

## Forensic Genealogy; Identifying the Culprit

Ruchika Dwivedi<sup>1</sup> and Dr. Mohd. Amjad Bhatt<sup>2</sup>

Available online at: [www.xournals.com](http://www.xournals.com)

Received 12<sup>th</sup> March 2021 | Revised 23<sup>rd</sup> March 2021 | Accepted 19<sup>th</sup> April 2021

### Abstract:

*It has been perceived in past years that the cases of DNA which have been unresolved by direct matching with DNA Database can be easily resolved by linking the SNP (Single Nucleotide Polymorphism) data with sequestered as well as open genomic databases. In this way, using the mixture of traditional genealogical research and genome comparison, the investigators can easily trace the distant relatives of the perpetrator whose DNA has been found on the crime scene and ultimately identify the real culprit of a violent crime. The approach is thriving in identifying the culprit with lesser crime and identifying the unknown deceased person. Such advances are bringing focus into the ethical question such as how much access of DNA Database should be granted to law enforcement agencies and how to control over DNA Data of public genome contributor with its best empowerment. The needful policies may take more time to developed but till then at least we could be better informed about such kind of familial searching policies which have already been developed for the use of Federal DNA Database searches and about the interest of anonymity and privacy of civilians*

**Keywords:** Forensics, Genealogy, DNA, Genomic Database, Crime Scene

### Authors:

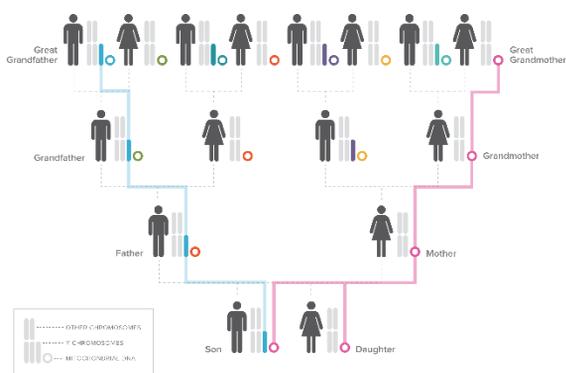
1. Scientific Officer, Sherlock Institute of Forensic Science (SIFS), INDIA
2. Senior Resident, Department of Forensic Medicine and Toxicology, Government Medical College Jammu (180001).

**Introduction**

Forensic genealogy is simply a way to match the genetic data base of the nearest relative of the perpetrator whose DNA has been found at the crime scene. It involves using the DNA data base like GEDmatch for purpose of comparison from the sample found from the crime scene with the database Populus to find the closest genealogical match.

Forensic genealogy, put simply, involves using a DNA database such as GEDmatch to compare a sample (generally obtained from a crime scene) to the database populous to search for closest genealogical matches. From there, investigators can create a family tree by combining the genetic data with other data types (such as electronic health records, social media, and public records) and practise them to narrow down which person(s) could qualify as being potentially involved in the case (either as victims or perpetrators) based on factors such as age or known geographic location at the time of the occurrence ([www.law.cornell.edu](http://www.law.cornell.edu), 1996).

Once said individuals have been identified, law enforcement then tries to acquire a current DNA sample of the suspected individual to compare with that obtained from the crime scene to check whether it is a match. This technique was used to recognise a suspect in a case called the Golden State Killer case ([www.theatlantic.com](http://www.theatlantic.com), 2018).



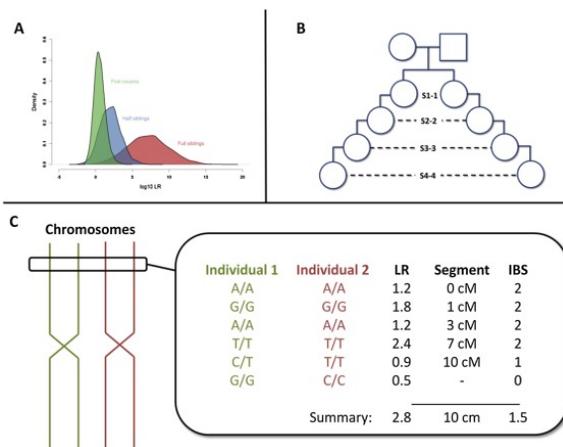
**Figure No. 1: How Forensic Genealogy works**

In another recent case, through the use of such searches, a man in California was exonerated subsequently spending 15 years in prison for a crime he didn't committed, showing just how powerful this tool can be as a vehicle of justice ([www.theguardian.com](http://www.theguardian.com), 2020).

That said, qualms have arisen over the unsolicited use of such data since most people being assessed during these law enforcement searches did not consent to having their information used for this purpose—even though the suspects identified through familial searches also have not surely shared voluntarily their genetic profile even if one of their genetic relatives has done so. To address these concerns, some entities have responded by doing more to protect user information. GEDmatch, for example, has edited its privacy policy to allow users to choose between two public DNA settings: opt-in and opt-out—the only difference being that an opt-out user cannot have their DNA compared with “DNA kits acknowledged as being uploaded for Law Enforcement purposes” ([www.gedmatch.com](http://www.gedmatch.com), 2019).

Similarly, Ancestry.com has created its own Ancestry Guide for Law Enforcement, in which it states that it “does not voluntarily cooperate with law enforcement” ([www.ancestry.com](http://www.ancestry.com), 2019).

