

Natural Selection at Foundry Cove: Evolution of Cadmium Resistant Worms



Part 1
Of Mice, Bugs, and
Bacteria

Part 2
Mud worms



Source: www.smc.edu

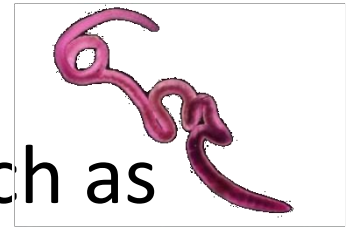
Source: www.fcps.edu

Of Mice, Bugs, and Bacteria

How did Foundry Cove worms become resistant to cadmium?

Natural Selection

Natural selection of an **invisible** trait such as cadmium resistance is hard to visualize.



So let's first look at natural selection of a **visible** trait such as fur color.





Source: www.nps.gov

Pocket Mice and Predation

http://www.hhmi.org/biointeractive/evolution/pocket_mouse_predation.html



Pocket Mice and Evolution

http://www.hhmi.org/biointeractive/evolution/pocket_mouse_evolution.html

Existing Variation

Variation within a species

e.g. Genetic variation for fur color
-multiple alleles for color

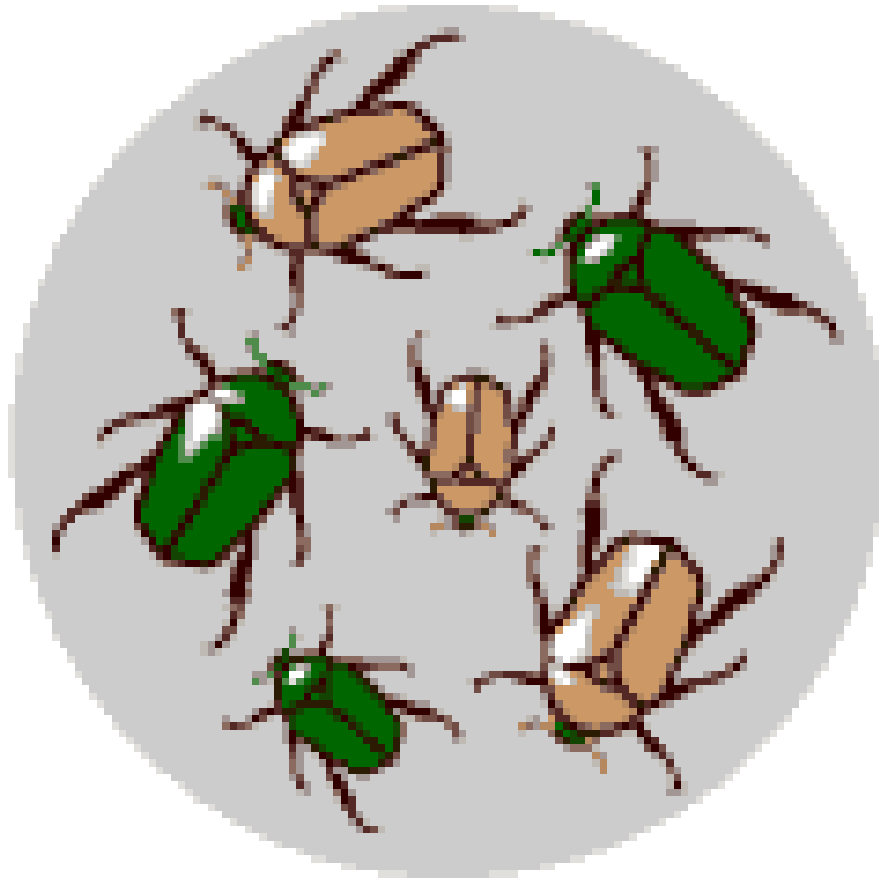
Present in a population or species
before natural selection occurs



