

# Solving Complex DNA Mixtures with Next Generation Sequencing

American Academy of Forensic Sciences  
Criminalistics Section

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New Orleans, LA

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## Disclosure

- The views and opinions expressed in this presentation are those of the presenters & authors and do not represent any official views or opinions of the American Academy of Forensic Sciences.
- Some authors are employed by Cybergenetics.
- We show the TrueAllele® evidence interpretation technology developed by Cybergenetics.

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## Ohio v. Slater Howell

On April 7, 2014, gas station clerk Babul Kumer Saha was killed before the store was robbed.



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### DNA Evidence

DNA samples were collected from a gas pump button, a plastic bag, and a lottery cash register slot.



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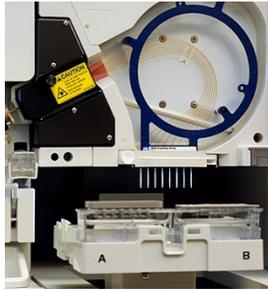
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### Capillary Electrophoresis (CE)

- Fragment analysis
- PCR based
- STR multiplex



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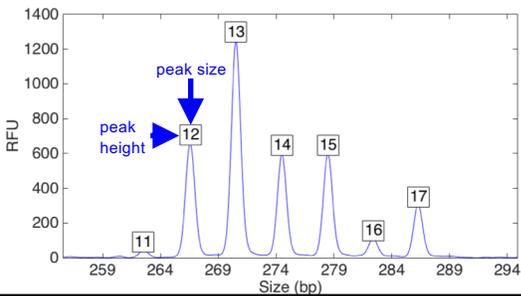
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### TrueAllele on CE

Quantitative STR data at locus D10



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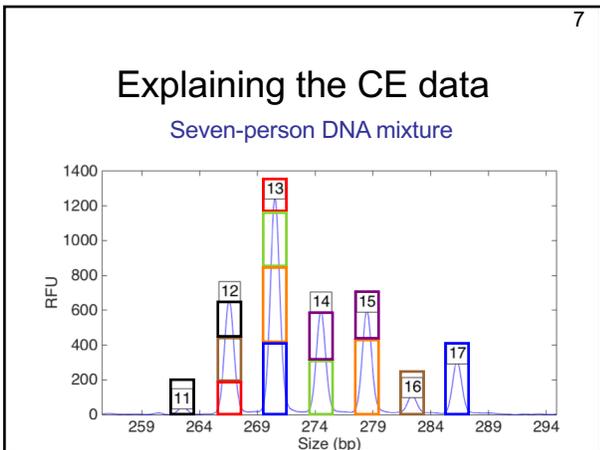
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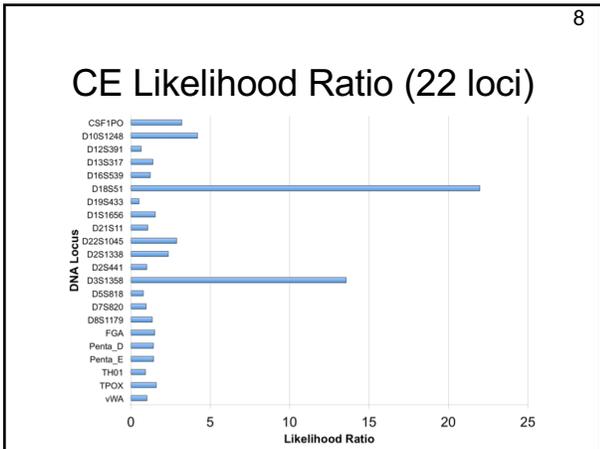
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### CE LR and error rate

A match between the plastic bag  
and Slater Howell is:

98 thousand times more probable  
than a coincidental match.

For a match strength of 98 thousand,  
only 1 in 119 million people would match as strongly.

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### Case outcome

In 2017, the jury found Howell guilty.

He was sentenced to life in prison.



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### TrueAllele Reliability

- Over 40 validation studies  
8 peer-reviewed publications
- Validated for up to 10 unknown contributors
- 49 successful US admissibility rulings  
In 16 different states  
3 Ohio *Daubert* hearings  
Federal court acceptance  
Appellate precedent in 8 states



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### Next Generation Sequencing (NGS)

