Biology from Hawaii Name

2014



**‘Amakihi Breeding Lab**

**Introduction**

The Hawaiian Islands have 113 **endemic** birds species, unique creatures that only exist in Hawaii. These ranged from tiny nectar eaters to gigantic, 200 pound ducks. Today, 80% of these species are either endangered or already extinct! Humans caused this biological tragedy by changing land from nature into farms or towns, by introducing new predator and competitor species such as rats and pigeons, and by introducing new diseases such as **avian malaria**.

*‘Amakihi* are little green-and-yellow forest birds. Like other **endemic** Hawaiian birds, they were hit hard by **avian malaria**. Mosquitoes transferred the malaria parasite to *‘amakihi* birds and they either died or got too sick to reproduce. *‘Amakihi* numbers plummeted. The only forests where you could find *‘amakihi* were high up on the top of mountains where it was too cold for mosquitoes to breed.

But then, in 2005, large flocks of *‘amakihi* appeared with the ability to survive avian malaria! Their children could survive malaria infection, too. These birds are now spreading around the Hawaiian Islands, reclaiming mosquito-ridden forests once off-limits to this species. How did *‘amakihi* evolve this new ability?

**Procedure**

Invent a way to simulate breeding in an *‘amakihi* population.

1. Start with these parent birds (P1)



**AA Aa aa aa aa**

**Aa aa aa aa aa**

**aa aa aa aa aa**

**aa aa aa aa aa**

2. Simulate *Random* Mating

*Randomly* choose 2 birds to produce each baby chick.

*Randomly* pass alleles from parent birds to baby chicks.

Produce 20 chicks through random mating.

3. Breed 5 Generations

Breed P1 birds to create an F1 generation. Breed F1 birds to produce an F2 generation, etc.

Use your simulation to produce a flock of great-great-grandchildren, 5 generations in the future.

Record all genotypes for each generation.

**Procedure (continued)**

Describe your simulation like they were the rules for a game.

**Results**

Record each bird's genotype for every generation; create the appropriate data tables.

**Analysis**

1. Describe the way you produced *random* mating. Did every bird (and every allele) have an equal chance to reproduce?

2. Play a different group's game. Compare the randomization between your game and theirs.

3. What happened to the **A** allele? By generation 5, was **A** more common than before?

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| --- | --- | --- |
| **Grading** | points worth | points earned |
| Procedure  *simulation produces random mating*  *each generation produces the next* | **4** |  |
| Results  *genotypes appropriately recorded* | **3** |  |
| Analysis  *answers refer to data* | **3** |  |
| Total dl | **10** |  |