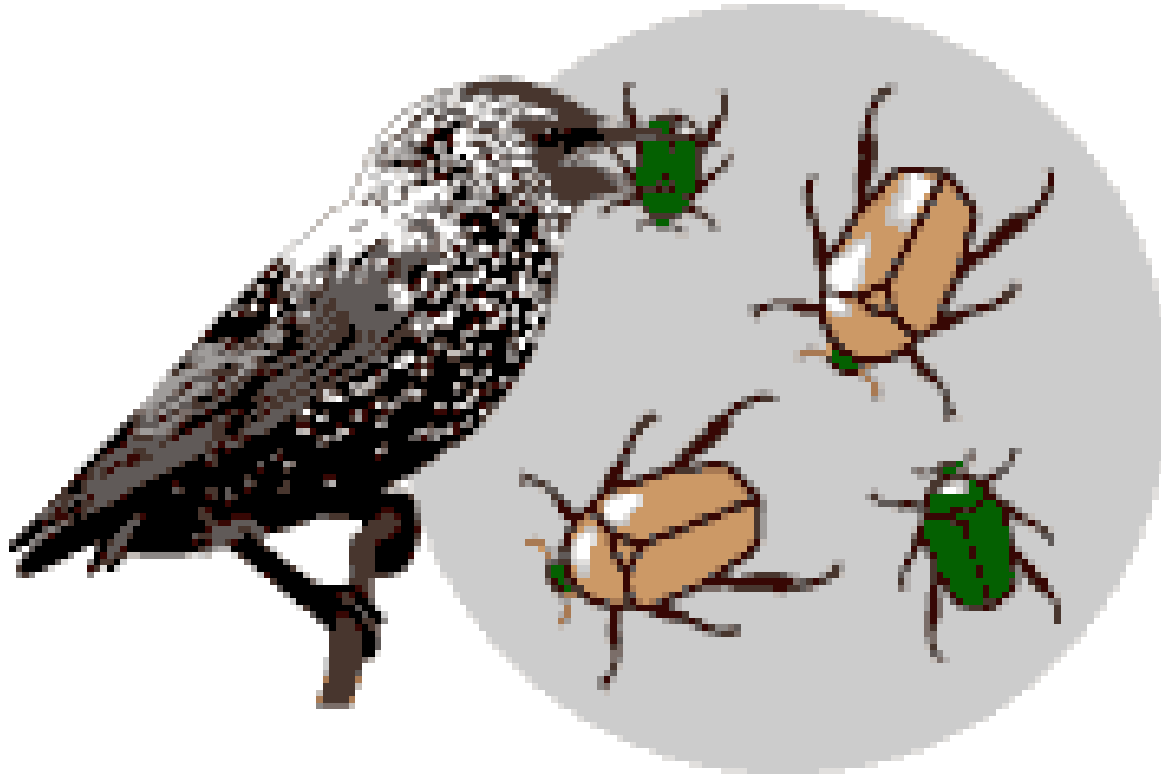
Natural Selection in a Population of Pocket Mice

- Existing genetic variation multiple alleles for fur color
- Heritable fur color is passed from parent to offspring
- Differential success dark fur protects mice better than light fur on lava flow habitat
- Time many generations of mice have lived and passed on their genes

