

## Pumping a 7-person murder mixture for TrueAllele® information

Cybergenetics Webinar  
User Group Meeting  
August, 2025  
Pittsburgh, PA

Matthew Legler  
Cybergenetics, Pittsburgh, PA



Cybergenetics © 2003-2025

---

---

---

---

---

---

---

## Crime

On April 7, 2014, a person killed gas station clerk Babul Kumer Saha before subsequently robbing the store.

“Per video, the suspect wore gloves but the suspect’s bare arms may have come in contact with the register and/or the lottery slots when taking the money. Additionally, the video showed that the suspect may have brought a **white plastic bag** to the scene.”

---

---

---

---

---

---

---

## Crime Scene



Video surveillance photos of the man who killed Babul Kumer Saha released by Maple Heights Police.

---

---

---

---

---

---

---

## Evidence

DNA samples were collected from several items around the gas station, including:

- gas pump button (10)
- a lottery cash register slot (14)
- **a plastic bag (17.1)**

---

---

---

---

---

---

---

## Previous Analysis

- Prior to Cuyahoga County deploying TrueAllele
- Lab performed a manual analysis

---

---

---

---

---

---

---

## Previous Results

"The DNA profile obtained from item 14 [cash register] is a mixture of two or more individuals. Babul Kumer Saha cannot be excluded as a possible contributor to this mixture. The probability of selecting an unrelated individual at random from the population as a possible contributor to this mixture is approximately 1 in 35 million in Caucasians, 1 in 133 million in African Americans, and 1 in 19 million in Hispanics. The genetic loci Penta E, CSF1PO, Penta D, and TPOX were not used in the statistical calculations."

"The DNA profiles obtained from items 10 [gas pump] and 17.1 [bag] are mixtures and are inconclusive due to too many contributors."

**Only match statistic was to victim**

---

---

---

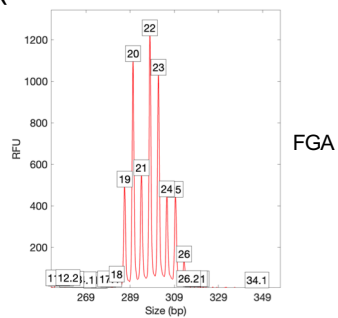
---

---

---

---

### Data (Item 17.1 – plastic bag)



Consistent with at least 4 (D12, **FGA**),  
5 (D2S1338, PentaE), 6 (D1, D18), or more contributors.

---

---

---

---

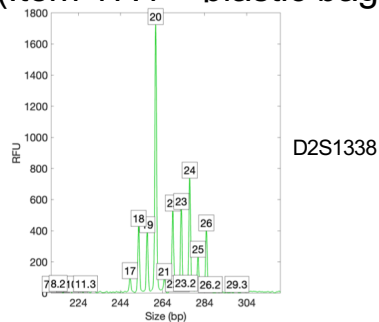
---

---

---

---

### Data (Item 17.1 – plastic bag)



Consistent with at least 4 (D12, FGA),  
5 (**D2S1338**, PentaE), 6 (D1, D18), or more contributors.

---

---

---

---

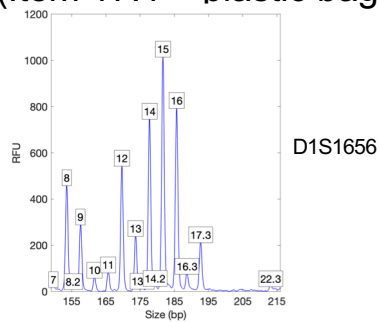
---

---

---

---

### Data (Item 17.1 – plastic bag)



Consistent with at least 4 (D12, FGA),  
5 (D2S1338, PentaE), 6 (**D1**, D18), or more contributors.

---

---

---

---

---

---

---

---

## TrueAllele Analysis

- 4 to 8 contributors
- 100K and 200K cycles
- Degraded DNA option on

---

---

---

---

---

---

---

## Genotype Concordance (ncon7)

- 4 requests x 7 genotypes = 28 genotypes
- How do we review efficiently?
  - Focus on one matching reference at a time
- Use the filter

Shown in VUler™

---

---

---

---

---

---

---

## Impact of different contributor assumptions

Ncon	Avg. log(LR)
4	2.77
5	2.48
6	4.12
7	4.92
8	4.76

*Matches to Reference 20*

---

---

---

---

---

---

---

# TrueAllele Reporting

Item 17.1, bag

TrueAllele assumed that the evidence sample data (Item 17.1) contained four, five, six, seven or eight unknown contributors, and objectively inferred evidence genotypes solely from these data. Degraded DNA was considered. Following genotype inference, the computer then compared separated genotypes from this evidence item to provided reference genotypes (Items 16 and 20), relative to ethnic populations, to compute LR DNA match statistics. Based on these results:

A match between the bag (Item 17.1) and Babul Kumer Saha (Item 16) is:  
 224 thousand times more probable than a coincidental match to an unrelated African-American person,  
 3.38 million times more probable than a coincidental match to an unrelated Caucasian person, and  
 6.09 million times more probable than a coincidental match to an unrelated Hispanic person.

