NIST
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FORENSICS @ NIST

#NISTForensics

Forensic Genetics

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NIST APPLIED GENETICS

Applied Genetics Group – Forensic & Clinical Genetics


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One aspect of the Applied Genetics group is focused on forensic genetics. Using DNA–based technologies, the AG group ***develops standards and assesses emerging forensic methods in support of the human identity community***.

These activities provide a foundation to ensure accurate measurements and validations performed by the forensic DNA typing community.

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Standard Reference Materials

SRM 2372a: Human DNA Quantitation Standard (March 2018)

Under production SRM 2391d PCR-based DNA Standard

Five components

- **A-C three single-source components**
- **D one mixture; approximately 3:1 (F:M)**
- **E one component: cells spotted on FTA paper (from cell lines)**

- Components A-D are DNA extracted from blood (not cell lines)
- Certified allele calls for U.S. core STR loci
- Characterized by CE- and **NGS-based methods (SNPs, mitochondrial genome)**
- Supports the FBI Quality Assurance Standards

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Next Generation Sequencing

Allele frequencies from NIST population samples enable the use of sequence-based methods for typing STR markers

ELSEVIER OPEN ACCESS

Forensic Science International: Genetics 37 (2018) 106–115

Contents lists available at ScienceDirect

Forensic Science International: Genetics

journal homepage: www.elsevier.com/locate/fsigen

Research paper

Sequence-based U.S. population data for 27 autosomal STR loci

Katherine Butler Gettings*, Lisa A. Borsuk, Carolyn R. Steffen, Kevin M. Kiesler, Peter M. Vallone

U.S. National Institute of Standards and Technology, Biomolecular Measurement Division, 100 Bureau Drive, Gaithersburg, MD 20899, USA

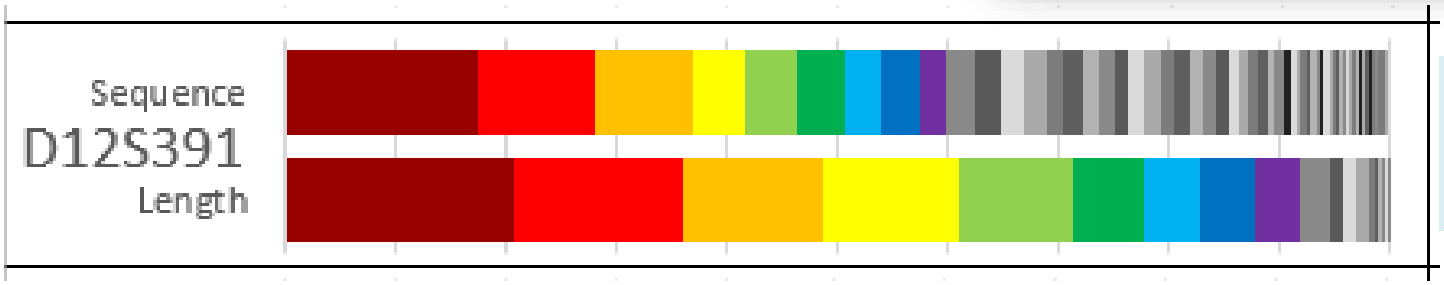
ELECTROPHORESIS

Research Article | Full Access

Sequence-based U.S. population data for the SE33 locus

Lisa A. Borsuk, Katherine B. Gettings, Carolyn R. Steffen, Kevin M. Kiesler, Peter M. Vallone

First published: 07 May 2018 | https://doi.org/10.1002/elps.201800091



89 alleles
24 alleles

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Next Generation Sequencing

Forensic Science International: Genetics 31 (2017) 111–117

Contents lists available at ScienceDirect

Forensic Science International: Genetics

journal homepage: www.elsevier.com/locate/fsigen

Research paper

STRSeq: A catalog of sequence diversity at human identification Short Tandem Repeat loci

Katherine Butler Gettings[a,*], Lisa A. Borsuk[a], David Ballard[b], Martin Bodner[c], Bruce Budowle[d,e], Laurence Devesse[b], Jonathan King[d], Walther Parson[c,f], Christopher Phillips[g], Peter M. Vallone[a]

STRSeq – cataloging STR alleles at NCBI
https://www.ncbi.nlm.nih.gov/bioproject/380127

Providing STR nomenclature support

Forensic Science International: Genetics 34 (2018) 162–169

Contents lists available at ScienceDirect

Forensic Science International: Genetics

journal homepage: www.elsevier.com/locate/fsigen

"The devil's in the detail": Release of an expanded, enhanced and dynamically revised forensic STR Sequence Guide