Existing Variation

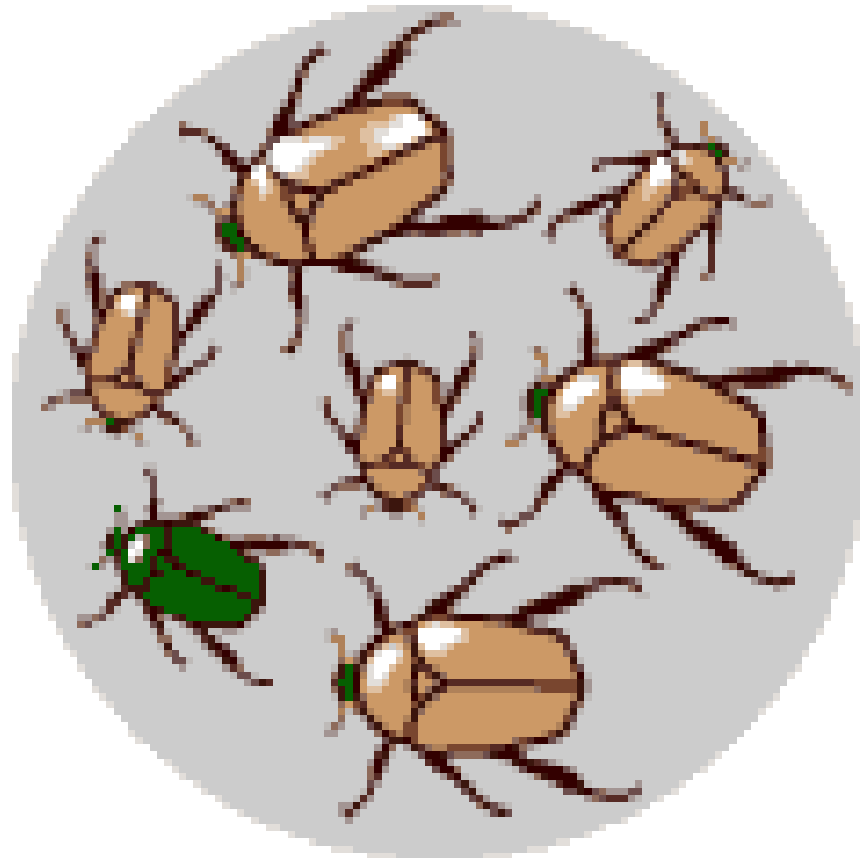


Differential Reproduction

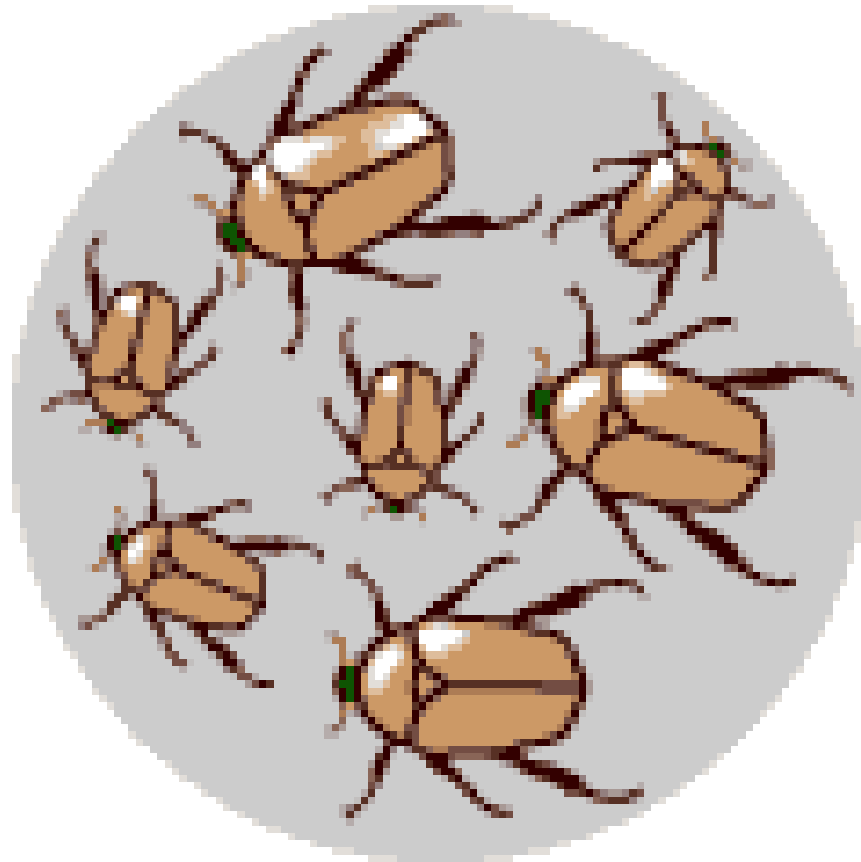


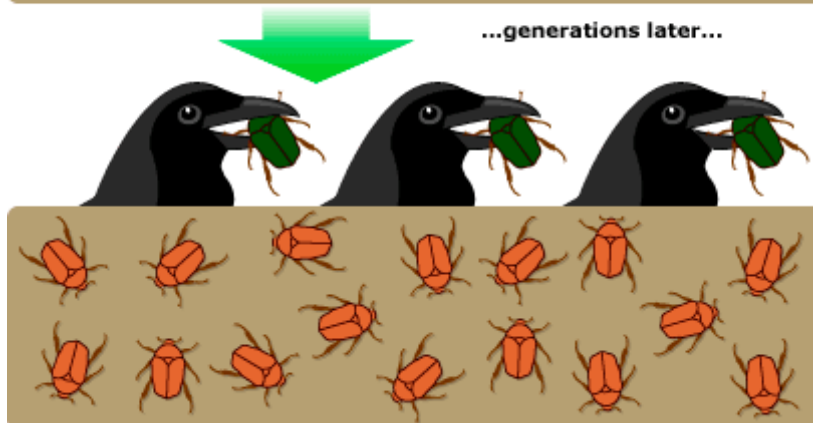
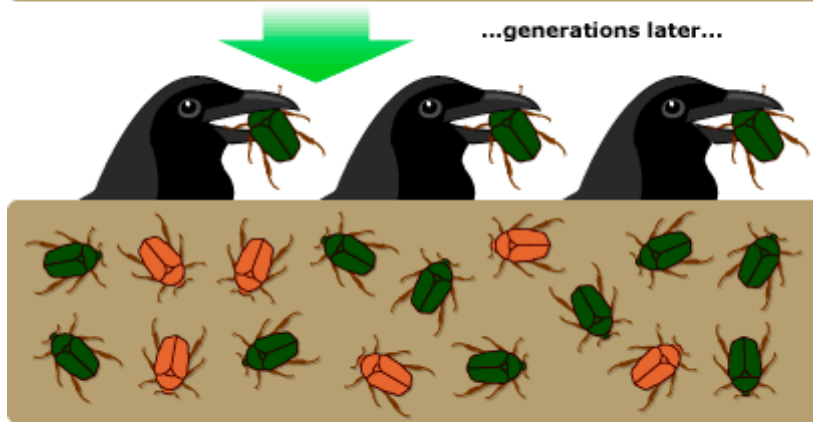
