International Standards in Forensic DNA and Recent Forensic Science Activities in the United States

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NIST Fellow & Special Assistant to the Director for Forensic Science
Vice-Chair, National Commission on Forensic Science
Location of NIST

- Washington, D.C.
- Dulles Airport
- Reagan National Airport
- Baltimore, MD
- BWI Airport
- Richmond, VA
- FBI Lab

North America Headquarters for Qiagen is ~10 km from NIST in Germantown, Maryland.
Presentation Outline

• International Standards in Forensic DNA
  – Benefits of standards
    • Help improve quality and consistency in testing
  – Authority to establish standards
    • Expert groups like SWGDAM, ISFG DNA Commission, ENFSI DNA WG, AFSN, OSAC

• Recent U.S. Activities in Forensic Science
  – National Commission on Forensic Science (NCFS)

Why?
  – Benefits of standards

Who?
  – Authority to establish standards
    • Expert groups like SWGDAM, ISFG DNA Commission, ENFSI DNA WG, AFSN, OSAC

What?
  – Documentary and physical standards
    • Quality Assurance Standards (QAS)
    • Core loci and common data formats
    • Certified Reference Materials (e.g., NIST SRM)

How?
  – Organization of Scientific Area Committees (OSAC)
Standards Aid Consistency and Quality

• Consistent processes
  – Documentary standards

• Reliable data comparison
  – Standard data formats and core DNA testing regions

• I believe that the use of standard methods and materials are a primary reason that DNA is on a more solid foundation compared to many of the other forensic disciplines
Ensuring Accurate Forensic DNA Results

- Laboratory Accreditation
- Inspections/Audits
- Proficiency Testing of Analysts
- QAS Documentary Standards & SWGDAM Guidelines
- Validated Methods (using physical standards and controls)
Types of Standards

**physical (measurement) standards**

Certified reference material to aid with calibration of measurements

[Link to NIST SRM](http://www.nist.gov/srm/)

**documentary (technical) standards**

Specific requirements for the operation of a laboratory related to management system and competence

[ISO/IEC 17025](http://www.iso.org/iso/17025)
DNA SRM 2391c Certificate Updated
3 April 2015

6 Components
A (single-source female genomic DNA)
B (single-source male genomic DNA)
C (single-source male genomic DNA)
D (3:1 mixture of A and C)
E (female cells on 903 paper)
F (male cells on FTA paper)

What's New? Addition of Sanger sequencing analysis; additional STR genotyping test kits used towards certification; extension of certification date; editorial changes

Certified Genotypes/Haplotypes
25 autosomal STR loci and amelogenin
29 Y-STR loci

Reference Genotypes
26 autosomal STRs

Information Genotypes/Haplotypes
1 autosomal STR: Penta C
12 X-STR loci
30 InDels (DIplex)

STR Kit Coverage
Thermo Fisher Applied Biosystems (Foster City, CA): AmpFISTR Identifiler, Identifiler Plus, NGM, NGM SElect, Cofiler, Profiler, Profiler Plus, Profiler Plus ID, SGM Plus, SEfiler, MiniFiler, GlobalFiler, YFiler, YFiler Plus
Promega Corporation (Madison, WI): PowerPlex 16, 16 HS, ESX 17, ESI 17, ES, S5, ESI 17 Pro, ESI 17 Fast, ESX 17 Fast, 18D, 21, CS7, Fusion, Y, Y23
Qiagen (Hilden, Germany): Investigator ESSplex, IDplex, ESSplex SE, ESSplex SE Plus, ESSplex SE GO!, IDplex Plus, IDplex GO!, 24plex, 24plex GO!, Argus X-12, DIplex
Allele Sequences Provided in New SRM 2391c Certificate to Aid Use with Next-Generation Sequencing

