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## TrueAllele for Africa

**6# African Forensic Forum**  
**University of Cape Town**  
**South Africa**  
**March 2026**

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**Cybergenetics, Pittsburgh, PA USA**



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JUSTICE  
THROUGH  
SCIENCE

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## Informative genotyping

Inconclusive uninterpretable DNA mixture?  
 Cybergenetics TrueAllele® computer analysis  
 Probability preserves identification information

Unmix the mixture



Contributor


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3 ← 400,000 →

4

Person A  
excluded



Person B  
included



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## UCT scientific research areas

1. Show sexual violence does exist as a problem in Africa
2. Demonstrate that “uninformative” DNA data can be informative
3. Reveal the presence of multiple perpetrators in DNA rape evidence
4. Find serial offenders by comparing DNA evidence between crimes

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## California serial rapist

Kern Regional Crime Laboratory

October 2013

thirty-seven  
swabs and cuttings

garments  
blankets  
apartment surfaces  
skin  
body cavities  
telephones  
zip ties

low-level DNA mixtures containing 3 or 4 people

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## Informative DNA mixtures

8 mixture items vs. 5 victims + 1 suspect

Description	Item	C0428X	C0459X	C0460X	C0475X	C0820X	C1147X
Purse strap	C0431X	18.73	5.91				1.63
Phone cord	C0432X						4.53
Phone	C0984X	18.74	2.06				4.62
Stain on pants	C0801S				16.39		6.24
Stain from pants	C0802S				17.42		6.73
Back of shirt	C0806S			6.69	17.43		8.86
Bathtub handle	C0929X					5.80	2.74
Zip tie	C0937X					4.55	20.32

BRJ

likelihood ratio (DNA match statistic)  
measures identification information

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## DNA threshold funnel

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## Discard DNA information

Most DNA evidence isn't reported

DNA evidence Information	Complex Question	Threshold	Level	Preserve
<b>Use evidence item</b>	Too difficult?	Sample type	Hat, gun	No
<b>Generate DNA data</b>	Too little DNA?	qPCR quantification	M:F of 1:10	No
<b>Infer evidence genotype</b>	Too few cells?	Analytic peak height	175 rfu	No
	Too much variation?	Stochastic height	400 rfu	No
	Too many people?	Contributor number	3, 4	No
	Too few alleles?	Male contributor	All	No
<b>Upload to database</b>	Too low match?	CODIS MME	7 ban	No
<b>Match with reference</b>	Too little strength?	CPI level	3-6 ban	No

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## Preserve DNA information

TrueAllele infers probabilistic genotype

DNA evidence Information	TrueAllele Question	Method	Preserve
<b>Use evidence item</b>	Too difficult?	Separate genotypes	Yes
<b>Generate DNA data</b>	Too little DNA?	Model PCR variation	Yes
<b>Infer evidence genotype</b>	Too few cells?	Full Bayesian model	Yes
	Too much variation?	Model all variation	Yes
	Too many people?	Unmix mixture	Yes
	Too few alleles?	Model missing alleles	Yes
<b>Upload to database</b>	Too low match?	TrueAllele LR	Yes
<b>Match with reference</b>	Too little strength?	LR error rate	Yes

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## South African bus crash



2008 bus crash in Komatipoort, South Africa  
 Police recover burned victim remains  
 Relatives submit DNA to help identify remains  
 Data sent to Cybergenetics

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## Victim remains

Victim Remains

- AO0553E
- AO0554E
- AO0555E
- AO0556E
- AO0557E
- AO0558E
- AO0559E
- AO0560E
- AO0561E
- AO0562E
- AO0563E
- AO0564E
- AO0565E
- AO0566E
- AO0567E

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## Relatives of missing people

Sample	Relation
AP2438C	Grandfather
AP2439C	Daughter
AP2440C	Son
AP2441C	Mother
AP2442C	Son
AP2443C	Sister
AP2444C	Father
AP2445C	Son
AP2446C	Unknown
AP2447C	Brother
AP2448C	Brother
AP2449C	Sister
AP2450C	Mother
AP2451C	Son
AP2452C	Father
AP2455C	Son

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## DNA match results

Victim remains	Relations of missing persons								
	AP2439C	AP2440C	AP2441C	AP2442C	AP2444C	AP2445C	AP2448C_3	AP2451C	AP2455C
AO0553E									
AO0554E							4.45		
AO0555E								1.88	
AO0556E				5.03					
AO0557E						3.57			
AO0558E									2.95
AO0559E									
AO0560E									
AO0561E					2.34				
AO0562E									
AO0563E					3.36				
AO0564E									
AO0565E									
AO0566E	4.03								
AO0567E		2.25							

