

Optimization of Taq DNA Polymerase Production in Bacteria

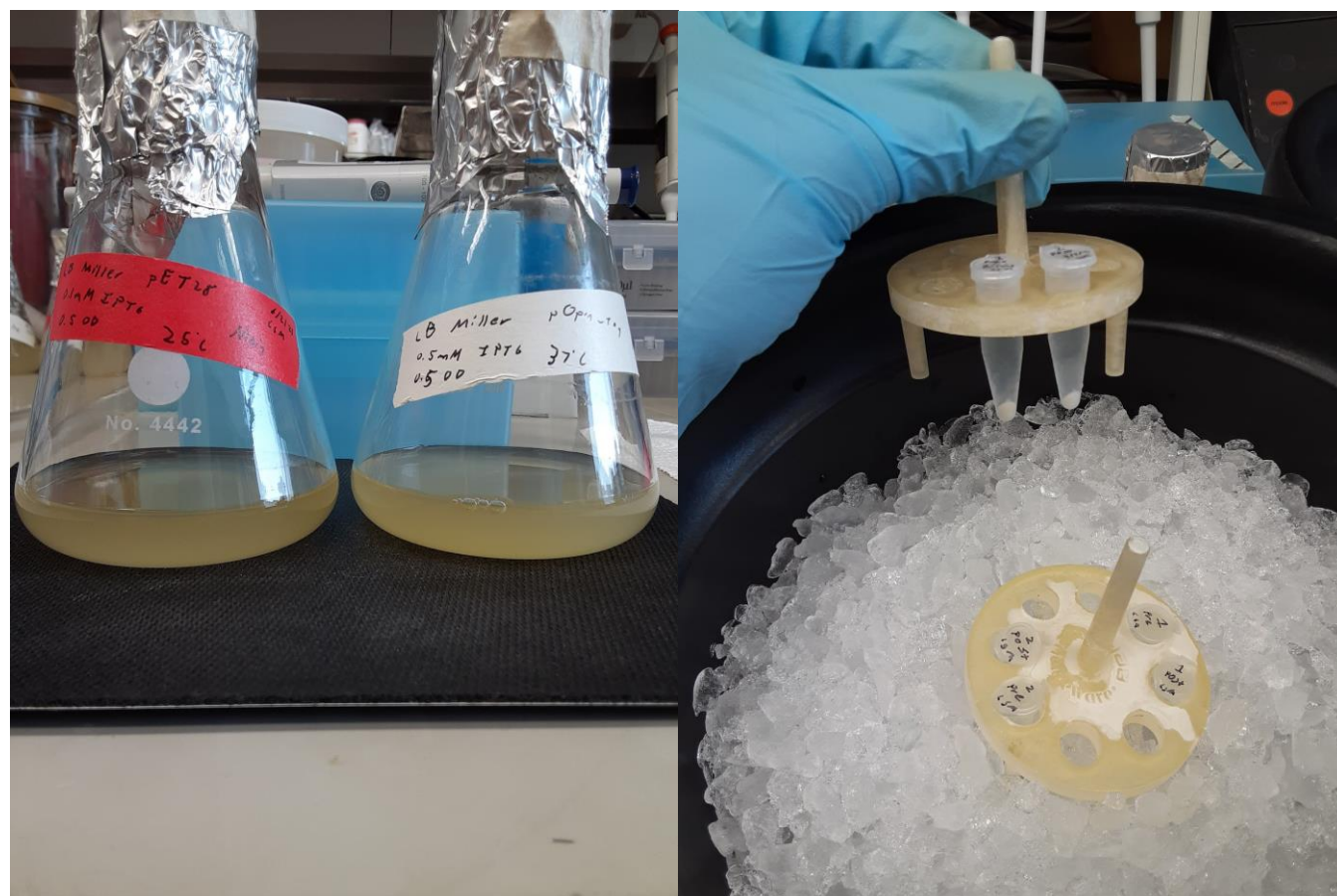
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Overview

Taq DNA Polymerase is an enzyme originally found in thermophilic bacteria near hydrothermal vents. This protein is responsible for amplifying DNA for a wide variety of applications that include PCR. By optimizing production the cost of production can be substantially lower. Potentially leading to more widescale use of PCR testing as a result of the lower cost.

Method- Growth and Production Stage

The bacteria used in this study was *Escherichia coli*, specifically pET-28. The *E. coli* was grown in flasks overnight. The culture flasks were then induced with IPTG after a given optical density was surpassed. Post induction the cultures were allowed to incubate overnight in order express the Taq protein. Varying induction conditions were tested including different: IPTG concentrations, optical densities, post-induction temperatures, and broths.



