

Separating DNA Mixtures by Computer to Identify and Convict a Serial Rapist

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Cybergenetics

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The Bakersfield Californian NEWS OBITS SPORTS EVENTS

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July & August 2013

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Rapes have east Bakersfield residents on edge

BY JASON KOTOWSKI Californian staff writer jkotowski@bakersfield.com
WEDNESDAY, AUG 21, 2013 6:43 PM

Crime scene #1



Crime scene #2



Crime scene #3



Zip tie in road

911 Call

Girl: Hi.
911: Hello, 911.
Girl: Ah yes, there's this guy.
He has my Mom naked.
911: OK.
Girl: And he had me blind-folded.
911: OK. How old are you?
Girl: Nine.
911: Nine. Where's your Mom at now?
Girl: What?
You're not my Dad.
You're not my Dad. Get off.
(Scream)



DNA database hit



Major contributor to DNA
of zip tie in road



Billy Ray Johnson

Biological evidence

Kern Regional Crime Laboratory

thirty seven
swabs and cuttings

garments
blankets
apartment surfaces
skin
body cavities
telephones
zip ties

Early October 2013

low-level DNA mixtures containing 3 or 4 people

TrueAllele® Casework



ViewStation
User Client

Visual User Interface
VUIer™ Software

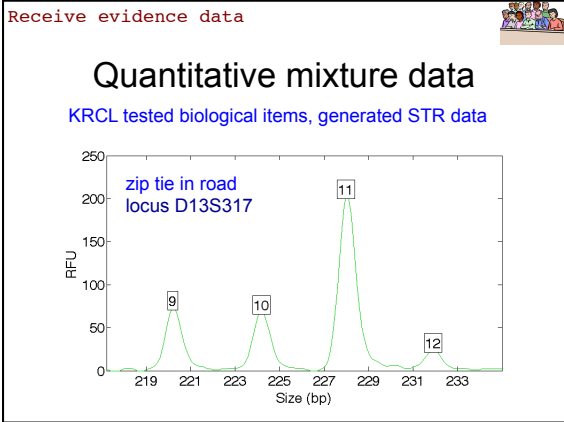


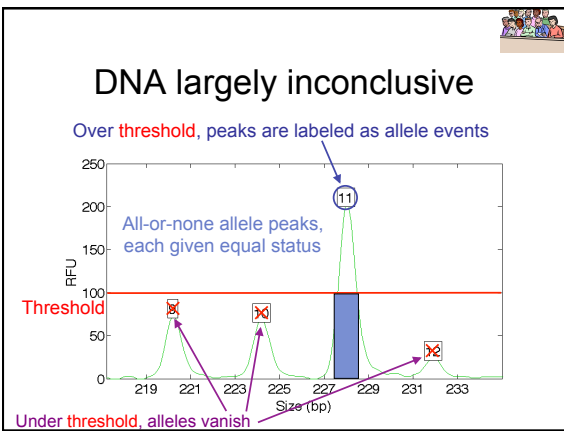
Database
Server

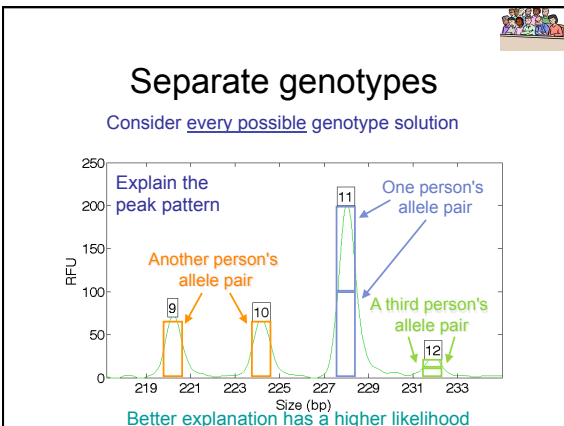
Parallel Processing Computers

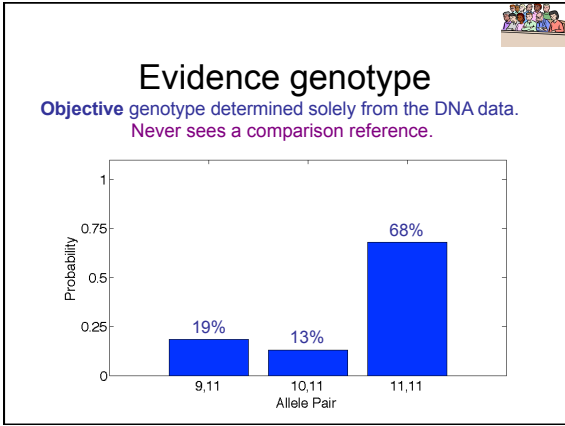


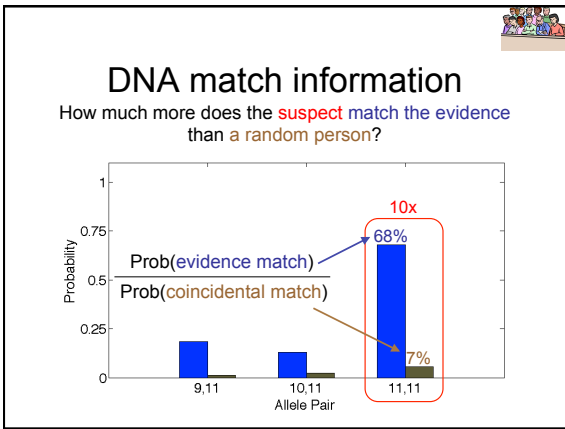
Interpret/Match
Expansion

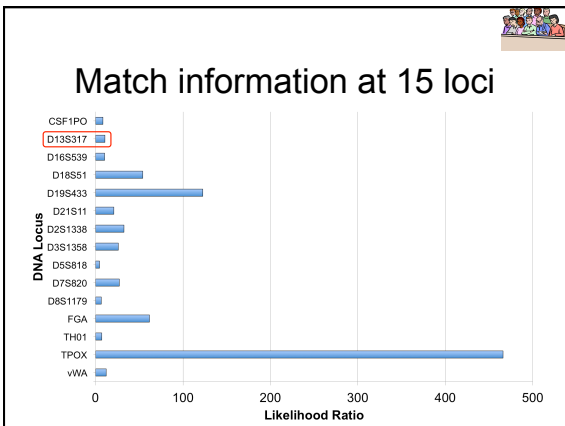














Is the suspect in the evidence?

A match between the zip tie