A match between the bag (Item 17.1) and Slater Howell III (Item 20) is:  
 98 thousand times more probable than a coincidental match to an unrelated African-American person,  
 2.24 million times more probable than a coincidental match to an unrelated Caucasian person, and  
 2.19 million times more probable than a coincidental match to an unrelated Hispanic person.

**Matches to victim and suspect on same item**

---

---

---

---

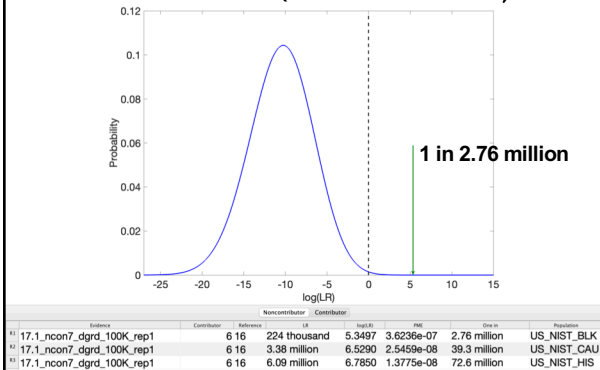
---

---

---

---

## Error Rate (Victim Match)




---

---

---

---

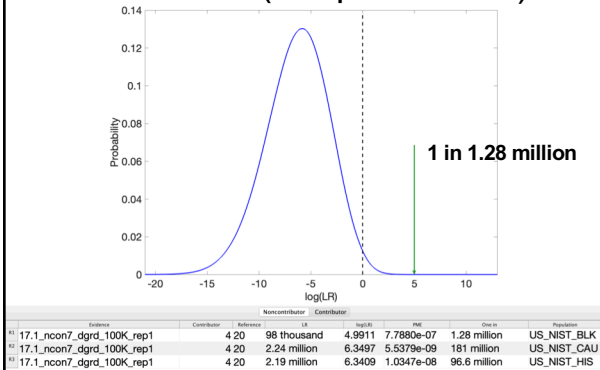
---

---

---

---

## Error Rate (Suspect Match)




---

---

---

---

---

---

---

---

## Validation

**Question:** How can we report on mixtures with >5 contributors?

**Answer:** We've validated the system on up to 10 contributors.

---

---

---

---

---

---

---

## Validation

JOURNAL OF  
FORENSIC  
SCIENCES



*J Forensic Sci.* March 2020, Vol. 65, No. 2  
doi: 10.1111/1556-4029.14204  
Available online at: [onlinelibrary.wiley.com](http://onlinelibrary.wiley.com)

### PAPER

### CRIMINALISTICS

David W. Bauer,<sup>1</sup> Ph.D.; Nasir Butt,<sup>2</sup> Ph.D.; Jennifer M. Hornyak,<sup>1</sup> M.S.; and Mark W. Perlin,<sup>1</sup> Ph.D., M.D.

Validating TrueAllele<sup>®</sup> Interpretation of DNA Mixtures Containing up to Ten Unknown Contributors\*

---

---

---

---

---

---

---

## Validation Design

TABLE 1—Study design.

Name	2-1	2-2	3-1	3-2	4-1	4-2	5-1	5-2	6-1	6-2	7-1	7-2	8-1	8-2	9-1	9-2	10-1	10-2
Designed (Des)	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
Observed (Obs)	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
Reference weight	78	66	94	55	66	41	39	36	56	35	65	21	33	42	32	24	46	25
	22	34	5	33	22	26	37	30	19	20	17	20	20	16	20	17	18	19
			1	12	7	20	16	21	13	18	5	19	18	15	15	17	17	14
				5	14	6	9	9	13	4	15	13	12	11	11	6	13	13
							5	2	8		13	9	8		9	5	12	12
									1	6	3	3	3	5	7	8	5	6
										1	4	2	2	2	4	8	1	5
												1	1	1	3	6	1	3
															1	0.2	1	1
																	0.5	1

\*The sample name (Name) gives the number of contributors in the study design, followed by an instance number. The number of contributors Cybergenetics observed (Obs) did not exceed the actual number in the study design (Des). Each column gives the mixture contributor weight as percentages. In a column where Des is greater than Obs, Des-Obs grayed out contributors could not be inferred.

