



Cold Fact: Uncovering the Blanket of Evidence

Kari Danser, MS, Matthew M. Legler, and Mark W. Perlin, PhD, MD, PhD
Cybergenetics, Pittsburgh, PA

Abstract



The Enco gas station.

On the night of June 13, 1963, a white car pulled up to an Enco gas station on an old Wisconsin highway. Oshkosh station owner Wayne Pratt went over to assist. The station lights suddenly went dark. Pratt's wife later discovered his body in a storage room, hidden beneath a blanket. He had been stabbed over 50 times.

Despite questioning 75 people and administering 25 lie detector tests, investigators couldn't uncover any solid leads. The absence of physical evidence and eyewitnesses stalled the homicide investigation. The case went cold and remained dormant for decades.

In 2012, Winnebago County reopened the investigation. The Sheriff's Office sent the blanket to the local crime lab for DNA testing, but the lab gave inconclusive results. Private forensic labs retested the blanket in 2015 and 2023, uncovering a degraded, low-level DNA mixture of multiple people. But they couldn't interpret the complex mixture. The blanket DNA evidence remained inconclusive.

In April 2024, the Sheriff's Office sent the blanket DNA data files to Cybergenetics. Applying its TrueAllele® technology to the data, the company analyzed the degraded three-person mixture. The computer separated the STR data into three distinct genotypes.

The blanket's probabilistic genotypes were compared with multiple suspect references, and a DNA identification was made. In June, Cybergenetics issued a report that statistically linked the blanket to suspect William Doxtator.

This forensic science breakthrough, combined with original case reports and witness statements, led the Sheriff's Office to refer a charge of First-degree Intentional Homicide to the District Attorney's Office.

Sixty years after the crime, better DNA science had solved the case. Doxtator died in 2022. District Attorney Eric Sparr believed that, had he lived, the new DNA evidence would have justified a homicide prosecution.

This case highlights how a single technological advance—unmixing DNA mixtures—can transform forensic science, strengthen justice, and redefine human identification. A computer gave voice to previously silent evidence, showing how statistical innovation and human determination can bring resolution to even the coldest of cases.



The Enco gas station and Wayne Pratt's residence.

DNA Data

Evidence

In June 2013, the Wisconsin State Crime Laboratory (WSCL) processed eight new evidence items. These items included the victim's clothing, a shovel, a multi-colored blanket, and boots. The lab tested the items using the MiniFiler™ amplification kit.

In August 2013, the FBI also tested some evidence items.

In October 2014, Sorenson Forensics retested the shovel handle and blanket, as well as the WSCL extracts using the MiniFiler kit.

In 2015, Sorenson Forensics retested the blanket using the MVAC collection method. The DNA from this round of testing utilized the PowerPlex® 16 amplification kit.

In 2018, the shirt and pants were retested by Sorenson Forensics.

In 2023 and 2024, Sorenson retested the blanket again using the GlobalFiler™ amplification kit.



The blanket that was covering Wayne Pratt after his murder.

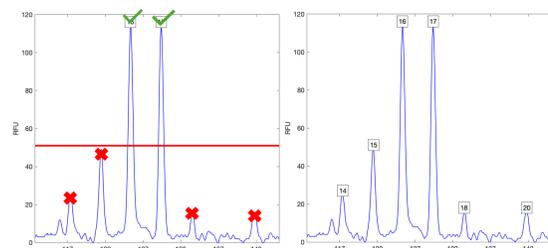
DNA items

Item	Description	Kit
18-R1	Bottom left corner of blanket swabs	GlobalFiler™
18-R2	Bottom left corner of blanket swabs	GlobalFiler™

Reference	Role	Kit
20	elimination	GlobalFiler™
21	suspect	GlobalFiler™
22	victim	GlobalFiler™
MK	suspect	PowerPlex® 16
WD	suspect	PowerPlex® Fusion

Tables showing the evidence and reference items tested along with the DNA testing kits used.

Electropherogram (EPG) data



The EPG on the left shows locus D3S1358 from the blanket at a threshold of 50 rfu. The EPG on the right shows all the data peaks at the same DNA location. TrueAllele used all of the DNA data (right) while threshold methods discard relevant data peaks, such as the 15 peak (left).

Methods

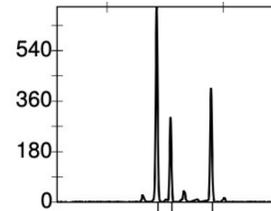
Manual interpretation

Sorenson Forensics used a threshold of ~50 rfu for manual interpretation.

The results of the manual analysis of the blanket data from the 2023 report are summarized below:

- A mixture of DNA profiles from three contributors, at least one of which genetically types as male, was obtained from this item.
- This mixture is inconclusive.

Detectives then asked Cybergenetics to reanalyze the blanket data using TrueAllele Casework technology.



Sorenson Forensics blanket data at locus D3S1358.

TrueAllele Casework

Cybergenetics' (Pittsburgh, PA) TrueAllele Casework (TA) probabilistic genotyping system uses Bayesian probability modeling and Markov chain Monte Carlo (MCMC) statistical sampling to interpret DNA data. The TrueAllele process is objective and uses all of the DNA data to separate out genetic types for each contributor in a DNA sample. The software learns from evidence data and does not need to be calibrated on previously developed laboratory data.