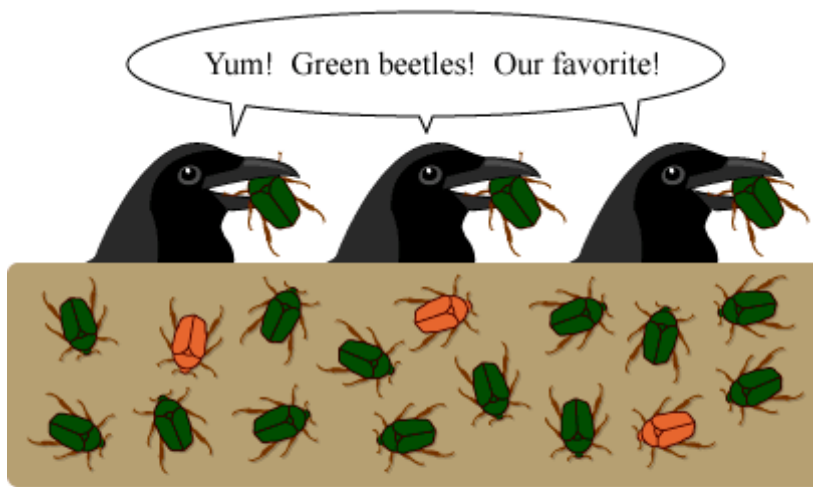
Some organisms are more likely to survive and reproduce.

Heritability



End Result





Green beetles have been selected against, and brown beetles have flourished.

