CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)

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Project Number

J0403

Project Title

Screening for Strong Gene Promoters

Abstract

Objectives/Goals

The objective of our project is to screen for strong gene promoters from the natural environment that will help protein production in Streptomyces. We are doing this experiment in hopes of finding a new industrial or pharmaceutical use for our newly discovered DNA sequence.

Hypothesis:

Genes need to have promoters to eventually be translated into proteins. We believe that nature has promoters that will increase protein production in Steptomyces. We think that we can find one of these promoters and isolate it from nature.

Methods/Materials

Materials and Equipment: Soil samples from Adobe Creek, Stanford hills, and Genencor lawn; Plastic bags, spatulas, flasks, spreader, tips, petri dishes, test tubes, gel blocks, pipette man, gloves, protection glasses, microscope, UV camera, electrophoresis apparatus, ventilation hood, refrigerator, water bath, centrifuge; Streptomyces, restriction enzymes, ligase, vector DNA; Bacteria transformation solutions, DNA isolation kit.

Procedure: We collected soil samples from three different environments. Then we grew the bacteria in a rich medium overnight and harvested it for the isolation of bacterial DNA by using the centrifuge. The DNA was digested into small pieces with restriction enzymes. We inserted them into our vector containing a promoterless reporter gene, but have an activator gene for producing red pigment, a type of antibiotics, on Streptomyces colonies. We transformed the recombinant DNA into Streptomyces and grew them on antibiotic agar plates. We did a negative control that had no DNA in the vector. We isolated the vector from the red colony containing the promoters. We sequenced the foreign DNA and did a BLAST search to find out what organisms and genes these promoters come from.

Results

When we finished our experiments we saw one red colony and one pink colony. The sample was from the water environment. The dark red colony contained a stronger promoter than the one with a pink colony. We then did a BLAST search on the red colony, which revealed that out of our 846 base pair sequence, our promoter was approximately 450 bp long. The promoter was undiscovered.

Conclusions/Discussion

We can conclude that strong promoters do exist in nature. Our results showed that colonies did have red which meant that the antibiotic was produced. This tells us that a relatively strong promoter was present that can work in Streptomcyes.

Summary Statement

The objective of our project is to screen for strong gene promoters from the natural environment that will help protein production in Streptomyces.

Help Received

Used lab at Genecor Int., Inc. under the supervision of Dr. Wei Liu