These efforts have been partially echoed by the federal government that issued rules that limit the ability of law enforcement to search “Family tree DNA databases,” though contrarily, a judge at the end of 2019 approved a warrant that granted a Florida detective the ability to infiltrate GEDmatch and can easily search its full database of nearly one million users ([The New York Times](http://www.nytimes.com), 2019; [Kaiser](http://www.kaiser.com), 2019).



**Figure No. 2: A Comparison of Methods to Infer Distant Relationships based on Dense SNP Data**

Some largely overlooked aspects of this debate include the effect of incorrect suspects/suspect tracking and the potential to address the ethnic and racial differences that outbreak old-style scientific and forensic searches. Innocent individuals who may be

questioned as suspects in cases as the result of a forensic genealogy search may be tarred by the attention, something that cannot ever be fully erased in the minds of those around them, leaving lasting scars on people who have committed no crime nor done anything wrong (**Butler, 2014; Ram et al., 2018**).

In terms of addressing the representation disparities: before accessing genealogical databases, law enforcement was left using the National DNA Index Service (NDIS), which primarily comprised DNA collected from arrested individuals or those convicted of certain crimes, a database that thus reproduces the ethnic and racial differences present throughout the legal integrity and justice system (**www.fbi.gov, 2017**).

Genealogical databases are prejudiced toward diverse demographics altogether: for instance, the 23andMe database contains largely of persons of European ancestry and thus, comprising genealogical databases in forensic searches might begin to recompense, for a minimum of one respect, discrepancies in the criminal justice system (**Guerrini et al., 2018; Ram et al., 2018**).

## Conclusion

As time progresses, this back and forth over what balance ought to be struck between using individuals' private and genetic data for purposes of which individuals are unaware might continue to grow. We advocate for placing greater control in individuals' hands.

If individuals retained control of their data, and knew when and how they were used, then resulting systems would reflect the values and purposes of those who participate in these databases: we have developed, with colleagues at LunaDNA, such a system (**Kain et al., 2019**). At the same time, if as a society we wish to facilitate criminal investigations and protect individuals, we hope that guidance, oversight, and regulations by law enforcement, companies, and genealogists are promptly forged (**www.theatlantic.com, 2019**).

This balance of consent between law enforcement and individuals must be met to allow for the greatest discovery work to be done while exposing personal data as minimally as possible—preliminary probings of the public opinion on the matter have shown that individuals appear less concerned over police searches of personal genetic data in genetic genealogy databases when the purpose is considered justified: violent crimes (including rape, murder, and arson), crimes against children (including child abuse), and identification of missing persons (**Guerrini et al., 2018**).

 References:

Ancestry. "Ancestry Guide for Law Enforcement." Ancestry (2019). Accessed on 8 March 2021, Accessed from <https://www.ancestry.com>.

Butler, John. *Advanced Topics in Forensic DNA Typing: Interpretation*. 1st ed., Academic Press, 2014.

Cornell Law School—Legal Information Institute. "45 CFR subpart E—privacy of Individually Identifiable Health Information." (1996), Accessed on 8 March 2021, Accessed from <https://www.law.cornell.edu/cfr/%20text/45/part-164/subpart-E>

FBI. "Frequently asked questions on CODIS and NDIS." (2017), Accessed on 8 March 2021, Accessed from <https://www.fbi.gov/services/laboratory/biometricanalysis/codis/codis-and-ndis-factsheet>

GEDmatch. "GEDmatch.Com Terms of Service and Privacy Policy." (2019), Accessed on 8 March 2021, Accessed from <https://www.gedmatch.com/tos.htm>

Guerrini, Christi J., et al. "Should Police Have Access to Genetic Genealogy Databases? Capturing the Golden State Killer and Other Criminals Using a Controversial New Forensic Technique." *PLOS Biology*, vol. 16, no. 10, 2018, p. e2006906. *Crossref*, doi:10.1371/journal.pbio.2006906.

Hill, Kashmir and Heather Murphy. "The New York Times Your DNA profile is private? A Florida judge Just Said Otherwise." *The New York Times* (2019), Accessed on 8 March 2021, Accessed from <https://www.nytimes.com/2019/11/05/business/dna-database-search-warrant.html>

Kain, Robert, et al. "Database Shares That Transform Research Subjects into Partners." *Nature Biotechnology*, vol. 37, no. 10, 2019, pp. 1112–15. *Crossref*, doi:10.1038/s41587-019-0278-9.

Kaiser, Jocelyn. "New Federal Rules Limit Police Searches of Family Tree DNA Databases." *Science*, 2019. *Crossref*, doi:10.1126/science.aaz6336.

Ram, Natalie, et al. "Genealogy Databases and the Future of Criminal Investigation." *Science*, vol. 360, no. 6393, 2018, pp. 1078–79. *Crossref*, doi:10.1126/science.aau1083.

The Guardian. "California Man Freed After 15 years in Prison Thanks to Genealogy Website Data." (2020), Accessed on 8 March 2021, Accessed from <https://www.theguardian.com/us-news/2020/feb/14/california-man-second-person-ever-exonerated-publicly>

Zhang, Sarah. "The Coming Wave of Murders Solved by Genealogy." *The Atlantic* (2018). Accessed on 8 March 2021, Accessed from <https://www.theatlantic.com>

Zhang, Sarah. "The Messy Consequences of the Golden State Killer Case." *The Atlantic* (2019). Accessed on 8 March 2021, Accessed from <https://www.theatlantic.com>.