Natural selection in a nutshell

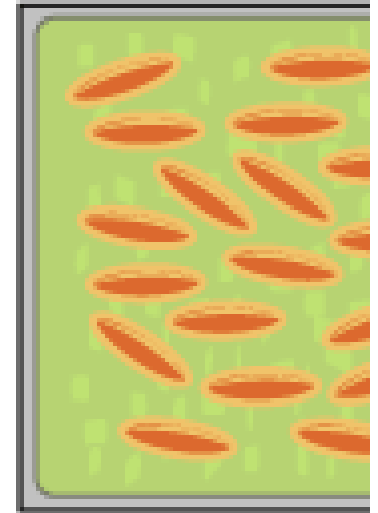
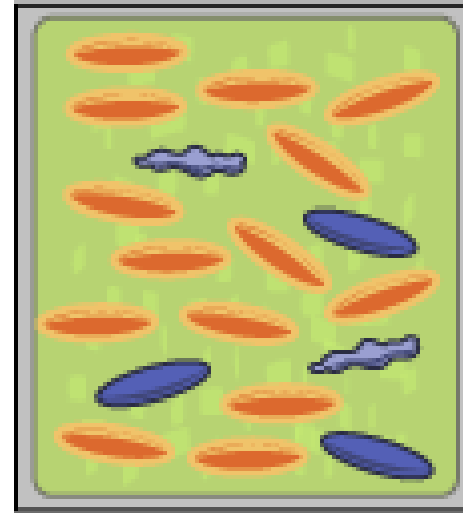
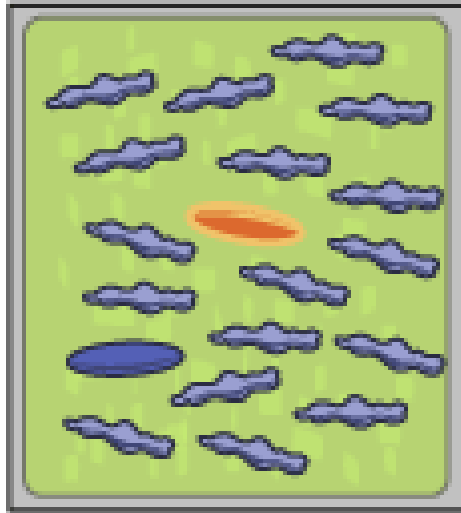
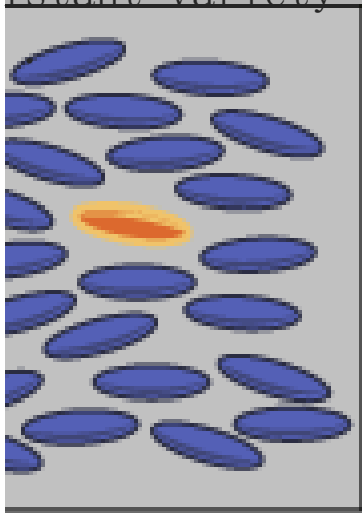
Evolution of Antibiotic Resistance

A bunch of bacteria, including a resistant variety

...get bathed in antibiotics. Most of the normal bacteria die.

The resistant bacteria multiply and become more common.

Eventually, the entire infection evolves into a resistant strain.



 normal bacterium  dead bacterium
 resistant bacterium

How did natural selection change the population of pocket mice, beetles, or drug-resistant bacteria?

Try not to use the word “adapt”.

Natural Selection in Foundry Cove Worms

Evolution of an Invisible Trait




Source: www.spiegel.de

Now, on to the natural selection of cadmium resistance in Foundry Cove mud worms.

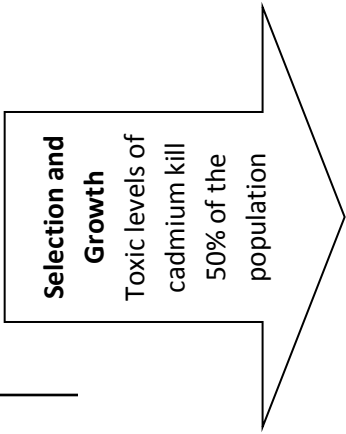
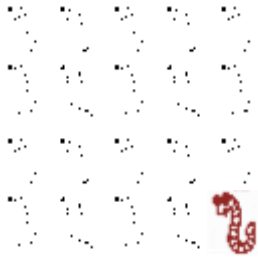
Foundry Cove Worms

