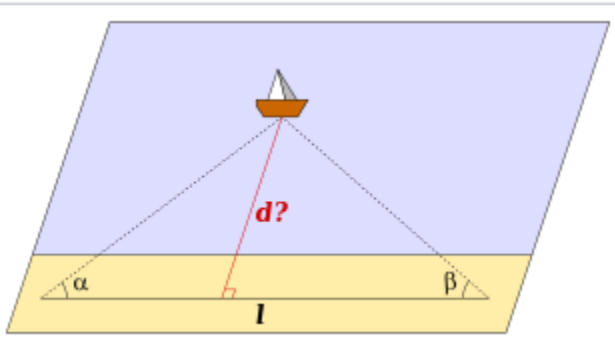
Genealogical triangulation
Part 1 - Motivation



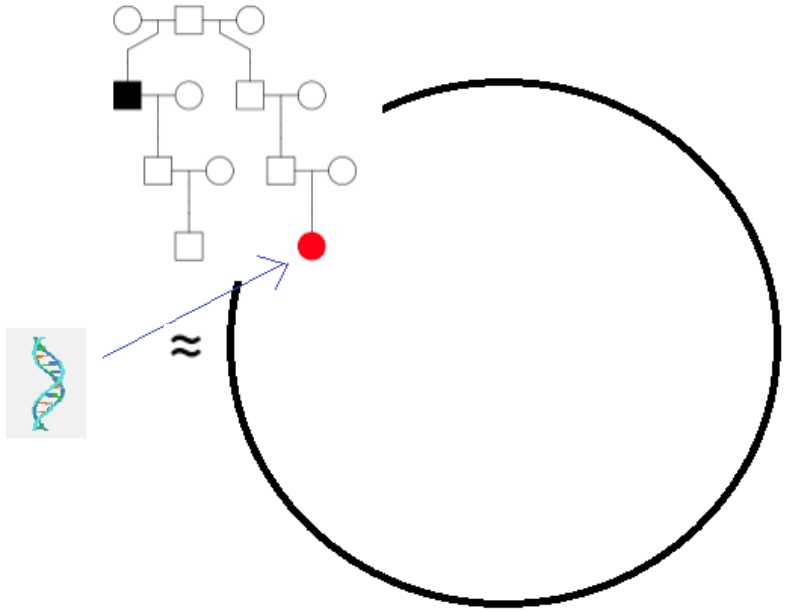
Thore Egeland

NORBIS June 17, 2022

Database search

A DNA profile is searched against a database. May get:

- a direct match
- a few close matches (familial searching)
- many distant matches,
  long range familial searching



Data: Direct to consumer DNA tests

Order test

Spit in a cup

You have 25 Relatives in Common™

Finding common relatives can help you piece together your family story.

Relative in common	You	Relative	Shared DNA
EU Example Uncle	Uncle (24.0%)	4th Cousin (0.29%)	Yes
ER Example Relative	4th Cousin (0.39%)	5th Cousin (0.12%)	No
ER Example Relative	4th Cousin (0.34%)	5th Cousin (0.18%)	No
ER Example Relative	4th Cousin (0.29%)	4th Cousin (0.28%)	Share to see

Results

ancestry
23andMe
MyHeritage
FamilyTreeDNA

Applications

- Traditional motivation. Find
  - relatives
  - ancestry www.africanancestry.com/home/, …
  - disease genes, eye colour etc,
- More recently. Find
  - biological parents (adoption cases) DNAAdoption.org
  - semen-, egg donors www.donorchildren.com
  - missing persons (Norway: Kripos)
- Major crime cases:

How lucky was the genetic investigation in the Golden State Killer case?