C. Phillips[a,*], K. Butler Gettings[b], J.L. King[c], D. Ballard[d], M. Bodner[e], L. Borsuk[b], W. Parson[e,f]

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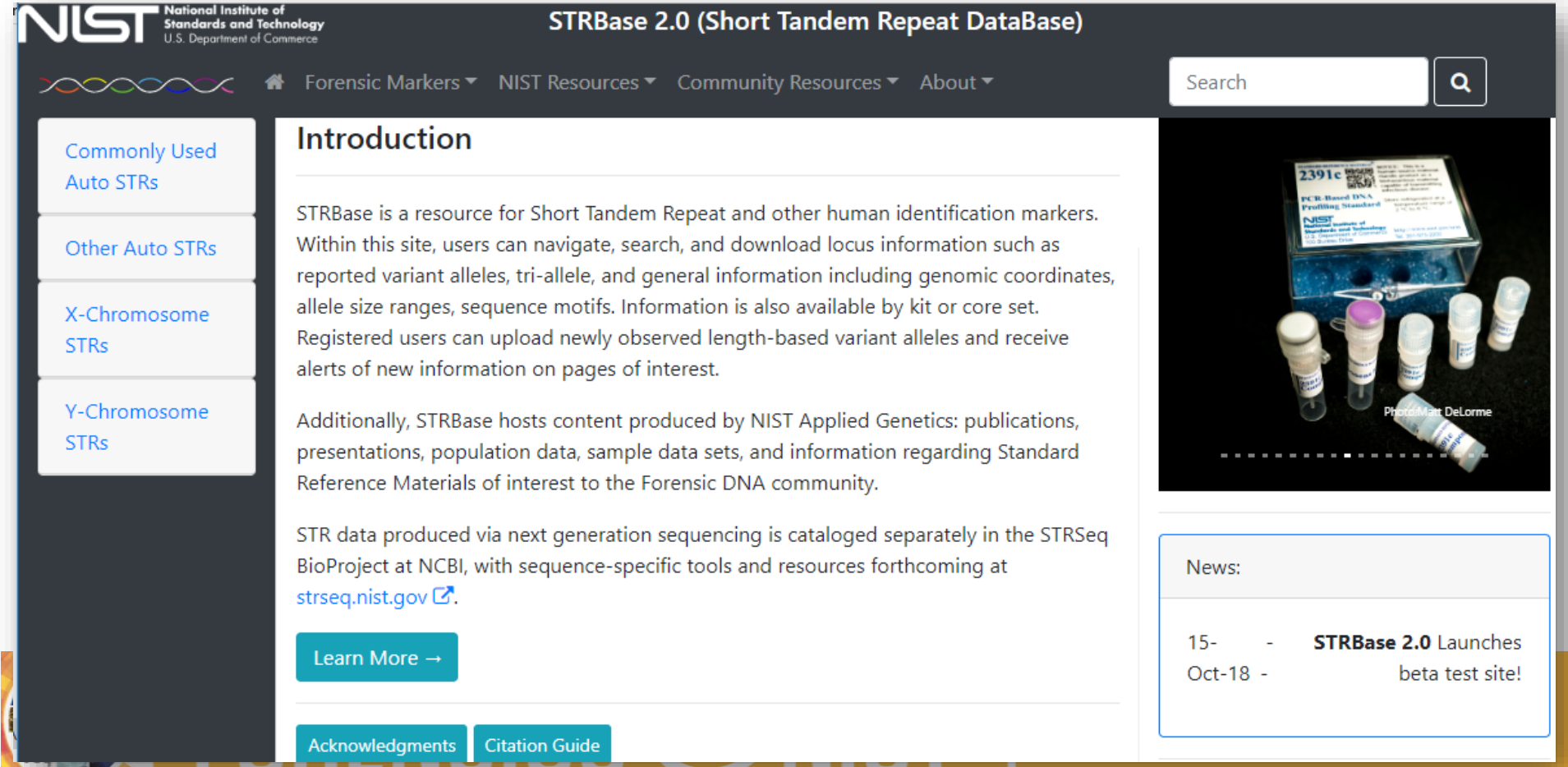
STRBase 2.0

https://strbase-b.nist.gov/

Under construction
Enhanced searching, sorting, downloading



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Other projects/activities

- Assessing DNA extraction efficiency
- Digital PCR for quantifying DNA
  - Understanding bias in qPCR measurements
- Use of probabilistic genotyping software for mixture analysis
- The use of SNP markers for ancestry and eye/hair color prediction
- IARPA – **Proteos** project - QC of DNA materials and eval. of extraction procedures
  - The use of proteins for human identification
- Various group member participating in forensic working groups
  - FBI-SWGDAM, OSAC, Forensic Laboratory Needs-TWG, NIJ-TWG, FBI RDNA task force

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Today

Characterization of noise in targeted sequencing of STR markers: **Sarah Riman**

Results from the 2018 Rapid DNA Maturity Assessment: **Erica Romsos**

Sequencing and standards for characterization of the mitochondrial genome: **Kevin Kiesler**

Funding

NIST Special Programs Office: *Forensic DNA*
FBI Biometrics Center of Excellence: *Forensic DNA Typing as a Biometric tool*.
NIJ: *STRSeq and Nomenclature*

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