THE INNOCENCE PROJECT

INTRODUCTION

Note: In this case, DNA profiling is used to reexamine evidence and challenge the guilt of a convicted individual. Although this activity discusses a real case explored by the Innocence Project, the DNA profiles provided do not represent any specific individuals.

DNA is a powerful tool used to exonerate or incriminate people accused of committing crimes. The technology to determine an individual's DNA profile has not always been available, however. The Innocence Project is an organization that uses genetic fingerprinting, among other techniques, to review evidence in cases that occurred before DNA analysis was possible or commonplace. Since it was founded in 1992, the Innocence Project has been involved in overturning the convictions of more than 340 people. In addition, the new evidence they provide has led to the capture of nearly 150 people who actually committed some of the crimes. The Innocence Project provides all of its services free of charge. More information about the Innocence Project can be found at http://www.innocenceproject.org.

One case examined by the Innocence Project was that of Malcolm Bryant. Bryant was accused of using a knife to kill a 16-year-old girl walking in Baltimore, MD, in 1998. A friend who was walking with the victim and was also dragged away by the attacker later identified Bryant as the killer. This eyewitness account led to Bryant's conviction for murder on August 5, 1999, and Bryant was sentenced to life in prison. In 2009, a petition was granted to test the victim's fingernail clippings for DNA in case she had struggled with her attacker and some of his skin got under her nails. The testing revealed a DNA profile that belonged to the victim, as well as a DNA profile of an unrelated male. A partial genetic profile of the male is shown in Figure 1.

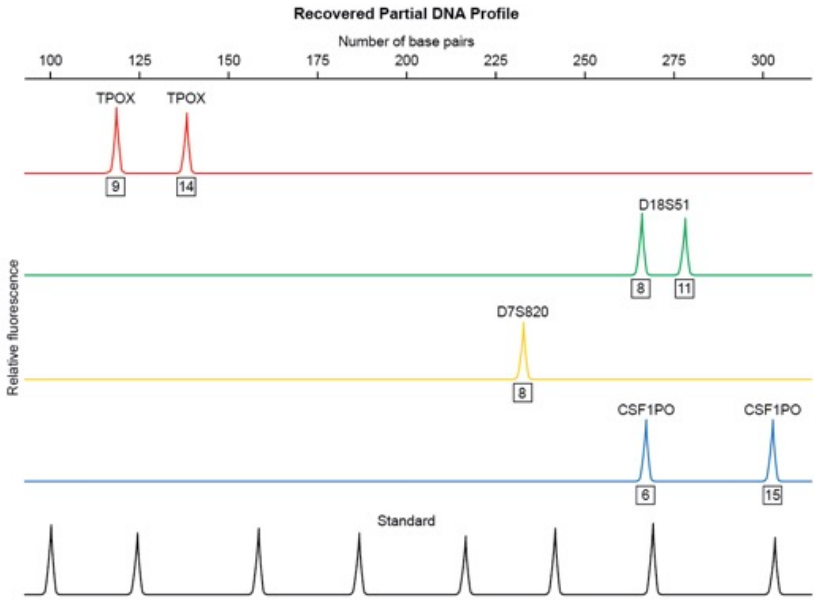


Figure 1. Electropherogram showing the profile of DNA recovered from under the victim's fingernails, which may match the killer's DNA profile.

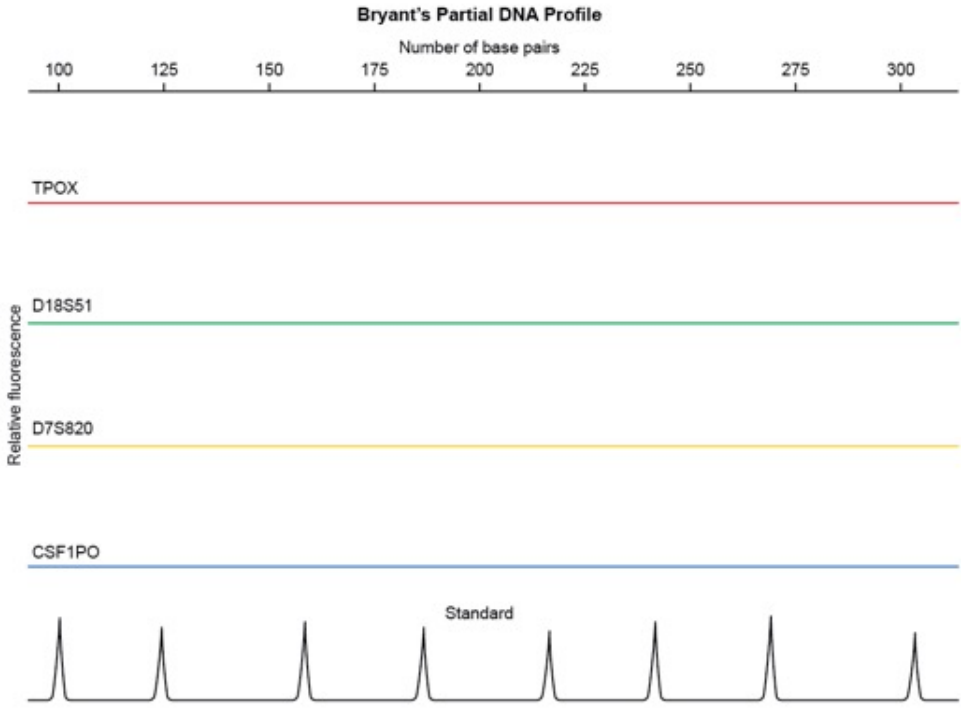
A forensic technician hired by the Innocence Project obtained a sample of Malcolm Bryant's DNA and determined his genetic fingerprint. Information from the analysis is in Table 1.

1. Complete Table 1 using mathematical reasoning. Remember that the total fragment length is equal to the length of the STR plus the length of the flanking sequences. Further, flanking sequences will always be identical for each allele of a given STR.

   Table 1. Data from Malcolm Bryant's Partial DNA Profile.

STR allele	Repeat structure	Length of flanking sequences (bp)	Total fragment length (bp)
TPOX allele 1	$[GAAT]_9$		118
TPOX allele 2			138
D18S51 allele 1	$[AGAA]_8$		266
D18S51 allele 2	$[AGAA]_{15}$		
D7S820 allele 1		233	257
D7S820 allele 2	$[GATA]_8$	233	
CSF1PO allele 1	$[TAGA]_6$	267	
CSF1PO allele 2	$[TAGA]_6$	267	

2. Draw Bryant's partial genetic fingerprint using the data from Table 1.



Follow the same instructions you used in Exercise 1. Mark where the peak should be with an "X" and also add the number of repeats at the locus.

3. Does the evidence suggest that Bryant is guilty or innocent of the crime? Explain your answer.

4. Suggest one or two reasons why DNA fingerprinting is more reliable than an eyewitness account.

5. Identify one or two reasons why DNA fingerprinting isn't always possible.

After this initial discovery, authorities conducted additional DNA testing. In 2015, a full genetic fingerprint was obtained from the victim's T-shirt near the site of the knife wound. The full genetic profile did not match Bryant's genetic profile. In May of 2016, Malcolm Bryant was exonerated of the crime he had been convicted of almost 17 years earlier. To learn more about the Bryant case, visit Bryant's page at The National Registry of Exonerations website: https://www.law.umich.edu/special/exoneration/pages/casedetail.aspx?caseid=4883