and Billy Ray Johnson is:

211 quintillion times more probable than
a coincidental match to an unrelated Black person

100,000,000,000,000,000
20 zeros after the one

10x10x10x10x10x10x10x10x10x10x
10x10x10x10x10x10x10x10x10
20 powers of ten

Receive reference data

Late October 2013

Crime scene #1 matches

Description	Item	C0428X	C0459X	C1148X	BRJ
outside kitchen window	C0429X	6	3		
inside kitchen window	C0430X	6			
purse strap	C0431X	19	6		2
phone cord	C0432X				5
vaginal swab, epithelial	C0439E	19			
vaginal swab, sperm	C0439S	8	19		
vaginal swab, epithelial	C0440E	19			
vaginal swab, sperm	C0440S		19		
underwear, epithelial	C0443E	19	5		
underwear, sperm	C0443S		19		
blanket, epithelial	C0819E	19			
blanket, sperm	C0819S		19		
phone	C0984X	19	2		5

Crime scene #2 matches

Description	Item	C0460X	C0475X	C0822X	C0897X	BRJ
vaginal, epithelial	C0451E	20				
vaginal, sperm	C0451S	6	16			
underwear, epithelial	C0453E	19	2			
underwear, sperm	C0453S	7	13			
cigarette butt	C0550X					
pants, epithelial	C0801E	20				
pants, sperm	C0801S		16			6
pants, epithelial	C0802E	20	7			7
pants, sperm	C0802S		17			
shirt, epithelial	C0806E	20				9
shirt, sperm	C0806S	7	17			
knife	C0943X	5				

Crime scene #3 matches

Description	Item	C0820X	C0821X	BRJ
left breast	C0714X	18		
right breast	C0715X	10		
zip tie	C0928X		17	
bathub handle	C0929X	6		3
outside cooler	C0932X			
exterior cooler	C0933X			
interior cooler	C0934X			
knife	C0935X	2		
duct tape	C0936X		17	
zip tie left in roadway	C0937X	5		20
phone	C0938X	10	7	
duct tape	C0939X	1		

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
Bathub handle	C0929X					5.80	2.74
Zip tie	C0937X					4.55	20.32