Table 14. Autosomal STR Sequencing for Component E

<table>
<thead>
<tr>
<th>Marker</th>
<th>Length-based Types</th>
<th>Sanger Result</th>
<th>Repeat Structure – Allele 1</th>
<th>Repeat Structure – Allele 2</th>
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<tbody>
<tr>
<td>D1S1656</td>
<td>11, 16.3</td>
<td>11, 16.3</td>
<td>[TAGA]$_{11}$ [TG]$_5$</td>
<td>[TAGA]$<em>4$ TGA [TAGA]$</em>{11}$ TAGG [TG]$_5$</td>
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<td>D2S1338</td>
<td>19, 20</td>
<td>19, 20</td>
<td>[TGCC]$<em>7$ [TTCC]$</em>{12}$</td>
<td>[TGCC]$<em>7$ [TTCC]$</em>{13}$</td>
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<td>D2S441</td>
<td>10, 10</td>
<td>10, 10</td>
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<td>[TCTA]$_8$ TCTG [TCTA]$_1$</td>
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<td>D3S1358</td>
<td>14, 15</td>
<td>14, 15</td>
<td>TCTA [TCTG]$<em>2$ [TCTA]$</em>{11}$</td>
<td>TCTA [TCTG]$<em>2$ [TCTA]$</em>{12}$</td>
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<tr>
<td>D7S820</td>
<td>8, 10</td>
<td>8, 10</td>
<td>[GATA]$_{8}$</td>
<td>[GATA]$_{10}$</td>
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<td>D8S1179</td>
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<td>D8S1115</td>
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<td>[ATT]$_9$</td>
<td>[ATT]$_{16}$</td>
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<tr>
<td>D10S1248</td>
<td>14, 14</td>
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<td>[GGAA]$_{14}$</td>
<td>[GGAA]$_{14}$</td>
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<td>D12S391</td>
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<td>[AGAT]$_{10}$ [AGAC]$_6$ AGAT</td>
<td>[AGAT]$_{13}$ [AGAC]$_8$ AGAT</td>
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<td>D13S317</td>
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<td>8, 12</td>
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<td>[TATC]$_{12}$, A→T SNP 1 bp ds from repeat</td>
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<td>[AGAA]$_{14}$</td>
<td>[AGAA]$_{17}$</td>
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International and Regional Coordination Efforts in Forensic Science
## Organizations Assisting Forensic Science Quality Assurance

<table>
<thead>
<tr>
<th>Organization; year started</th>
<th>Membership</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Society of Crime Laboratory Directors (ASCLD); started in 1974</td>
<td>U.S. federal, state, and local lab managers; not directly associated with SWGDAM but ASCLD/LAB (not ASCLD) uses the FBI Quality Assurance Standards for DNA audits</td>
<td><a href="http://www.asclld.org">http://www.asclld.org</a></td>
</tr>
<tr>
<td>European Network of Forensic Science Institutes (ENFSI); started in 1995</td>
<td>16 working groups including one on DNA</td>
<td><a href="http://www.enfsi.eu">http://www.enfsi.eu</a></td>
</tr>
<tr>
<td>UK Forensic Science Regulator; started in 2008</td>
<td>Multiple advisory groups inform the Regulator including one on DNA</td>
<td><a href="https://www.gov.uk/government/organisations/forensic-science-regulator">https://www.gov.uk/government/organisations/forensic-science-regulator</a></td>
</tr>
<tr>
<td>Academia Iberoamericana de Criminalística y Estudios Forenses (AICEF); started in 2004</td>
<td>Represents 19 Spanish and Portuguese speaking countries in Europe and Latin America; has four working groups including one on forensic genetics</td>
<td><a href="http://www.aicef.net/">http://www.aicef.net/</a></td>
</tr>
<tr>
<td>Asian Forensic Sciences Network (AFSN); started in 2008</td>
<td>5 working groups including one on DNA</td>
<td><a href="http://www.asianforensic.net">http://www.asianforensic.net</a></td>
</tr>
</tbody>
</table>

International Forensic Strategic Alliance (IFSA) initiated in Nov 2004

- [http://www.enfsi.eu/ifsa](http://www.enfsi.eu/ifsa)
- Crafting minimum requirements documents to aid developing countries with forensic science
- Released in Oct 2014:
  “Minimum Requirements for DNA Collection, Analysis, and Interpretation”

multilateral partnership between the regional networks of operational forensic laboratories
Forensic DNA Advisory Groups

- ISFG DNA Commission (International)
- FBI DNA Advisory Board (U.S.)
- SWGDAM (U.S.)
- ENFSI DNA WG (Europe)
- Forensic Science Regulator (UK)
- Biology Specialist Advisory Group (Australia/NZ)
- Asian Forensic Science Network DNA WG (Asia)
- NCFS and OSAC (U.S.)

