(DNA) Fingerprinting the Culprit in Food Poisoning Case Study

A group of scientistsat the Centers for Disease Control (CDC) noted 13 cases of *Salmonella enterica* infection in sick people in a dozen states during November 2008. The typical symptoms of salmonellosis (infection with salmonella) include vomiting and diarrhea, and may result from ingesting any of more than 1,500 different *strains,* or unique subspecies, of *S. enterica.* Two weeks later, a similar outbreak of 27 cases of the disease, spread across 14 states, was found to be caused by the same strain of the organism seen in the first outbreak. By February 2009, 682 people from 46 states and Canada had become infected, nine had died, a large corporation had filed for bankruptcy, and several criminal investigations had begun.

PulseNet is a branch of the CDC that seeks to identify food-borne disease clusters by carefully studying the bacterial isolates thought to be the source of an outbreak. Usually this means obtaining DNA profiles, called *fingerprints*, of each bacterium and using that information to compare *isolates* (isolated strains of bacteria) from different outbreaks. Because the fingerprints from the two outbreak strains in this case were similar to one another—but also different from any fingerprint within the PulseNet database—CDC scientists initiated an epidemiological investigation.

*S. enterica* was identified in unopened 5-pound containers of King Nut peanut butter in Minnesota and Connecticut, in the peanut butter factory, and in bacteria isolated from the patients. At the time, King Nut peanut butter was manufactured by the Peanut Corporation of America (PCA) in Blakely, Georgia, and sold to schools, hospitals, restaurants, cafeterias, and other large institutions rather than directly to consumers. Examination of the bacteria revealed several different *S. enterica* strains, but only a few of them were linked to the illnesses.

* What chemicals make up DNA?
* Without knowing the specific details of DNA fingerprinting, how do you think these profiles could be used to show that a particular bacterial strain is *not* part of an outbreak?