References (A list of the KEY references, if applicable)

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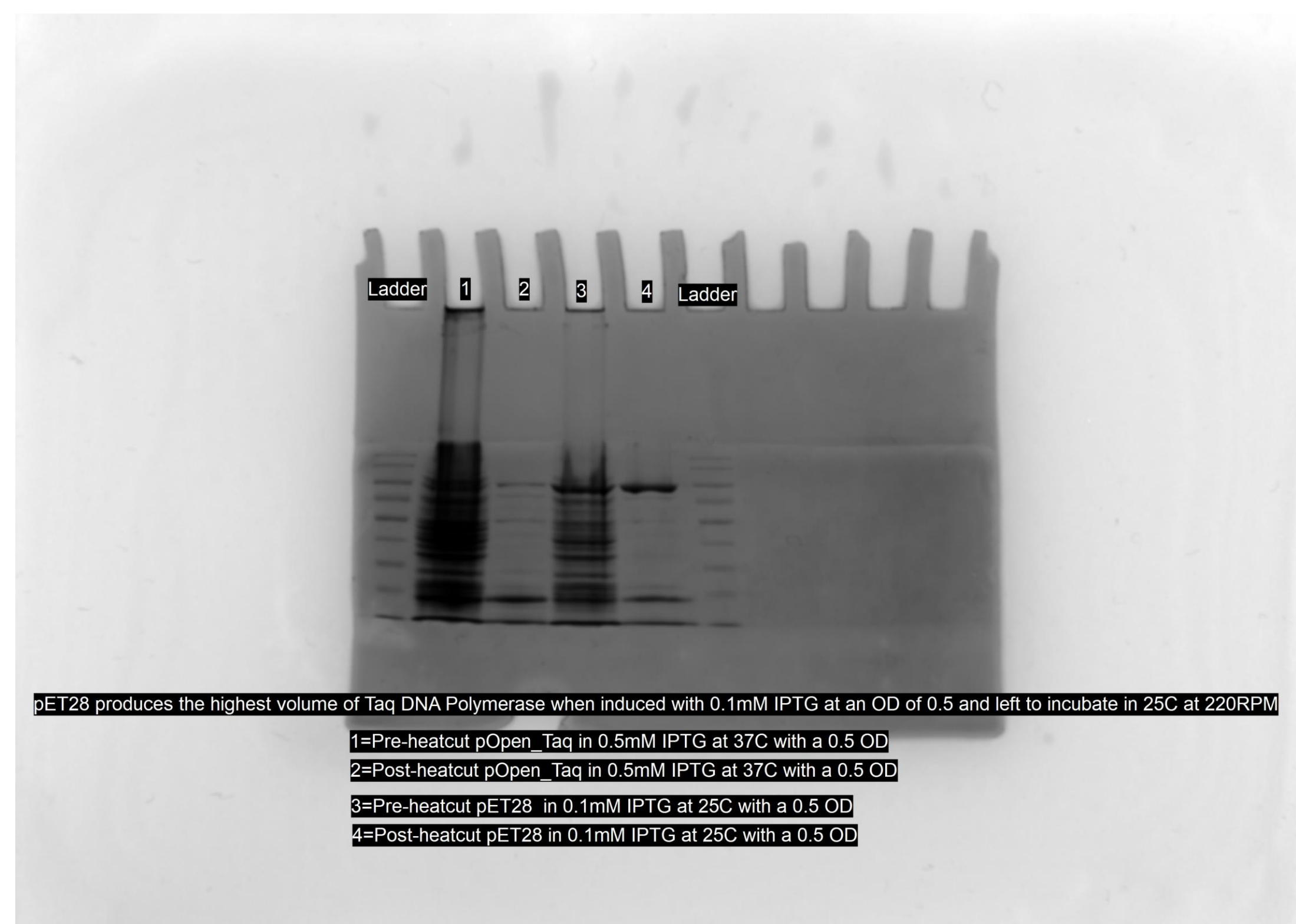
Acknowledgements

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Protein Extraction

After the cultures were allowed to incubate post induction the bacterial cells were harvested via centrifugation in order to obtain the cells in the form of a pellet. Each pellet was then suspended in buffer and sonicated in order to break open the cells. A heat cut was then used to denature mesophilic proteins. An additional centrifugation was performed to separate the supernatant from denatured mesophilic proteins. The supernatant containing Taq protein was then aspirated for testing.

Results



Conclusion and Impact

Taq DNA polymerase is optimally produced in pET-28 bacteria at a suboptimal growth temperature. Following induction, the bacteria is forced to focus on protein expression rather than cell growth and reproduction. This knowledge can be used to expand upon protein expression in bacterial models; potentially increasing yield of commercially produced proteins like insulin.