## Forensic DNA Advisory Groups

<table>
<thead>
<tr>
<th>Organization</th>
<th>Membership</th>
<th>Meeting Frequency/Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNA Commission of the International Society for Forensic Genetics (ISFG)</td>
<td>ISFG Executive Committee and selected experts; chaired by Dr. Peter Gill</td>
<td>As needed to prepare recommendations (see <a href="http://www.isfg.org/Publications/DNA+Commission">http://www.isfg.org/Publications/DNA+Commission</a>)</td>
</tr>
<tr>
<td>Scientific Working Group on DNA Analysis Methods (SWGDAM)</td>
<td>U.S. and Canada federal, state, and local DNA Technical Leaders and invited guests (40-50 people total); subdivided into 5-8 committees</td>
<td>Meets twice a year to develop guidelines on validation, DNA data interpretation, and other topics</td>
</tr>
<tr>
<td>European Network of Forensic Science Institutes (ENFSI) DNA Working Group</td>
<td>&gt;30 European countries and invited guests (90-100 people total); subdivided into 5 committees</td>
<td>Meets twice a year along with European DNA Profiling Group (EDNAP)</td>
</tr>
<tr>
<td>Biology Specialist Advisory Group (BSAG)</td>
<td>Representatives of each forensic DNA lab in Australia &amp; New Zealand (11 people total)</td>
<td>Meets once a year under direction of SMANZFL and with support of the Australian National Institute of Forensic Science</td>
</tr>
<tr>
<td>Organization of Scientific Area Committees (OSAC)</td>
<td>24 discipline-specific subcommittees (has two DNA groups focused on methods and interpretation)</td>
<td>Just starting in 2014; plans to meet once a year in person and multiple times virtually</td>
</tr>
</tbody>
</table>


And recent events at NIST – see [http://www.nist.gov/forensics/osac/index.cfm](http://www.nist.gov/forensics/osac/index.cfm)
<table>
<thead>
<tr>
<th>Topics Addressed</th>
<th>Publications (16 as of 2014)</th>
</tr>
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<tbody>
<tr>
<td>DNA polymorphisms</td>
<td>FSI 1989 (43:109-111)</td>
</tr>
<tr>
<td></td>
<td>FSI 1992 (52:125-130)</td>
</tr>
<tr>
<td></td>
<td>FSI 1992 (55:1-3)</td>
</tr>
<tr>
<td>Commentary on the 1992 NRC I report</td>
<td>FSI 1993 (59:1-2)</td>
</tr>
<tr>
<td>STR markers and allele nomenclature</td>
<td>IJLM 1994 (107:159-160)</td>
</tr>
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<td></td>
<td>IJLM 1997 (110:175-176)</td>
</tr>
<tr>
<td>Mitochondrial DNA typing</td>
<td>FSI 2000 (110:79-85)</td>
</tr>
<tr>
<td>Revised and extended guidelines</td>
<td>FSIG 2014 (13:134-142)</td>
</tr>
<tr>
<td>Y-chromosome STRs</td>
<td>FSI 2001 (124:5-10)</td>
</tr>
<tr>
<td>Additional recommendations on nomenclature</td>
<td>FSI 2006 (157:187-197)</td>
</tr>
<tr>
<td>Interpretation of DNA mixtures</td>
<td>FSI 2006 (160:90-101)</td>
</tr>
<tr>
<td>STR typing results using probabilistic methods</td>
<td>FSIG 2012 (6:679-688)</td>
</tr>
<tr>
<td>Non-human (animal) DNA</td>
<td>FSIG 2011 (5:501-505)</td>
</tr>
<tr>
<td>Disaster victim identification</td>
<td>FSIG 2007 (1:3-12)</td>
</tr>
<tr>
<td>Biostatistics in paternity testing</td>
<td>FSIG 2007 (1:223-231)</td>
</tr>
</tbody>
</table>

