Problem-based Learning for Bioinformatics

Forensic DNA and Bioinformatics: Ethical Considerations

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In recent years, thanks to the evolution of DNA forensics, law enforcement has been able to solve a number of "cold cases." Up until recently, a suspect must already be in a criminal database in order to make a match. In April 2018, an alleged serial killer in California ("Golden State Killer") was arrested and charged with 13 murders after DNA analysis of materials from a crime scene were matched with a potential relative through an open source ancestry DNA database. He's also suspected in at least 50 sexual assaults.

A few weeks later, similar techniques led to an arrest in a cold case involving a Canadian couple who were killed in Washington state in 1987. The couple's bodies were found within days of their disappearance. Police had a sample of what they believed was the killer's DNA, but they couldn't find a match in the Canadian law enforcement databank, which only includes DNA records of convicted criminals. Experts from an American company identified the suspect through two cousins who had uploaded their own genetic information on public genealogy sites. The experts then worked forward to identify the suspect himself, and the police subsequently obtained a DNA sample from a cup the suspect had used to make the positive identification.

In mid 2019, Vancouver police announced that it was using the same genetic genealogy technique to solve the cold case of Edgar Leonardo, who was murdered in a West End apartment in 2003. The DNA evidence did not match anything in the law enforcement databank, and Vancouver police hired the same firm in the aforementioned cases to search available genealogical records that would hopefully lead detectives to the killer.

Considering various technical, ethical, and legal factors, do you think that law enforcement and genealogical sites should partner together to use bioinformation for forensic purposes?

Learning Objectives

Upon completing this case, students should be able to:

- Describe the purpose and techniques in forensic genealogy
- Identify the ethical considerations of using forensic genealogy
- Identify the legal frameworks in Canada regulating genetic privacy
- Balance intersecting and competing ethical considerations in determining when forensic genealogy may be ethically and legally justified

Discussion Questions:

1. **How does forensic genetic genealogy work?**
2. **How should genealogical sites or other DNA databanks determine whether they would give law enforcement access to their databases?**
3. **What types of policies should genealogy services have regarding sharing their databases?**
4. **How accurate does the technology need to be in order for you to feel comfortable with the use of forensic genetics to solve crimes?**
5. **How would you decide whether there can be third-party access to one's genealogy data other than law enforcement?**
6. **Who should be entitled to genetic privacy in the context of genetic genealogy?**
7. **What are the Canadian legal frameworks on genetic data, and why do many think genetic privacy has specific ethical importance?**
8. **(Broader ethical question) How may various bioethical principles help to frame how genetic information can be legitimately used?**