



Agent Based Model to observe the impact of  
reproductive isolation in the population dynamics  
of an isolated ecosystem



# Group No : 4

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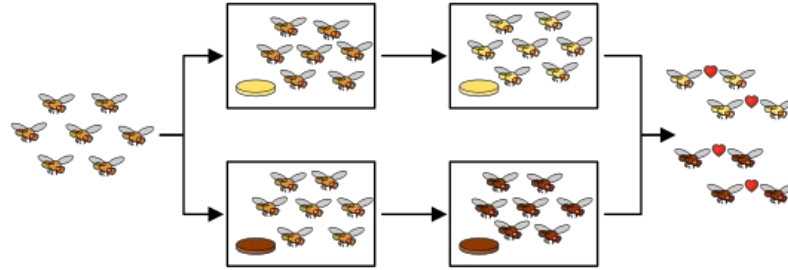
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REPRODUCTIVE ISOLATION CAUSED BY NATURAL SELECTION  
AGAINST IMMIGRANTS FROM DIVERGENT HABITATS 09 May 2007  
Patrik Nosil, Timothy H. Vines, Daniel J. Funk

# Motivation and Relevance



Reproductive isolation is one of the primary reasons why endangered and endemic species are vulnerable to extinction in today's world. To delve a bit more into it - It is a condition where a population of a particular species is left with no choice but to breed within itself, thus narrowing its genetic diversity and eventually creating a new subspecies that cannot interbreed with other species.

In many cases, a bad genome (an undesired trait) spoils the whole species and it becomes difficult to cure the fault in a natural manner. Eg. [Indonesian Bananas](#)

# Why Agent Based Model approach?

As we are dealing with complex phenomena by integrating the modeling and simulation based environment, we can say that agent based modelling focuses on the individual active components of a system. This is in contrast to both the more abstract system dynamics approach and process-focused discrete method. Hence ABM provides an appropriate paradigm to think and work on the proposed statement.

# A brief description of our proposed work

- ❖ We have proposed to replicate an isolated environment with two or three sub-species of any generic herbivore.
- ❖ We introduce a convention of rating the relevant characteristics of these subspecies on a scale of one to ten. The relevant characteristics involve those characteristics that help in their overall survival. E.g. Food retention, vulnerability to be hunted down etc.
- ❖ Our experiment involves altering the value of reproductive isolation index, which is an indirect measure of successful crossbreed mating ratio. A 0 RII means complete access to interbreed among subspecies and a 100 means a complete restriction.
- ❖ The species of the crossbreed offspring would be decided on the amount of genes inherited from the particular parent i.e. if child receives more traits of species A parent, it becomes a species A offspring (with some trait variations of course!)

# A brief description of our proposed work

To simulate the real world scenario, we will introduce randomness in the following ways-

1. Genetic Drift - A random inclination of species to a particular trait
2. Natural Selection - Advantage due to a trait that prefers survival
3. Genetic Mutation - A sudden alteration in a particular trait of a subspecies
4. Dominant Trait choice - To be selected randomly to improve results

Moreover, we propose a measure of Survival Index which is an indirect measure of the extent to which the population could preserve its collective existence in the ecosystem.

More SI of the final population means the population could preserve its identity collectively with a considerable proportion of preservation of each subspecies' trait.

Thank You!