European Network of Forensic Science Institutes (ENFSI) DNA Working Group

Documents Available

One of now 17 working groups in ENFSI; meets at least once each year typically in April; representatives from 35 countries

http://www.enfsi.eu/about-enfsi/structure/working-groups/dna

<table>
<thead>
<tr>
<th>Year</th>
<th>Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2004</td>
<td>Terms and Abbreviations</td>
</tr>
<tr>
<td>2009</td>
<td>Report on DNA Legislation in Europe</td>
</tr>
<tr>
<td>April 2006</td>
<td>Report on Criminal Cases in Europe Solved by DNA Mass Testing</td>
</tr>
<tr>
<td>Nov 2010</td>
<td>Recommended Minimum Criteria for the Validation of Various Aspects of the DNA Profiling Process</td>
</tr>
<tr>
<td>Nov 2010</td>
<td>Training DNA staff</td>
</tr>
<tr>
<td>Nov 2010</td>
<td>Contamination Prevention Guidelines</td>
</tr>
<tr>
<td>Dec 2013</td>
<td>Survey of DNA Databases in Europe</td>
</tr>
<tr>
<td>April 2014</td>
<td>DNA Database Management: Review and Recommendations</td>
</tr>
</tbody>
</table>

Selects core DNA testing markers for Europe

ENFSI DNA Database Management: Review and Recommendations

• Since first version in 2008, this document is revised each April by Kees van der Beek from the Netherlands Forensic Institute

• Current document is 88 pages long with 33 recommendations (and questions for audit purposes)

• Useful and up-to-date information provided on European DNA database activities

http://www.enfsi.eu/about-enfsi/structure/working-groups/dna
Interpol Handbook

- Interpol Standard Set of Loci (ISSOL) are the same as the European Standard Set (ESS)

- in 2010, ISSOL was expanded from 7 to 12 loci

- Supports ENFSI DNA Database Management recommendations

http://www.interpol.int/INTERPOL-expertise/Forensics/DNA
Several documents have been published recently

- **Codes of Practice and Conduct** for forensic science providers and practitioners in the Criminal Justice System (Aug 2014, 56 pages)

- FSR-C-108 **APPENDIX: DNA Analysis** (Sept 2014, 11 pages): DNA analysis: codes of practice and conduct

- FSR-G-213 **GUIDANCE** (Sept 2014, 15 pages): *Allele frequency databases and reporting* guidance for the DNA (Short Tandem Repeat) profiling; contains 8 recommendations

- FSR-P-302 **PROTOCOL** (Sept 2014, 49 pages): DNA contamination detection - The management and use of staff elimination DNA databases
DNA Contamination Concerns


- Written to commercial manufacturers of disposable plastic-ware and other reagents used by forensic DNA laboratories worldwide

- Advocates that manufacturers: (1) utilize automation in manufacturing lines, (2) minimize interaction of staff with manufacturing lines, (3) ensure products are protected from staff using personal protective equipment, (4) utilize clean rooms for production, (5) perform QC checks with adequate sensitivity, (6) conduct post-manufacture DNA contaminant destruction, (7) perform QC checks on post-production treatment(s), and (8) maintain staff elimination databases for screening DNA results as needed

ISO/IEC 18385 Standard

• “Minimizing the risk of DNA contamination in products used to collect and analyze biological material for forensic purposes”

• Under development and review by participating ISO member countries
FBI Quality Assurance Standards (QAS)

- **DNA Identification Act of 1994**
  - Requires FBI Laboratory, those labs receiving federal funds, and those labs using the National DNA Index System (NDIS) to comply

- **FBI Laboratory’s DNA Advisory Board (DAB)**
  - Met from 1995 to 2000 to discuss and draft QAS
  - FBI Director issued initial QAS in October 1998 (caseworking) and April 1999 (databasing)

- **Scientific Working Group on DNA Analysis Methods (SWGDAM)**
  - assumed responsibility for QAS revisions when DAB was dissolved
  - QAS revisions released in July 2009 and September 2011

- **QAS audit documents are used by accrediting bodies such as ASCLD/LAB in audits of DNA laboratories as supplemental material to the ISO/IEC 17025 standard**
1. SCOPE
2. DEFINITIONS
3. QUALITY ASSURANCE PROGRAM
4. ORGANIZATION AND MANAGEMENT
5. PERSONNEL
6. FACILITIES
7. EVIDENCE (SAMPLE) CONTROL
8. VALIDATION
9. ANALYTICAL PROCEDURES
10. EQUIPMENT CALIBRATION AND MAINTENANCE
11. REPORTS
12. REVIEW
13. PROFICIENCY TESTING
14. CORRECTIVE ACTION
15. AUDITS
16. SAFETY
17. OUTSOURCING