DNA match statistics
corroborate victim statements

BRJ

December 2013: Grand Jury



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December 4, 2013

TO: DR. KEVIN MILLER
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BAKERSFIELD, CA 93309

SUPPLEMENTAL REPORT
LAB #13-CL-01721, 13-CL-01927,
13-CL-02349

Case: 13-CL-01721

Case: 13-CL-01927

Case: 13-CL-02349



Cybergenetics TrueAllele Report

Arrest

March 2015: Trial

C1147X

Case	Item	Description	Billy Ray Johnson
13-CL-01721	C0431X	Purse strap	1.63
	C0432X	Phone cord	4.53
	C0984X	Phone	4.62
13-CL-01927	C0801S	Stain on pants	6.24
	C0802S	Stain from pants	6.73
	C0806S	Back of shirt	8.86
13-CL-02349	C0929X	Bathtub handle	2.74
	C0937X	Zip tie	20.32

Validation studies



 J Forensic Sci, 2015

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 PAPER

 CRIMINALISTICS



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TrueAllele® Genotype Identification on DNA Mixtures Containing up to Five Unknown Contributors*

ABSTRACT: Computer methods have been developed for mathematically interpreting mixed and low-template DNA. The genotype modeling approach computationally separates out the contributors to a mixture, with uncertainty represented through probability. Comparison of actual genotype solutions to likelihood ratio (LR) which measure identification information. The study statistically examined the genotype modeling performance of a probabilistic TrueAllele® computer system. High and low template DNA mixtures of seven individuals (combinations containing 2, 3, 4, and 5 contributors) were tested. Sensitivity, specificity, and reproducibility were established through LR quantification in each of these eight groups. Covariance analysis found LR behavior to be relatively invariant to DNA amount or contributor number. Analyses of variance found that optimized solutions were produced, once a sufficient number of contributors were considered. This study demonstrates the reliability of TrueAllele interpretation on complex DNA mixtures of representative forensic composition. The results can help predict an information outcome for a DNA mixture analysis.

KEYWORDS: forensic science, DNA mixture, genotype modeling, validation study, likelihood ratio, probabilistic genotyping

Match error rates

False positive rate in Specificity Table 8

TABLE 8—Specificity. Specificity statistics were calculated for the eight groups (quantity and contributor number). (a) The minimum, mean, maximum, and standard deviation log(LR) values were averaged across three ethnic populations. (b) The total number of false inclusions is shown for each group, binned by log(LR) value (rows).

none	1 ng				200 pg			
	2	3	4	5	2	3	4	5
(a) Summary statistics								
N	900,000	900,000	1,200,000	1,500,000	600,000	900,000	1,200,000	1,500,000
Min	-30,000	-30,000	-30,000	-30,000	-30,000	-13,507	-9,517	-20,145
Mean	-23,908	-18,339	-13,878	-9,429	-20,247	-13,507	-9,517	-7,626
SD	4,608	5,990	7,183	4,536	6,821	5,986	4,048	2,218
Max	2,514	1,511	2,140	3,202	0,410	1,878	7,006	1,671
(b) False inclusions								
log(LR)	2	3	4	5	2	3	4	5
0	0	18	142	1071	0	36	152	123
1	0	6	37	200	0	16	22	18
2	0	1	7	24	2	3	3	4
3	0	0	0	6	0	0	0	0
Total	0	25	186	1301	2	55	177	145

Crime lab runs TrueAllele



Concordant Kern lab report

Independent TrueAllele processing

13-CL-01927										
CO451S			6.352	Inferred						
CO453E			Inferred	4.076						
CO453S	0 to 2.5		8.027	Inferred						
CO550X					12.375					
CO801E			19.842	-0.5 to 0.5						
CO801S	6.365		-2.5 to -1.5	Inferred						
CO802E			Inferred	7.705						
CO802S	5.63			Inferred						
CO806E			19.851	-1.5 to -0.5						
CO806S	7.635		Inferred	Inferred						
CO941X			7.438	-4.5 to -2.5						

April 2015



May 2015

'Sadistic monster' gets life in prison for Bakersfield rapes

BY CAROL FERGUSON, EYEWITNESS NEWS | MONDAY, MAY 18TH 2015




BAKERSFIELD, Calif. (KBAK/KBFJ) - An east Bakersfield serial rapist was sentenced Tuesday afternoon to life in prison, with no chance of parole, plus 423 years.

The so-called "East Side Rapist" will spend the rest of his life behind bars.


More information

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




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