- Random design (replicates casework)
- Observed vs. Expected

---

---

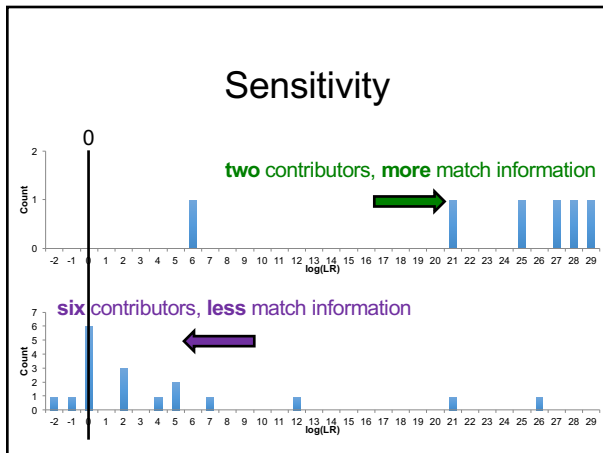
---

---

---

---

---




---

---

---

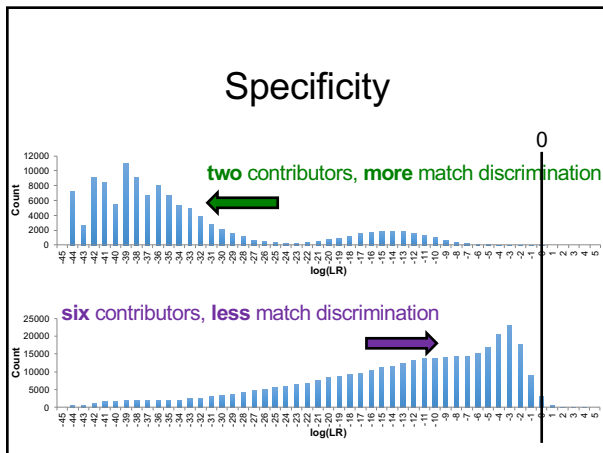
---

---

---

---

---




---

---

---

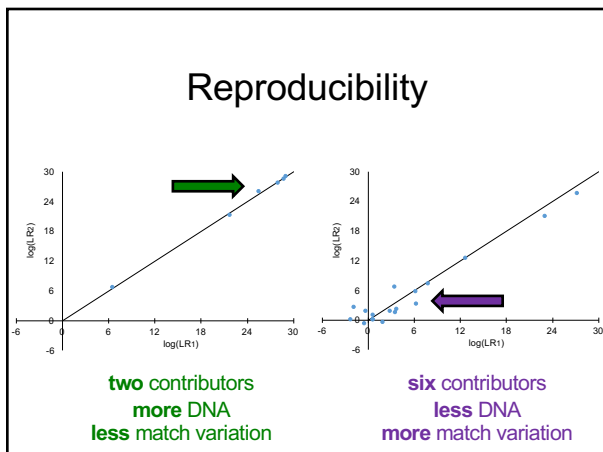
---

---

---

---

---




---

---

---

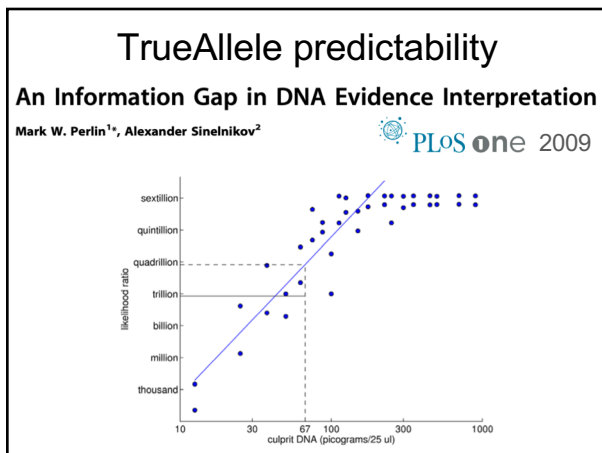
---

---

---

---

---




---

---

---

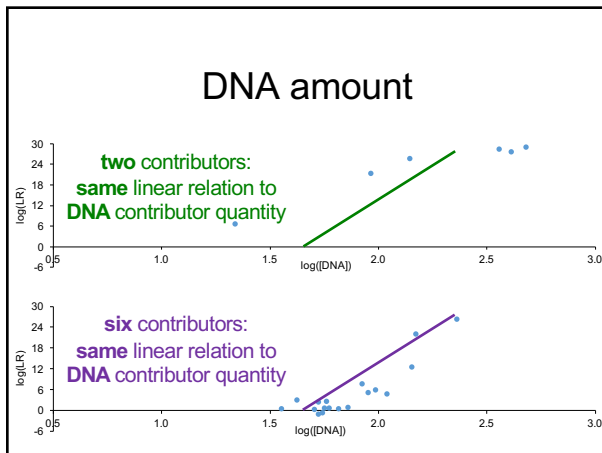
---

---

---

---

---




---

---

---

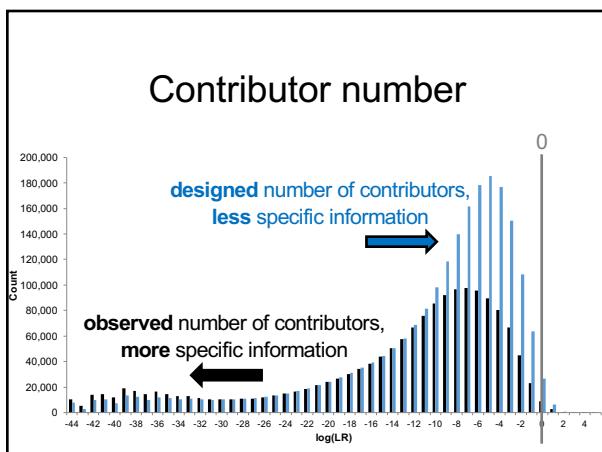
---

---

---

---

---




---

---

---

---

---

---

---

---



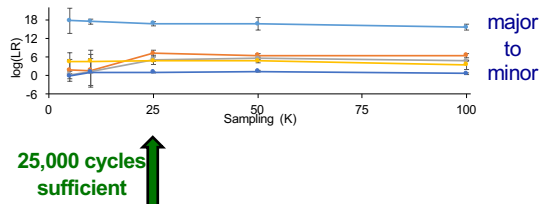
## Peeling genotypes

% DNA	Peeling Round							
	0	1	2	3	4	5	6	
13	7.1	K	K	K	K	K	K	K
22	5.7	7.4	K	K	K	K	K	K
12	5.1	4.3	5.5	K	K	K	K	K
16	3.9	3.8	5.2	6.3	K	K	K	K
13	3.5	2.8	2.5	1.3	6.1	K	K	K
15	3.2	3.2	4.0	1.1	5.6	8.4	K	K
2	1.4	0.9	1.3	1.1	2.8	2.9	4.1	
2	0.2	2.3	1.8	2.7	2.3	2.5	3.6	
4	0.1	1.0	0.6	1.3	2.5	0.4	1.8	
1	-0.2	0.1	0.1	-0.3	-1.0	-0.7	-0.1	

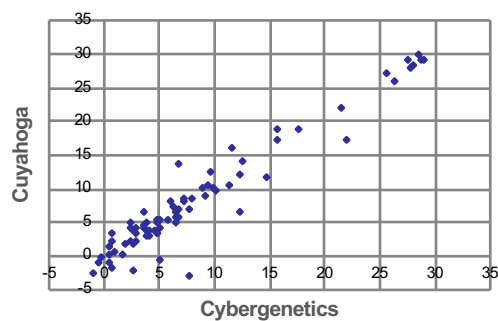
## MCMC sampling

Five contributors (observed in the EPG data)

Longer sampling, better metrics



## Independent testing



Testimony

