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http://www.moleculeoftheday.com/2006/08/02/taq-polymerase-dna-polymerase-from-the-finest-hot-springs/

Taq Polymerase (DNA polymerase from the finest hot springs)

This one is a much larger molecule than we usually do, but it's easy to forget that enzymes (and all proteins) are really just very large molecules. Taq polymerase is a DNA polymerase (DNA-copying enzyme) from the microorganism *thermus aquaticus*, a bacterium that lives in very hot water.

Taq was crucial to the development of PCR,the process by which large pieces of DNA are copied today, pretty much exclusively, and the subject of Kary Mullis' 1993 Nobel. To copy DNA by PCR, it needs to be repeatedly "melted" (separated into single strands by heating), "annealed" (fused back into double strands), and "extended" (copied by the DNA polymerase, Taq here). The idea here is that you do this ~30 times and get 2 copies, then 4, then 8…then 2^30, or about a billion.
The trouble with this is that the melting phase requires sufficiently intense heating that most enzymes are damaged (unfolded, or "denatured"). Since PCR requires tens of cycles, enzyme denaturation is a problem. Initially, the polymerase from E.Coli, the workhorse of modern molecular biology was used. Cetus, the company with which Mullis and co-workers developed PCR, was planning a system to add fresh polymerase after every cycle - ~30 times - it works, but it's not an elegant solution.

Fortunately, Taq, as you've probably surmised, lives in hot water. It's enzyme has evolved to withstand an amazing amount of heat (relatively speaking), and the near-boiling temperatures used in PCR barely make it break a sweat (well, not quite. it lasts about half an hour near boiling, so you can only use it for one ~30 cycle PCR reaction).

Taq polymerase has made genetic engineering and molecular biology possible today. Another thermophilic polymerase from *Pyrococcus furiosus* (Furiosus. Don't you love science?) has come into favor today because of its enhanced stability and decreased tendency to make copying errors. The thermostable polymerases are something without which molecular biology would pretty much grind to a halt.