Scientific Working Group on DNA Analysis Methods (SWGDAM)

http://www.swgdam.org/

- Established in November 1988 by FBI Laboratory
- Named Technical Working Group on DNA Analysis Methods (TWGDAM) for the first decade
- Comprised of ~50 scientists from U.S. and Canada
  - Typically 20-25 voting members and the rest as invited guests
- European Network of Forensic Science Institutes (ENFSI) DNA Working Group representative often attends
- Three day meetings held semiannually every January and July
- Current committees (6) and working groups (2):
  - Autosomal STR Interpretation, Combined DNA Index System, Enhanced Detection Methods and Interpretation, Quality Assurance, Rapid DNA, Y-STR, Probabilistic Genotyping, and Next Generation Sequencing
- Previous committees:
  - RFLP, PCR, mitochondrial DNA, mass spectrometry, training, validation, expert systems, missing persons/mass disasters, and mixture interpretation
<table>
<thead>
<tr>
<th>Release Date</th>
<th>Guidelines</th>
<th>Previous Versions (TWGDAM)</th>
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<tbody>
<tr>
<td>2010</td>
<td><strong>STR Interpretation</strong> Guidelines</td>
<td>2000</td>
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<tr>
<td>2013</td>
<td><strong>Mitochondrial DNA Analysis Interpretation</strong> Guidelines &amp;</td>
<td>1993, 2003</td>
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<td></td>
<td>Mitochondrial DNA Nomenclature Example</td>
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<td>2013</td>
<td><strong>Training</strong> Guidelines</td>
<td>2001</td>
</tr>
<tr>
<td>2014</td>
<td>Guidelines for <strong>Missing Persons Casework</strong></td>
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<tr>
<td>2014</td>
<td><strong>Interpretation Guidelines for Y-Chromosome STRs</strong></td>
<td>2009</td>
</tr>
<tr>
<td>2014</td>
<td><strong>STR Enhanced Detection Methods</strong></td>
<td>--</td>
</tr>
<tr>
<td>2015</td>
<td><strong>Collection and Serological Examination of Biological Evidence</strong></td>
<td>--</td>
</tr>
</tbody>
</table>

**Guidelines in development:** validation of probabilistic genotyping software, and updated STR interpretation guidelines
Public Comments Can Now Be Made on Draft SWGDAM Documents

Public Comments Page

In accordance with the SWGDAM Bylaws (Section V.C.5), SWGDAM will make any new or revised guidance or standard document(s) available for public comment for a minimum of 30 days. Generally, SWGDAM attempts to review its guidance documents within 5 years of their issuance and is usually actively revising at least one of its guidance documents at any given time. SWGDAM strongly encourages the forensic DNA community or other interested group to comment on the SWGDAM documents currently in this stage of development.

Upon receipt, these comments will be forwarded to the appropriate SWGDAM Committee for consideration and may be incorporated into the final document considered for approval by the SWGDAM Membership. Alternately, SWGDAM may publish a response to a specific suggestion or recommendation on its FAQ Page for general information purposes. SWGDAM will make all reasonable efforts to advise the forensic DNA community of those documents currently available for public comment. SWGDAM strongly encourages all interested parties to regularly monitor SWGDAM.org for the guidance document(s) or standard document(s) currently available for public comment. Please use the contact portal below for providing comments on the SWGDAM document(s) available for public comment.