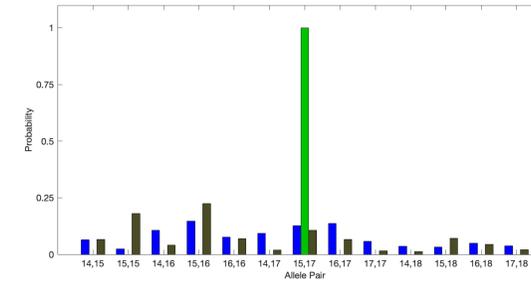
TrueAllele genotype

The blanket DNA data indicated a three-person mixture. TrueAllele separated this data into probabilistic genotypes (allele pairs with probability). The computer inferred both major and minor components.

Allele 1	Allele 2	Probability
15	16	0.1477
16	17	0.1378
15	17	0.1270
14	16	0.1066
14	17	0.0940
16	16	0.0773
14	15	0.0650
17	17	0.0585
16	18	0.0505
17	18	0.0377
14	18	0.0359
15	18	0.0329
15	15	0.0240

Genotype table showing the genotype probabilities of an inferred minor contributor from the bottom left corner of the blanket at locus D3S1358. The genotype probabilities are displayed at a 99% credible level.

Match Statistics



Three genotypes are needed to calculate a likelihood ratio (LR) match statistic. The image above shows these genotype probability distributions at locus D3S1358: 21% minor evidence contributor (blue), suspect (green), population (brown). At each allele pair, the LR is the ratio of evidence (blue) to population (brown) probability.

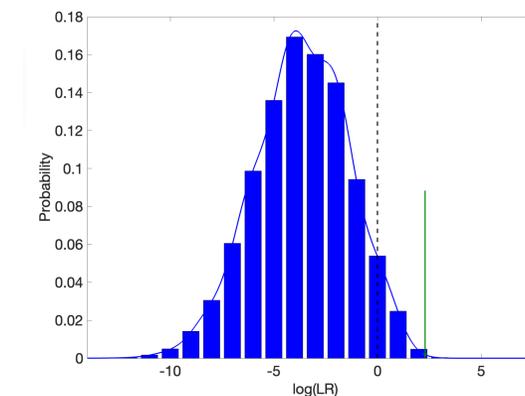
Match Statement:

A match between an inferred genotype and William Doxtator is 203 times more probable than a coincidental match to an unrelated individual.

Population	LR	log(LR)	PME	One in...
FBI BLK	1.59 thousand	3.2024	7.85E-05	12.7 thousand
FBI CAU	309	2.4894	3.41E-04	2.93 thousand
FBI SEH	298	2.4748	3.31E-04	3.02 thousand
FBI SWH	203	2.3072	6.11E-04	1.64 thousand

Match table showing the Likelihood Ratio (LR), log(LR), Probability of Misleading Evidence (PME) and Error Rate (One in) for the match between a minor contributor evidence genotype from the blanket swabs and the suspect.

The TrueAllele user interface can calculate error rates for reported match statistics. The image below shows the Noncontributor distribution for the 21% minor contributor from the blanket swabs. The blue curve shows the log(LR) distribution for noncontributors. The suspect's matching log(LR) of 2.31 is indicated by the green arrow. The false positive error rate is the area under the blue curve to the right of the green arrow.



Error Rate Statement:

For a match strength of 203, only 1 in 1.64 thousand people would match as strongly.

Outcome

Sheriff
John F. Matz
Chief Deputy
Todd A. Christopherson



Winnebago County Sheriff
www.co.winnebago.wi.us
4311 JACKSON STREET
OSHKOSH, WISCONSIN 54901
(920) 236-7300 (920) 232-0988
JAIL (920) 236-7360
ADMINISTRATION FAX (920) 236-7333
RECORDS FAX (920) 236-7302

PRESS RELEASE
07/16/2024

In June 2024, the Winnebago County Sheriff's Office received the TrueAllele case report for the blanket swabs and comparisons to Wayne Pratt and suspect William Doxtator.

On July 16, 2024 the Winnebago County Sheriff's Office released a formal press release resolving the case. Winnebago County District Attorney Eric Sparr stated that "there would be sufficient evidence to support a factual basis and probable cause to pursue a homicide charge."

William Doxtator passed away in 2022.

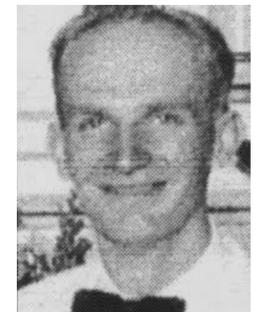
Conclusions

DNA laboratories and the Winnebago County Sheriff's Office had evidence items where manual threshold methods discarded peak data, rendering the interpretation inconclusive.

Using TrueAllele probabilistic genotyping, previously uninterpretable DNA, including 60-year-old, degraded samples, were successfully analyzed. TrueAllele fully modeled all of the peak data without applying thresholds, employing Bayesian inference and Markov chain Monte Carlo (MCMC) to objectively compute match statistics and error rates.

Through this advanced analysis, TrueAllele identified a suspect as the minor contributor to the blanket mixture, while prior manual interpretation had already associated the victim as the major contributor. Together, these findings contextualize both individuals on the same evidence item.

TrueAllele's ability to interpret low-level, degraded mixtures and compare profiles generated from different amplification kits demonstrates its robustness and reliability for complex casework and legacy DNA evidence.



Picture of the victim, Wayne Pratt.

References

- [1] <https://www.wsaw.com/2024/07/16/investigators-said-bowler-man-was-suspect-newly-solved-cold-case-murder-winnebago-county/>.
- [2] Perlin, M.W. Efficient construction of match strength distributions for uncertain multi-locus genotypes. *Heliyon*, 4(10):e00824, 2018.