects



**Insects** and nematodes infected by *Wolbachia* spread animal diseases. Adult heartworm (blood-borne)

- Heartworm disease in canines

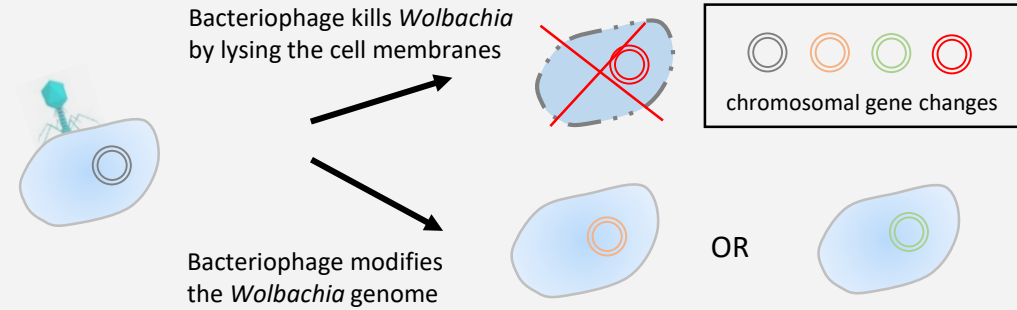


## How do we control them?

### Utilize bacteriophage WO to control animal diseases

- Eliminate *Wolbachia* known to be essential for viability of nematodes that spread animal diseases.
- Manipulate *Wolbachia* genome so that it can inhibit transmission of animal diseases, such as heartworm in mosquitoes.

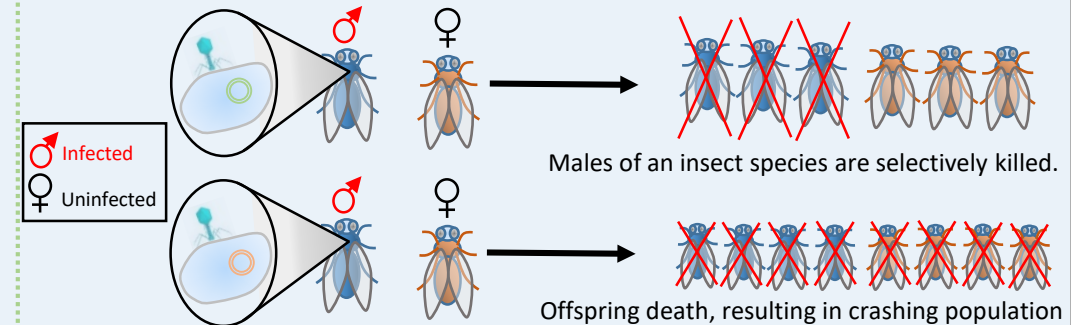
### How does a bacteriophage WO control *Wolbachia*?



### Manipulate *Wolbachia* to control animal diseases

- Infect disease-carrying insect species with *Wolbachia* expressing certain genes to selectively kill male populations.
- Infect insect species with genetically modified *Wolbachia* to reduce number of offspring.

### Expressing certain genes in *Wolbachia*, creating genetically modified *Wolbachia*



### Manipulate **insects** to control animal diseases

- Express certain genes in insect germline directly, creating transgenic insect to control disease-carrying population.
- Transgenic insects can be used to selectively deplete male insect populations, crash insect populations or spread beneficial traits among population.

### Expressing certain genes in insects, creating transgenic insects