SWGDAM Documents Available for Public Comment

The following guidance or standards document(s) is/are currently available for public comment until April 18, 2015:

**SWGDAM Guidelines for the Validation of Probabilistic Genotyping Systems**

Details: This document provides guidelines for the validation of probabilistic genotyping software used for the analysis of autosomal short tandem repeat (STR) typing results. Probabilistic genotyping refers to the use of biological modeling, statistical theory, computer algorithms, and probability distributions to infer genotypes and calculate likelihood ratios (LRs) for the DNA typing results of forensic samples. A probabilistic genotyping system is comprised of software, or software and hardware, with analytical and statistical functions that entail complex formulae and algorithms. Probabilistic genotyping approaches can reduce subjectivity in the analysis of DNA typing results, as compared to historical methods of mixture interpretation (e.g., deconvolution of the mixture into individual components), and quantifies uncertainty in the analysis.

http://swgdam.org/public_review.html
Current Hierarchy of Standards for Accrediting Bodies to Use in Auditing U.S. Forensic DNA Laboratories

International Laboratory Accreditation Cooperation (ILAC) G19:08/2014 Modules in a Forensic Science Process

ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories

The FBI Quality Assurance Standards (2011) serve as supplemental materials to ISO/IEC 17025 for DNA audits

SWGDAM guidelines (interpretation, validation, etc.) provide further information but are not audited against
Standard Approaches Enable Reliable DNA Data Comparison

• **Core loci**
  – In 1997, U.S. selected 13 core STR markers
  – U.S. is moving to 20 core STRs in January 2017
  – Europe moved from 7 to 12 core STR loci in 2011

• **Common data formats**
  – ISFG DNA Commission allele nomenclature designation recommendations
  – ANSI/NIST-ITL standard for data storage and transmission

• **Commercial STR kits**
  – Consistent allelic ladders

• **Certified reference materials**
  – NIST SRM 2391c (certified values for STR allele measurements)

STR: short tandem repeat DNA markers
Letter to the Editor

Selection and implementation of expanded CODIS core loci in the United States

“The CODIS Core Loci Working Group selected a consortium of 11 CODIS laboratories…these laboratories performed validation experiments…”

With the assistance of the National Institute of Standards and Technology (NIST), the data generated through these validation studies were compiled, reviewed and analyzed.”
Position of Forensic STR Markers on Human Chromosomes

13 Core U.S. STR Loci

- TPOX
- D3S1358
- D2S441
- D1S1656
- D2S1338
- D5S818
- FGA
- CSF1PO
- D7S820
- D8S1179
- TH01
- VWA
- D10S1248
- D12S391

1997 (13 loci)

2017 (20 loci)

15 STR loci overlap between U.S. and Europe

Core STR Loci for the United States

- D13S317
- D16S539
- D18S51
- D21S11
- D19S433
- D22S1045

AMEL

Sex-typing

Core STR Loci for the United States
U.S. Core Loci Expansion Efforts

More loci added as databases grew...

**U.S. Core Loci Goals**

- **1990**: 4 VNTRs (RFLP)
- **1997**: 13 STRs (PCR)
- **2011**: 20+ STRs

President's DNA Initiative

- Debbie Smith Act increases funding for DNA databases

**PowerPlex Fusion**

- 24plex kits available

**Europe expands**

- from 7 to 12 loci

**NDIS exceeds**

- 10 million profiles

**NDIS exceeds**

- 1 million profiles

**CODIS Core Loci WG recommend new loci**

- 2009

**Implementation to be required**

- 2 years after announcement

- 2014

**Hares (2012a, 2012b)**

- Letters to editor (1) & (2) announcing proposed new loci

- 2012

**Butler et al. (2012)**

- NIST population data published covering all 29 kit STR loci

- 2011

**Launched U.S. National DNA Database (NDIS)**

- Initial QAS released

- 2003

**U.S. began**

- with 4 RFLP VNTRs

- 1990

**DNA Identification Act** (federal law)

- 1994

**Combined DNA Index System (CODIS)** proposed

- 1996

**Early STR kits**

- 1997

**Budowle et al. (1998)**

- Initial CODIS core loci (13 STRs)

- 1998

**16plex STR kits**

- 2000

**Launch of U.S. National DNA Database (NDIS)**

- 2002

**NDIS exceeds**

- 1 million profiles

**1996**

**Butterly et al. (1991)**

- Combined DNA Index System (CODIS) proposed

- 1990
American National Standards Institute/
National Institute of Standards and Technology-Information Technology Laboratory