Posted on May 7, 2018 by cooplab

Last week, police arrested Joseph DeAngelo as a suspect in case of the Golden State Killer, an infamous serial murderer and rapist whose case has been open for over forty years. The arrest is huge news in and of itself, but for people interested in the social uses of genetic data, the way in which DeAngelo was identified—using genetic genealogy & genetic data from crime-scene samples—was noteworthy. In this blog post, we discuss some of the

Looking at SNP-based relative matches in GEDmatch, police found what they needed in the form of 10 to 20 likely relatives. These likely relatives represented third-to-fourth cousins of DeAngelo, most of whom he had probably never met. Using this genetic data, in combination with genealogical information about these relatives, the Golden State Killer investigation narrowed to one extended family, eventually honing in on DeAngelo himself.

https://gcbias.org/2018/05/07/how-lucky-was-the-genetic-investigation-in-the-golden-state-killer-case/

Golden State Killer

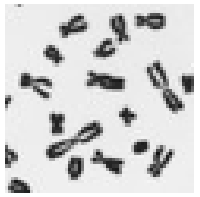
One of the three primary sketches of the Golden State Killer

Other names	Original Night Stalker East Area Rapist East Bay Rapist Diamond Knot Killer[1]

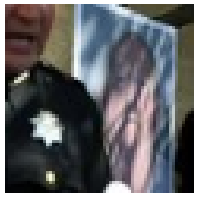
Joseph DeAngelo, April 2018

The **Golden State Killer** is a recent moniker for a serial killer, serial rapist, and serial burglar who committed at least 13 murders, at least 50 rapes, and over 100 burglaries in California from 1974 through 1986.[2]

The Golden State Killer Is Tracked Through a Thicket of DNA, and Experts Shudder APRIL 27, 2018



What We Know About Joseph DeAngelo, the Golden State Killer Suspect APRIL 26, 2018



Search for 'Golden State Killer' Leads to Arrest of Ex-Cop APRIL 25, 2018

Golden State Killer's Victims: The Families Who Never Gave Up Hope APRIL 26, 2018

She Helped Crack the Golden State Killer Case. Here's What She's Going to Do Next.

Barbara Rae-Venter's genealogical sleuthing acumen has inspired others to help law enforcement with unsolved cases, as well as an ethics and privacy debate.

"I am a retired patent attorney," said Barbara Rae-Venter. "None of this is a planned event." Brian L. Frank for The New York Times

I'll Be Gone in the Dark
HBO


Oslo
Drammen
Karlstad
Örebro kommune
Uppsala kommune
Stockholm
Linköping


SAMHÄLLE
DNA-analys
Polisen
Dubbelmordet i Linköping blir pilotfall med släktforsknings-dna
Om det inte skulle hitta rätt person där har utredarna i dubbemordsfallet fått möjlighet att utöka sökningen till kommersiella register. Metoden har gett resultat i USA där man fick upp spåret efter en misstänkt seriemördare. Det fallet var också det som inspirerade i Linköping.
Man anhållen för dubbelmord i Linköp
JUST NU: Skatteverket betalar ut
Man gripen för dubbelmordet i Linköping 2004
Man anhållen för dubbelmord
Man gripen för dubbelmordet

Forensic Science International: Genetics 53 (2021) 102525

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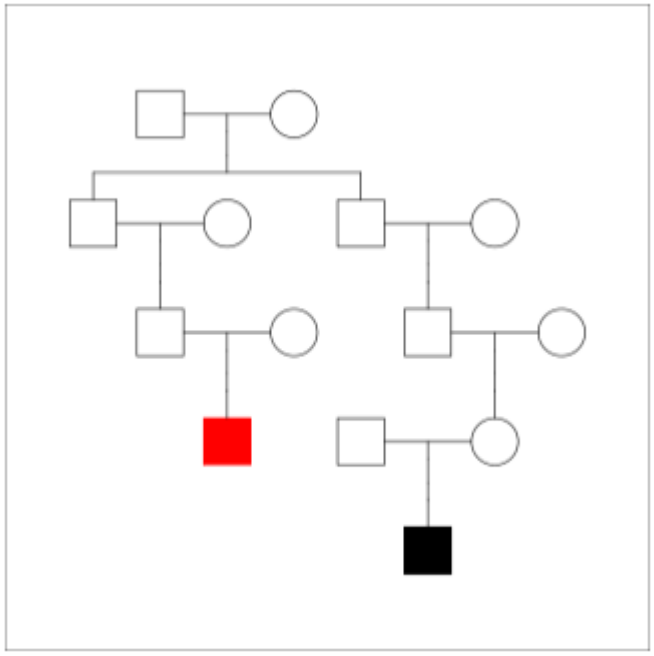
Forensic Science International: Genetics