Natural Selection Process Diagram

Key

- = Non-resistant worm
-  = Resistant worm

First Generation
as Young




How many are alive? _____

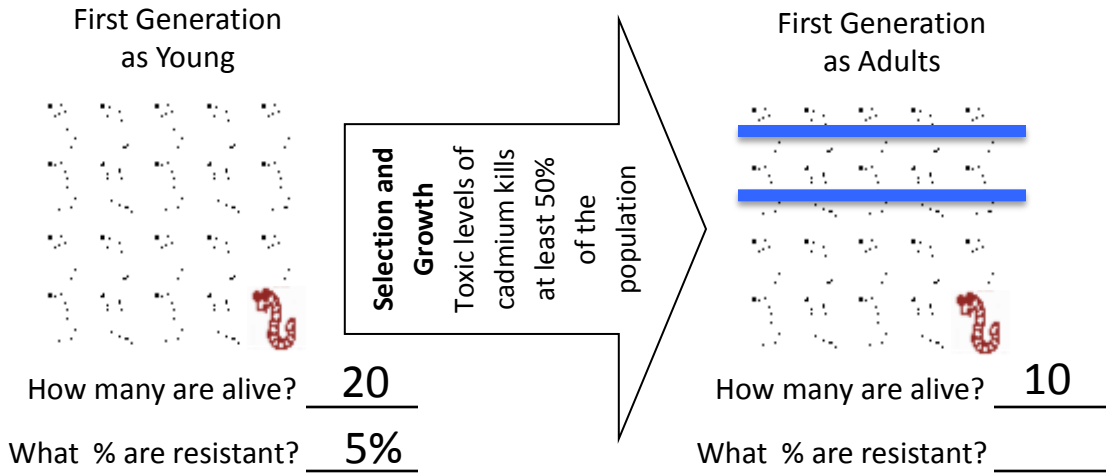
What % are resistant? _____

Foundry Cove Worms

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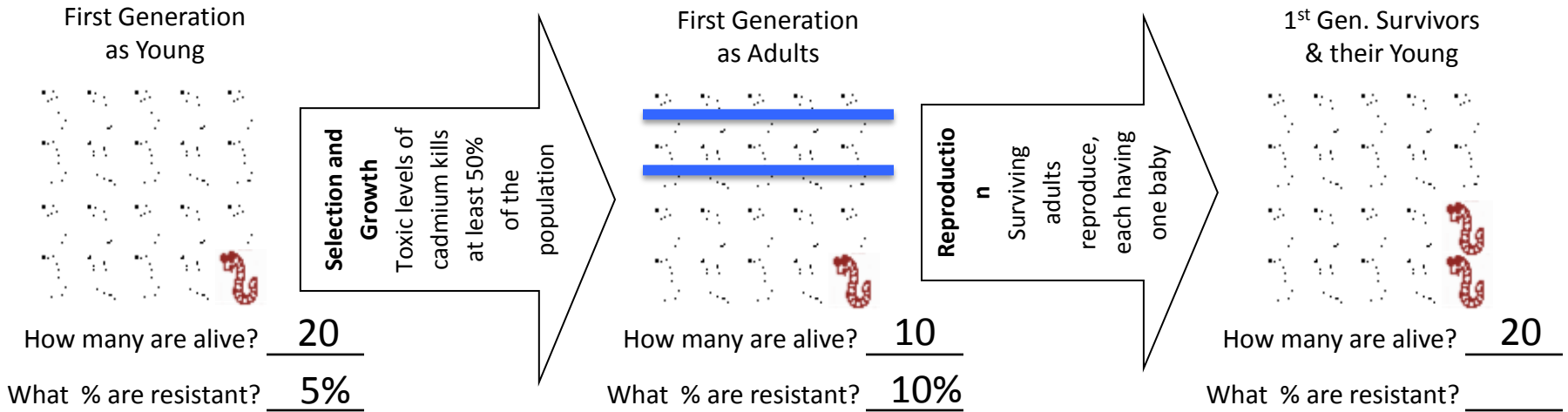