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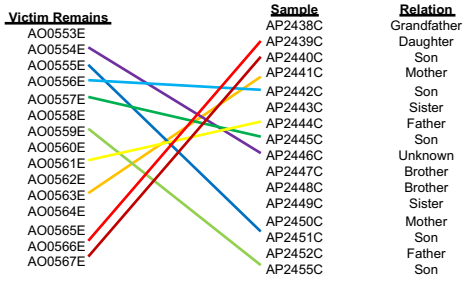
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### TrueAllele identifications




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### All genotyping is probabilistic

Why? Because a genotype is a statistical variable that summarizes DNA data.

A statistical variable has uncertainty.

In math and science, probability is the only valid way to represent uncertainty.

But some genotype probabilities are more accurate and informative than others.

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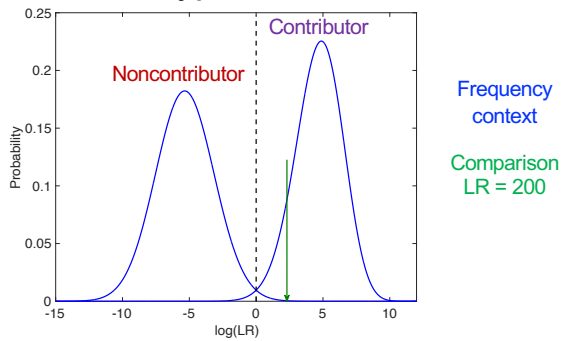
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### Genotype LR distributions




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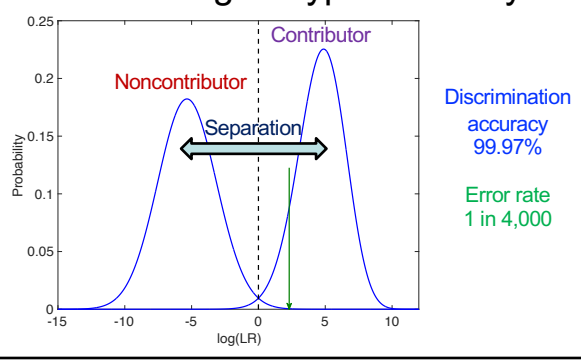
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### Measure genotype accuracy




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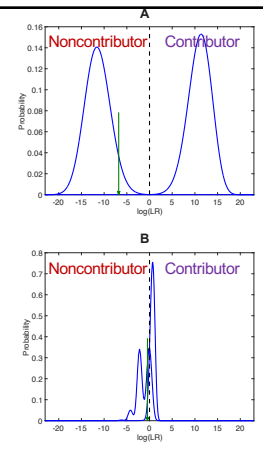
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### US v. Sandoval



TrueAllele  
Accuracy = 100%

Discriminate  
between Noncontributor  
and Contributor  
classifications

STRmix  
Accuracy = 91%

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### LR sensitivity to data threshold

TrueAllele				
RFU	nloci	npeaks	ΔKL	log(LR)
0	21	210	22.4487	-6.7828
STRmix				
RFU	nloci	npeaks	ΔKL	log(LR)
10	19	54	12.3538	-3.1580
20	18	38	6.8887	-6.2917
30	16	29	4.1158	-3.2046
40	14	24	1.7239	-0.8440
50	12	21	1.5647	-0.8173
60	10	16	0.4240	-0.5886
70	9	14	0.2194	-0.5065
80	9	13	0.2612	-0.6204
90	8	11	0.2092	-0.6071

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### TrueAllele reliability

Over 40 validation studies  
 8 peer-reviewed papers  
 up to 10 contributors, low DNA  
 Over 50 admissibility rulings  
 accepted in US, UK, etc.  
 Over 500 client agencies  
 including FBI  
 Sensitive, specific, accurate  
 informative, easy to use

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### TrueAllele for Africa

DNA information solves crime  
 prevents crime, promotes justice  
 Information preserving genotypes  
 connect crimes and criminals  
 more effective DNA database  
 Computer automation  
 accurate genotyping and match  
 scales up for Africa at low cost  
 Easy to understand and use

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### More information

<http://www.cybgen.com/information>



- Courses
- Newsletters
- Newsroom
- Presentations
- Publications
- Reliability
- Webinars

<http://www.youtube.com/user/TrueAllele>  
TrueAllele YouTube channel




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