



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Sabina Bera; Andrew Murphy	Project Number S0401
Project Title Ideal Deoxyribonucleic Acid Detection Through Hybridization of Complementary Strands	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Currently, all methods of detecting anthrax have ninety-four to ninety-six percent accuracy. This four to six percent margin of error can be catastrophic when viewed on a national level. The objective was to create a DNA detection system that can identify a specific DNA strand. It operates through the use of a complementary DNA strand to bind to the foreign strand to be tested.</p> <p>Methods/Materials The sequence chosen as the foreign DNA strand is named "EM07." The testing strand is a combination of two sequences (EP08 and EP07. EP07 is the complement of EM07 (the foreign DNA) and is designed to bind together. If these two strands bind, then the foreign DNA strand has been detected. Also, biotin is attached to the test strand, to make it "EP08+EP07 5' Biotin." To demonstrate that the strands bound, the test strand is designed to push off an indicator if successful. The indicator is the fluorescent dye "TET," which is attached to the sequence "EM08+EM06" (which is designed to bind partially with EP08+EP07).</p> <p>Results The indicator was isolated through the use of magnetic, streptavidin-coated Dynabeads attached to the strand EP08+EP07 5' Biotin next to the future bonding site of the foreign strand, EM07. Using a magnet, any DNA not attached to the Dynabeads can be removed (by siphoning off any excess materials floating in the presence of a magnetic field). There was no trace of TET found in any of the trials performed; hence, no TET was attached to the strand EP08+EP07 5' Biotin. This implies that the EM07 attached to the test strand and pushed off the indicator.</p> <p>Conclusions/Discussion The incubated test strands proved able to detect the foreign strand when added to the solution. It can be deduced that it is possible to detect foreign DNA strands through the use of a complementary test strand. This can directly apply to anthrax testing, where accuracy is necessary and vital.</p>	
Summary Statement A versatile DNA detection system was created using the idea of complimentary DNA for the identification of any type of DNA, including anthrax.	
Help Received Used lab equipment at University of California, Riverside under the supervision of Dr. Allen Mills	