Foundry Cove Worms

Natural Selection Process Diagram

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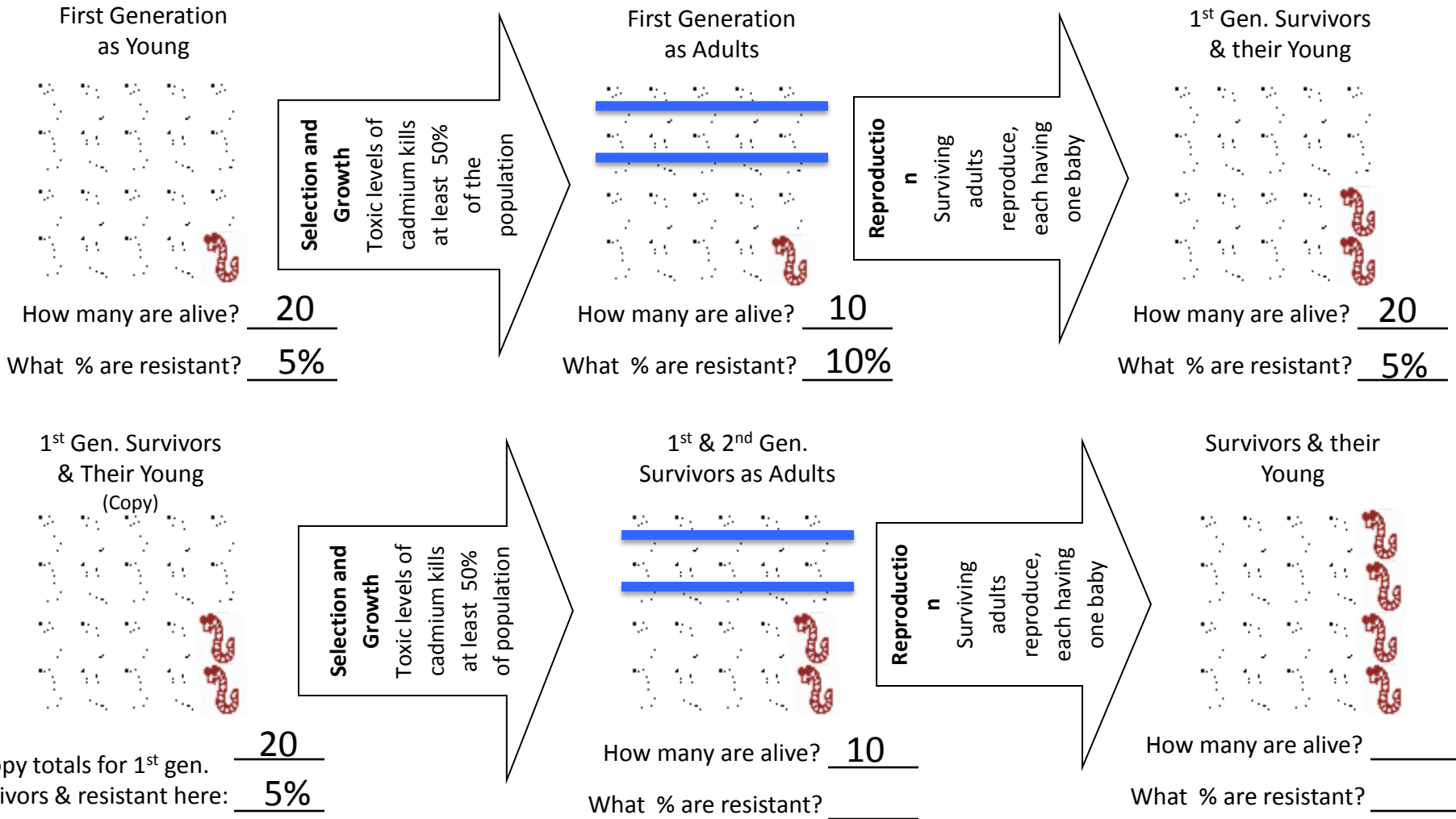


