In humans, the AMY1 gene on chromosome 1 produces salivary amylase. Humans are diploid organisms, meaning that, except for the genes on the X and Y chromosomes, they have two copies of most genes—one copy inherited from each parent. However, genetic studies show that people can have anywhere from two to 15 diploid copies of the AMY1 gene on each chromosome 1, suggesting that the gene has been duplicated during human evolution. Why would this be?

Researcher George Perry and his colleagues hypothesized that as some groups of people started consuming more starch, individuals with more copies of the AMY1 gene would have had a survival advantage. It follows that people living in populations with starch-rich diets would have more copies of the AMY1 gene than people in populations that don't eat a lot of starch-rich foods (G. H. Perry et al., Nature Genet. 2007).

#### QUESTIONS

- List the enzymes involved in starch digestion, where they work, and what they do.
- 2. Name the gene that produces salivary amylase. How many copies of the gene do humans have?
- 3. The researchers hypothesized that increased consumption of starch-rich foods during human evolutionary history gave individuals with multiple copies of the salivary amylase gene an "advantage." In this context, what does advantage mean?

To test their hypothesis, Perry and colleagues analyzed DNA collected from two groups. The first group consisted of populations that have historically consumed a diet rich in protein and low in starch, such as hunter-gatherers living in tropical rainforests or near the Arctic Circle. The other group consisted of populations from agricultural societies and hunter-gatherers living in arid environments, which traditionally eat high-starch foods. The researchers measured the number of copies of the AMY1 gene in individuals from these different populations. In this activity, you will analyze some of the data collected by Perry and colleagues.

#### MATERIALS

- Scientific calculator and/or a computer with a spreadsheet program like Excel
- · Graph paper, pencils, and a ruler if not using a spreadsheet program

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