



FORENSICS @ NIST
November 28-30, 2012 • #NISTForensics

Overview of DNA Programs at NIST

John M. Butler

NIST Fellow & Applied Genetics Group Leader

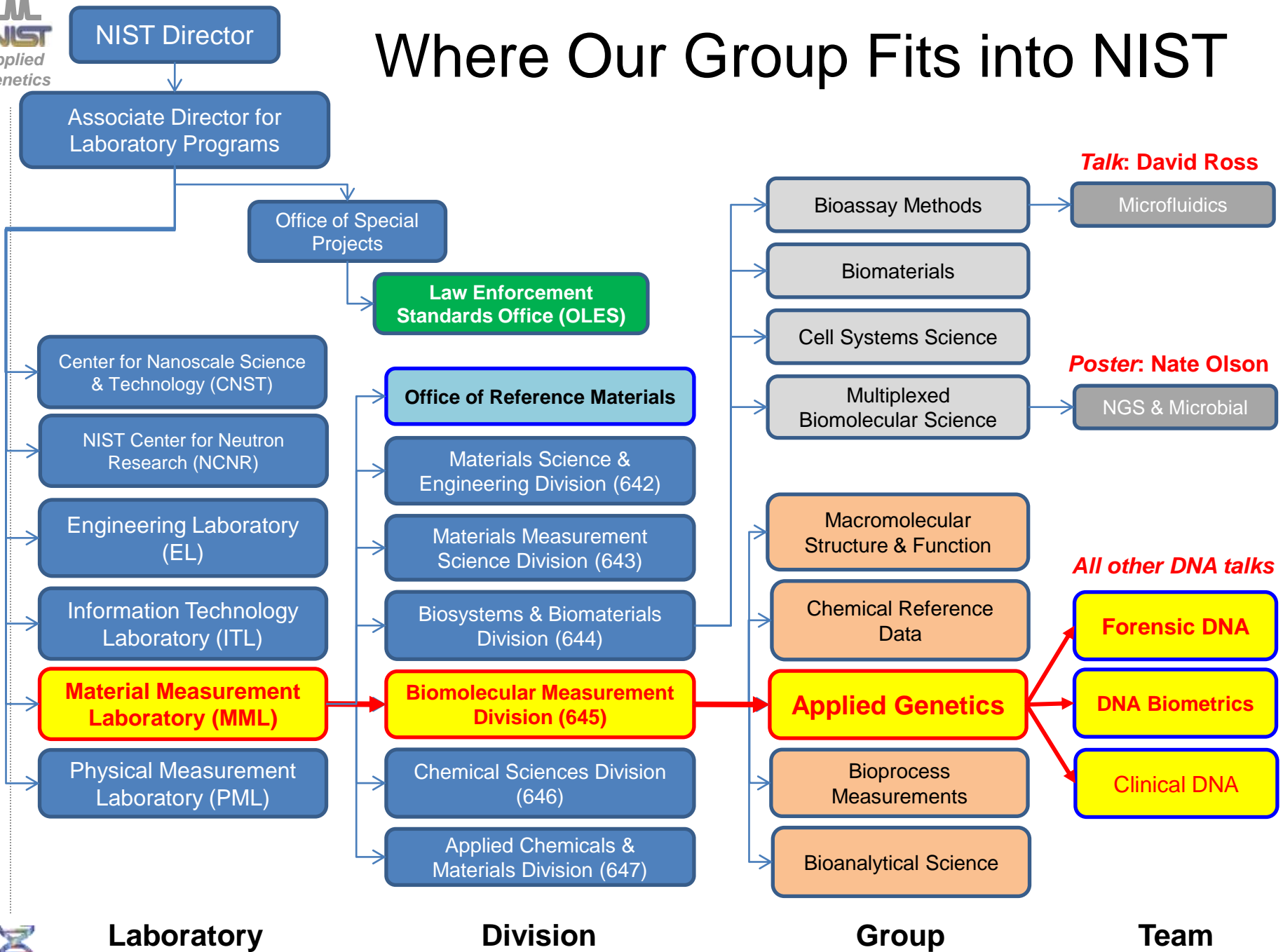
Forensics@NIST 2012 Meeting

Gaithersburg, MD

November 28, 2012



Where Our Group Fits into NIST



NIST Human Identity Project Teams within the **Applied Genetics Group**

Forensic DNA Team



John
Butler



Mike
Coble



Becky
Hill



Margaret
Kline

Data Analysis Support



Dave
Duewer

DNA Biometrics Team



Pete
Vallone



Erica
Butts



Kevin
Kiesler

Funding from the **National Institute of Justice (NIJ)**
through NIST Law Enforcement Standards Office (OLES)