Foundry Cove Worms

Natural Selection Process Diagram

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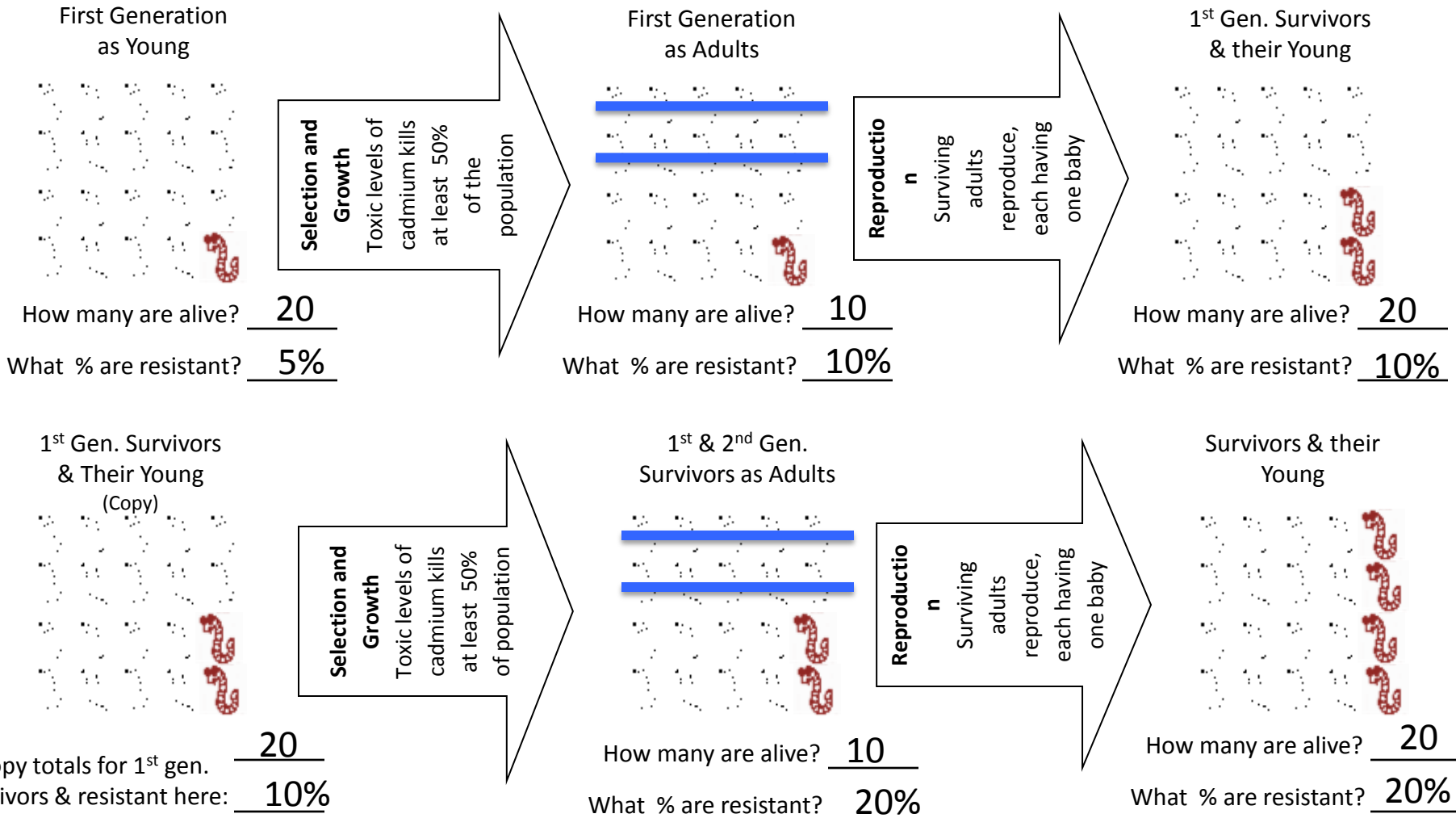


Foundry Cove Worms

Natural Selection Process Diagram

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Scientists noticed fewer muskrats in Foundry Cove during the most polluted years.



Source: www.fcps.org

1. Do you think muskrats evolved resistance to cadmium? Why or why not?
2. What else might cause a reduction in the number of muskrats in the cove?