

Appendix D. Phillips *et al.*

DNA Gel Analysis Exercise: Report on Locus 8

You are a member of a team that is in charge of investigating a crime scene. Your task is to examine one of the twelve loci that will be used to determine the source of an unknown hair at the scene that did not belong to the victim as determined by hair color. You used PCR to amplify your assigned allele (Locus #8: expected size of fragment = 1400 bp) from hair samples of the victim, nine potential suspects and the unknown hair. You will determine whether each sample has this particular allele (presence or absence is the polymorphism*). The results are below. The positive and negative controls are DNA hair standards that are commonly used in the lab to verify presence and absence of this 1400 bp DNA fragment, respectively. In addition there is a water control in which no DNA was used in the PCR reaction. You must now analyze your results and submit a report to your boss. The main questions of your experiment are:

- 1) What are the controls of this experiment?
- 2) What are the approximate sizes of the products of your PCR reactions? What is the importance of the two bands based on their sizes?



- 3) How were the positive and negative controls important to your conclusions? What can you conclude about the primers you used for these PCR reactions?
- 4) What follow-up action should be taken before submitting your report? (i.e. Is there a follow up experiment necessary? If so, what should be retested? Remember the key components of good experimental design.)
- 5) Which suspects can you eliminate from the suspect pool? Why?
- 6) Why do you think it is necessary to examine 12 different loci?

*Note that there are many ways to do genetic fingerprinting analysis. Whereas this case relies on the presence or absence of a PCR fragment of an allele, other more common techniques, including RFLPs (restriction fragment length polymorphisms) or VNTRs (variable number tandem repeats), rely on more specific polymorphisms or differences in DNA sequence between individuals. For more information, the Dolan DNA Learning Center has a great website with animations that might be of interest:

<http://dnalc.bii.a-star.edu.sg/resources/aboutdnafingerprinting.html>