- Sequence analysis
- Bridge amplification
- STR & SNP multiplex



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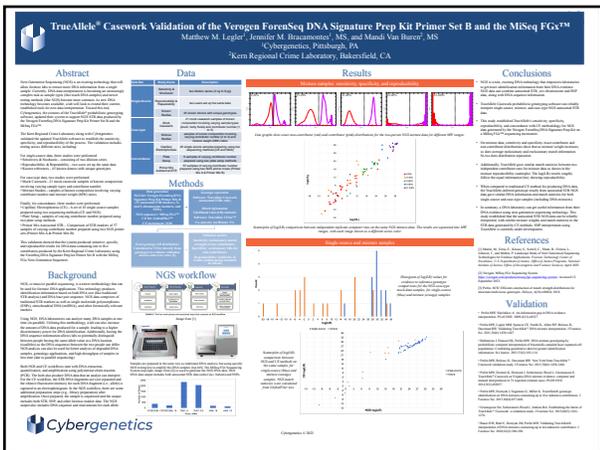
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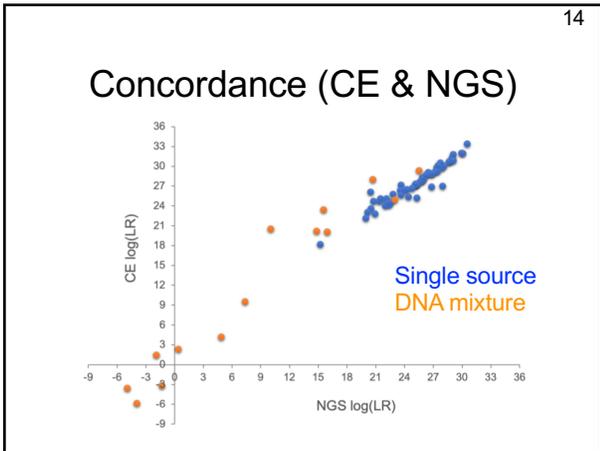
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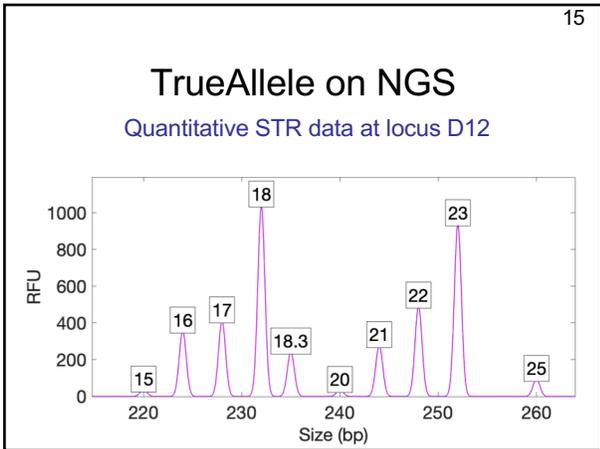
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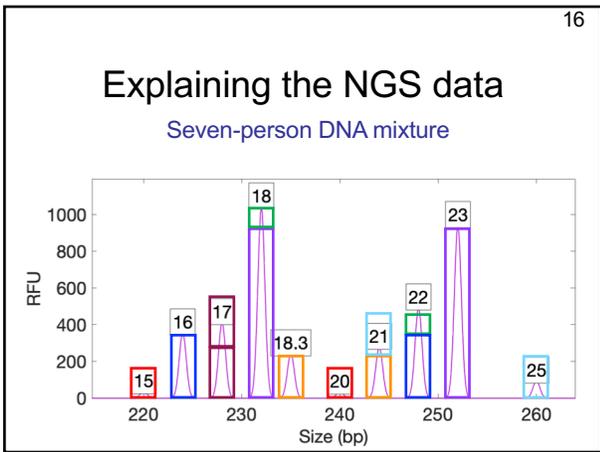
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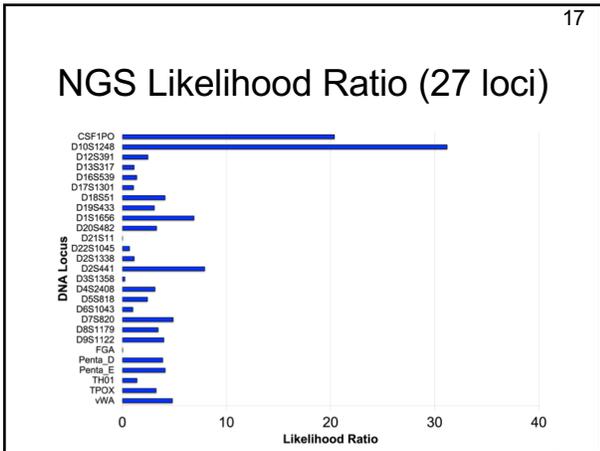
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### NGS LR and error rate

A match between the evidence item and the defendant is:

29 million times more probable than a coincidental match.

For a match strength of 29 million, only 1 in 12.4 billion people would match as strongly.

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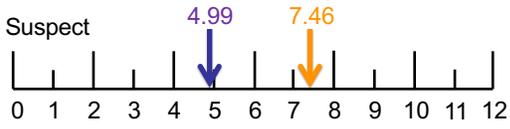
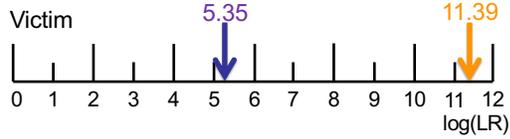
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### CE vs. NGS



More loci, more information

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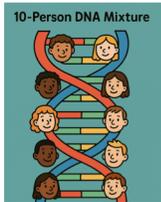
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### Conclusions

- The TrueAllele technology:
- uses CE and NGS data
  - is validated for CE and NGS
  - solves 10-person mixtures




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### More information

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



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

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




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