On September 7, 2017, DNA analyst Jennifer Bracamontes (Née Hornyak) testified about the computer’s results before a Cuyahoga County jury.

---

---

---

---

---

---

---

29

Match statistics

		16	20
Item	Description	Babul Kumer Saha	Slater Howell III
10	Gas pump button		
14	Cash register lottery slot	11.1 trillion	
17.1	Bag	224 thousand	98 thousand

---

---

---

---

---

---

---

30

Match statistics

		16	20
Item	Description	Babul Kumer Saha	Slater Howell III
10	Gas pump button		
14	Cash register lottery slot	13.04	
17.1	Bag	5.35	4.99

---

---

---

---

---

---

---

## Case Outcome

On September 12, 2017, the jury found Slater Howell III guilty of all charges. On November 14, 2017, Howell was sentenced to life in prison for Saha's homicide and the murder of a Cleveland firefighter, a charge to which he plead guilty.

Source: [Man convicted of killing Maple Heights store clerk to 'earn bones' for Heartless Felons - cleveland.com](#)

---

---

---

---

---

---

---

## Conclusions

### Next month

We'll hear from Dr. Nasir Butt of Cuyahoga County Regional Forensic Science Laboratory (CCRFSL) who will discuss their workflow and how they are making full use of TrueAllele.



---

---

---

---

---

---

---