Funding from the **FBI S&T Branch**
through NIST Information Access Division



Clinical DNA



Ross
Haynes



Our Team's Consistent Funding and Productivity

<http://www.cstl.nist.gov/strbase/NISTpub.htm>

<u>Year</u>	<u>NIJ Funding</u>	<u>Staff</u>	<u>Publications</u>	<u>Presentations</u>	<u>Workshops</u>
Pre-2000	\$100-200k	5	~3	~5	0
FY2002	\$950k	6	6	33	0
FY2003	\$900k	6	10	23	0
FY2004	\$1.1M	7	15	24	1
FY2005	\$1.2M	7	16	38	2
FY2006	\$1.2M	6	14	42	7
FY2007	\$1.1M	6	14	44	9
FY2008	\$1.0M	7	11	29	6
FY2009	\$1.1M+	7	7	50	11
FY2010	\$1.2M+	9	11	51	2
FY2011	\$1.2M+	9+1	18	72	10
FY2012	\$1.2M+	8+1	22	58	9
TOTALS	\$12.2 M		144	464	57
Average	~\$1.1M		13.1	42.2	5.2
+FBI-funding (DNA biometrics)					



Summary of NIJ-Funded Research



The screenshot shows the DNA Initiative website. At the top right, there are links for [About Us](#), [Contact Us](#), and [Site Map](#). The main header features the DNA Initiative logo and the tagline "Advancing Criminal Justice Through DNA Technology". Below the header is a navigation menu with links for Home, Grant Funding, Training, Statistics, Research, Publications, and State Profiles. A search bar is located on the right side of the menu. The main content area is titled "Research" and includes a breadcrumb trail: [DNA.gov](#) > Research. The primary heading is "Forensic DNA Research and Development". The text below this heading states: "Forensic DNA analysis has played a crucial role in the investigation and resolution of thousands of violent crimes since the late 1980s. Currently, short tandem repeats (STRs) are the most widely used markers for forensic DNA testing. Because of their high discriminatory power, good resolution". A large yellow box with a red border contains the text: "One-third of all NIJ DNA publications come from our NIST DNA Team". Below this box, the text continues: "operational needs and requirements. These needs and requirements help validate NIJ's planned and ongoing DNA research and development activities, and help ensure that future technologies meet practitioner-driven needs." On the left side of the page, there is a vertical yellow box with the text "9 areas of funded research" and a list of research areas: Alternative Genetic Markers, Compromised DNA Evidence, General Tools and Information, Human DNA Quantitation, Miniaturization and Automation, Mitochondrial DNA, Non-Human DNA, Sperm Detection and Separation, and Y Chromosome. Below this list are links for "Research Articles from NIJ-Funded Research", "About Forensic DNA", "DNA Databases", and "Reducing the Backlog".

<http://www.dna.gov/research/>

NIST Reference Materials (SRMs) for Forensic DNA Measurement Assurance

Required under FBI Quality Assurance Standard 9.5.5 for labs connected to the national DNA database or receiving federal \$



DNA quantity
measurement calibration

Autosomal and Y-chromosome
short tandem repeat (STR)
measurement calibration

Activities in the NIST Applied Genetics Group Related to Human Identity Testing



- **Standard Reference Materials**
 - **SRM 2391c** (autosomal & Y-STRs), 2395 (Y-STRs), 2392-I (mtDNA)
 - **SRM 2372** (DNA quantitation) – *being re-certified*
- **Technology Evaluation and Development**
 - *The presentations you will hear today represent a portion of our work over the past few years*
- **Training Materials**
 - Workshops & STRBase website
 - Textbooks (*Forensic DNA Typing*)

