Name:_____   Date:_____

Bean There Done That
Genetic Backcrossing of the American Chestnut

Background Information:

Genotype is the set of genes, genetic information that an organism has. An organism's **phenotype** consists of the physical characteristics that result from the genes. For example, dimples would be the phenotype, but the genotype would be DD or Dd, the two possible gene forms that can result in a dimple phenotype. The American Chestnut has many different genotypes than the Chinese Chestnut and thus, many different phenotypes. The Chinese Chestnut has blight resistance due to its genes, but the American Chestnut does not have these blight resistant genes (blight resistance is a phenotype). Research into the genes that infer blight resistant has revealed that at least seven different genes are involved in providing the Chinese Chestnut with resistance to the blight fungus. The goal of The American Chestnut Foundation (TACF) is to reestablish the once flourishing American Chestnut tree in forests. In order to do this, scientists are inter-breeding American and Chinese Chestnuts. They are using a process called **genetic backcrossing** to try to insert blight resistant genes into our American Chestnut. This activity simulates the backcross process.

Hybrid and Backcross Data Table

Step	Generation	Proportion of American to Chinese chestnut genes	Genetic engineering process (choose from hybridization, backcross, or intercross)
1			
2			
3			
4			
5			

Analysis and Conclusions Questions

1. Based on this investigation and what you already know, define the term *hybrid.*

2. What characteristics is the American Chestnut Foundation trying to obtain in the American Chestnut with each cross?

3. Why was each successive generation backcrossed with the American Chestnut?

4. Based on what you have observed (with this simulation and your visit to the Blandy chestnut plot), do you think there ever will be a pure American Chestnut (100% American Chestnut genes) that is resistant to the fungal blight? Explain your answer (why or why not?)

5. Brainstorm some other genetic engineering or genetic biotechnology techniques that could be used to add blight resistance to the American chestnut genetic information.