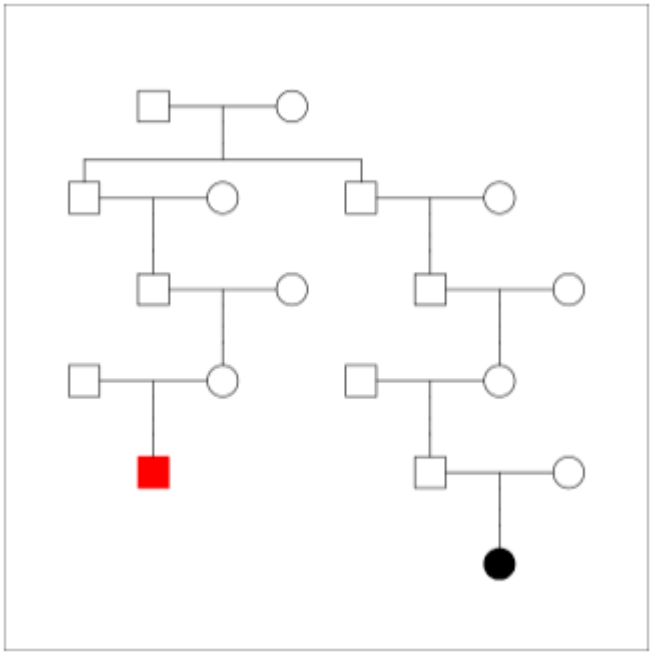
journal homepage: www.elsevier.com/locate/fsigen

Getting the conclusive lead with investigative genetic genealogy – A successful case study of a 16 year old double murder in Sweden

Andreas Tillmar [a,b,*], Siri Aili Fagerholm [c], Jan Staaf [d], Peter Sjölund [e], Ricky Ansell [c,f,**]

The search in FTDNA was however more fruitful and yielded several hits that were used for family pedigree building and genealogy. In total, 890 hits were obtained in the first search of which the top 28 individuals were used for the genealogy analyses (top two hits shared about 60–100 cM with the unknown and later turned out to be 2nd cousin once removed and 3rd cousin once removed to the perpetrator). Family pedigrees were built back to the late 18th century,





Suspect

Known relatives

- During the process, 15 volunteers with known origin from a specific part of Sweden (that emerged as of high interest due to the genealogy work performed) provided their DNA samples to FTDNA whereas one of them turned out to be a closer match (shared about 347 cM in total)

% shared	Total cM shared half-identical (or better)	Relationship
100% (Method I)/50% (Method II)	3400.00	Identical twins (monozygotic twins)
50%	3400.00	Parent/child
50% (Method I)/37.5% (Method II)	2550.00	Full siblings
25%	1700.00	Grandparent/grandchild, aunt-or-uncle/niece-or-nephew, half-siblings
25% (Method I)/23.4375% (Method II)	1593.75	Double first cousins
12.5%	850.00	First cousins, great-grandparent/great-grandchild, great-uncle or aunt/great-nephew or niece, half-uncle or aunt/half-nephew or niece
6.25%	425.00	First cousins once removed, half first cousins, great-great-grandparent/great-great-grandchild, great-great-aunt/uncle, half great-aunt/uncle
6.25%	425.00	Double second cousins
3.125%	212.50	Second cousins, first cousins twice removed, half first cousin once removed, half great-great-aunt/uncle, great-great-great-grandparent/great-great-great-grandchild
1.563%	106.25	Second cousins once removed, half second cousins, first cousin three times removed, half first cousin twice removed

https://isogg.org/wiki/Autosomal_DNA_statistics

From the subsequent mapping of descendants of the common ancestors, including investigative information such as year of birth, a pair of brothers remained as candidates to be the unknown perpetrator. Buccal swabs were subsequently, following prosecutors decision, obtained from both brothers and with comparative routine STR profiling, one of these brothers was confirmed to match the crime scene sample. The suspect confessed and was later convicted for the double murder.