Plan for Presentations This Morning

DNA typing process



DNA Stability, Extractions and Quantitation

- | | |
|-------------|---|
| 9:00-9:05 | Overview of DNA Programs at NIST – John Butler |
| 9:05-9:25 | Stability Studies – Margaret Kline |
| 9:25-9:40 | DNA Extraction – Erica Butts |
| 9:40-10:00 | DRAGEN (NIST Forensics Grand Challenge Project) – David Ross |
| 10:00-10:20 | Digital PCR & DNA Quantitation – Ross Haynes |
| 10:20-10:50 | Break and Poster Viewing/Exhibitor Displays |

STRs, mtDNA, Rapid DNA

- | | |
|-------------|--|
| 10:50-11:10 | STR Kits & New Loci – Becky Hill |
| 11:10-11:30 | STRBase and Information Resources – John Butler |
| 11:30-11:50 | Mixture Interpretation & True Allele – Mike Coble |
| 11:50-12:10 | mtDNA base composition – Kevin Kiesler |
| 12:10-12:30 | Rapid DNA – Pete Vallone |
| 12:30-1:45 | Lunch and Poster Viewing/Exhibitor Displays |

DNA Posters (Lecture Room B)

1. **DNA Sequencing Error Estimation and SNP Validation for Microbial Forensics Applications**
2. Characteristics of 24 Commonly Used Autosomal STR Loci
3. Population Statistics on the Proposed Expanded U.S. Core Loci
4. Concordance Testing Comparing STR Multiplex Kits with a Standard Data Set
5. SE33 Variant Alleles: Sequences and Implications
6. Evaluation of Additional Y-STR Loci to Resolve Common Haplotypes
7. An Evaluation of Additional Y-STR Loci in the PowerPlex Y-23 Kit
8. Direct PCR Amplification of STR Loci: Protocols and Performance
9. Rapid Amplification of Commercial STR Typing Kits
10. Validation of PowerPlex 16 HS in Comparison to Identifiler Plus on the ABI 3500 Genetic Analyzer
11. Setting Interpretation Thresholds and Results with Low-Level DNA Analysis
12. The New SRM 2391c: PCR-based DNA Profiling Standard
13. Using SRM 2372 Human Quantitation Standard: Are there differences between qPCR assays?
14. Forensic Performance of Insertion-Deletion Marker Systems
15. Candidate Reference Family Data: A Tool for Validating Kinship Analysis Software
16. Rapid DNA Testing Approaches for Reference Samples

**Please go visit
them during
breaks or lunch**

Disclaimer

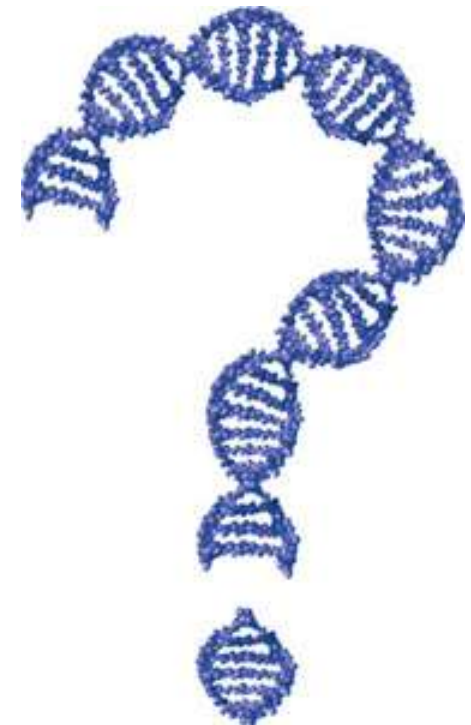
NIST Disclaimer: Certain commercial equipment, instruments and materials are identified in order to specify experimental procedures as completely as possible. In no case does such identification imply a recommendation or it imply that any of the materials, instruments or equipment identified are necessarily the best available for the purpose.

Points of view are those of the presenters and do not necessarily represent the official position of the National Institute of Standards and Technology or the U.S. Department of Justice.

For More Information on Forensic DNA Efforts at NIST...

<http://www.cstl.nist.gov/strbase>

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Our team publications and presentations are available at:
<http://www.cstl.nist.gov/strbase/NISTpub.htm>