ANSI/NIST-ITL Standard Data Format

http://www.nist.gov/itl/idad/ansi_standard.cfm

- Data storage and transmission standard for software developers
- Record types include biometric fingerprint, iris, dental, and voice information
- DNA records (type 18) are covered in 24 pages
- Provides list and codes for 88 DNA kits from Life Technologies, Promega, and Qiagen
- Codes provided for 64 autosomal STR loci, 64 X-STRs, and 135 Y-STRs

http://biometrics.nist.gov/cs_links/standard/ansi_2012/Type_18_DNA_Record_Loci_list_111913.pdf
Standard Information Resources

NIST STRBase website: http://www.cstl.nist.gov/strbase/

Short Tandem Repeat DNA
Internet Database

NIST Standard Reference Database SRD 130

Serving the forensic DNA and human identity testing communities for over 10 years... These data are intended to benefit research and application of short tandem repeat DNA markers to human identity testing. The authors are solely responsible for the information herein. Please Rate Our Products and Services: http://tsapps.nist.gov/MSDSurvey/default.aspx?ID=5&DB=130

This database has been accessed >500,000 times since 10/02/97.

Created by John M. Butler
Forensic DNA Typing Textbooks Have Set the Standard for the Field

1st Edition

Jan 2001
335 pages

2nd Edition

Feb 2005
688 pages

3rd Edition (3 volumes)

Sept 2009
520 pages

Aug 2011
704 pages

Oct 2014
608 pages

Language Editions

Chinese (2007)

Japanese (2009)

Chinese (2013)
NCFS and OSAC: U.S. Efforts to Strengthen Forensic Science

• National Academy of Sciences (NAS) report issued in Feb 2009

• White House Subcommittee on Forensic Science (SoFS) operated from July 2009 to Dec 2012

DOJ/NIST Partnership (announced Feb 2013)

1. NCFS (National Commission on Forensic Science)
   • First meeting held February 3-4, 2014 in Washington DC

2. OSAC (Organization of Scientific Area Committees)
   • 542 members named; first public meetings held in Feb 2015
National Commission on Forensic Science (NCFS)

NCFS Leadership

Sally Q. Yates  
Acting Deputy Attorney General  
DOJ Co-Chair

Willie E. May  
Acting Director of NIST  
NIST Co-Chair

Nelson A. Santos  
Vice-Chair (DOJ)

John M. Butler  
Vice-Chair (NIST)

31 voting and 8 ex-officio members

Last meeting (5th): January 29-30, 2015
Next meeting (6th): April 30-May 1, 2015

www.justice.gov/ncfs
February 3-4, 2014 was the first meeting of the National Commission on Forensic Science

First meeting was not webcast but future ones will be

37 Commissioners + DOJ/NIST Leadership Team (with ~100 public attendees)

- **31 voting and 8 ex-officio members**
  - Selected from >300 applicants
  - Represent diverse backgrounds, extensive experience, and come from 21 states

- Professors of biochemistry, chemistry, pathology, physics, sociology, statistics, and law (including a Nobel laureate and National Medal of Science recipient)
- Crime laboratory directors
- Judges, prosecutors, and defense attorneys
- Sheriff, detective, coroner, medical examiner, victims’ advocate, and defendants’ rights advocate
Organization of Scientific Area Committees (OSAC)

Forensic discipline-specific “guidance groups” administered by NIST

http://www.nist.gov/forensics/osac/index.cfm
<table>
<thead>
<tr>
<th>Scientific Working Group (SWG)</th>
<th>Topic (Forensic Discipline)</th>
<th>Start</th>
<th>Sponsor</th>
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Organization of Scientific Area Committees (OSAC)

Forensic Science Standards Board (FSSB)

Legal Resource Committee (LRC)
- June 26

Quality Infrastructure Committee (QIC)
- July 16

Human Factors Committee (HFC)
- Sept 3

collaborative group of 542 forensic practitioners & other experts

Bottom portion (subcommittee membership) announced Oct 29 & Dec 22, 2014

Biology/DNA SAC
- Biological Data Interpretation and Reporting Sub
- Biological Methods Sub
- Wildlife Forensics Sub

Chemistry/Instrumental Analysis SAC
- Fire Debris and Explosives Sub
- Geological Materials Sub
- Gunshot Residue Sub
- Materials (Trace) Sub
- Seized Drugs Sub
- Toxicology Sub

Crime Scene/Death Investigation SAC
- Anthropology Sub
- Disaster Victim Identification Sub
- Dogs and Sensors Sub
- Fire and Explosion Investigation Sub
- Medicolegal Death Investigation Sub
- Odontology Sub

Digital/Multimedia SAC
- Digital Evidence Sub
- Facial Identification Sub
- Speaker Recognition Sub
- Video/Imaging Technology and Analysis Sub

Physics/Pattern Interpretation SAC
- Bloodstain Pattern Analysis Sub
- Firearms and Toolmarks Sub
- Footwear and Tire Sub
- Forensic Document Examination Sub
- Friction Ridge Sub

SAC = Scientific Area Committee
Sub = Subcommittee

>1200 additional applicants who can assist with task group efforts as OSAC affiliates
Organization of Scientific Area Committees (OSAC)

542 members and >1200 affiliates as subject matter experts participating in 24 subcommittees, 5 scientific areas, 3 resource committees (legal, quality, human factors), and 1 governing board (Forensic Science Standards Board).

Initial membership finalized Dec 22, 2014

http://www.nist.gov/forensics/osac/index.cfm
OSAC Scientific Area Committee Public Meetings
held February 16-17, 2015 in Orlando, FL

1 of 30 presentations that can be downloaded

- This friction ridge subcommittee presentation contains 27 slides
- Reviews subcommittee leadership, membership, priority topics, and task groups

https://workspace.forensicosac.org/kws/public
Dr. Jan de Kinder from the National Institute of Criminalistics and Criminology (Brussels, Belgium) visited NIST on March 18, 2015. He met with NIST OSAC leadership and discussed the Organization of Scientific Area Committees (OSAC) and how the European Network of Forensic Science Institutes (ENFSI) might interface with OSAC efforts. ENFSI has 64 member institutes, 2 standing committees, 17 working groups, and a 20 year history.
Governing Board has 17 members

**Forensic Science Standards Board (FSSB)**

3 **Resource Committees**

- Human Factors Committee (HFC)
- Legal Resource Committee (LRC)
- Quality Infrastructure Committee (QIC)

**Committees** (5) and **Subcommittees** (24)

**Crime Scene/Death Investigation**
- Anthropology
- Disaster Victim Identification
- Dogs and Sensors
- Fire Scene and Explosives
- Medical/Legal Death Investigation
- Odontology

**Chemistry/Instrumental Analysis**
- Controlled Substances
- Fire Debris and Explosives
- Geological Materials
- Gunshot Residue
- Materials (Trace)
- Toxicology

**Digital/Multimedia**
- Digital Evidence
- Facial Identification
- Imaging Technologies
- Speaker Recognition

**Biology/DNA**
- DNA Analysis 1
- DNA Analysis 2
- Wildlife Forensics

**Physics/Pattern**
- Bloodstain Pattern Analysis
- Friction Ridge
- Firearms/Toolmarks
- Footwear and Tire Tread
- Questioned Documents

**http://www.enfsi.eu/**

**http://www.nist.gov/forensics/osac/**

**Governing Board** has 5 members

2 Standing Committees

- Quality & Competence Committee (QCC)
- Research & Development Committee (R&D)

17 Expert Working Groups

- Animal, Plant and Soil Traces
- Digital Imaging
- DNA
- Documents
- Drugs
- Explosives
- Fingerprint
- Firearms/GSR
- Fire and Explosions Investigation
- Forensic Information Technology
- Forensic Speech and Audio Analysis
- Handwriting
- Handwriting
- Marks
- Paint & Glass
- Road Accident Analysis
- Scene of Crime
- Textile and Hair
International Symposium on Forensic Science Error Management – Detection, Measurement and Mitigation

FORENSIC SCIENCE ERROR MANAGEMENT
INTERNATIONAL FORENSICS SYMPOSIUM
JULY 20-24, 2015 • WASHINGTON, DC

The technical program will cover eight tracks: death investigation, crime scene investigation, human factors, criminalistics, digital evidence, legal factors, quality assurance and laboratory management. Each track will consist of plenary lectures, poster sessions and panel discussions.

Hilton Washington DC - Dupont Circle
1919 Connecticut Ave., NW, Washington, DC

http://www.nist.gov/director/international_forensics_home.cfm
National Commission on Forensic Science (NCFS):
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