Updates on Biology SAC, NCFS, and Recent NIST Activities

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National Institute of Standards and Technology
NIST Fellow & Special Assistant to the Director for Forensic Science
Vice-Chair, National Commission on Forensic Science
Co-lead with DOJ

National Commission on Forensic Science

NIST Point-of-Contact (POC): John Butler

A federal advisory committee for the U.S. Department of Justice

http://www.justice.gov/ncfs

NIST Forensic Science Research Program

POC: Sue Ballou

SIX FOCUS AREAS
1. Ballistics and Associated Tool Marks
2. Digital and Identification Forensics
3. Forensic Genetics
4. Toxins
5. Trace
6. Statistics

http://www.nist.gov/forensics

Organization of Scientific Area Committees

POC: Mark Stolorow & John Paul Jones

NIST-administered effort dedicated to identifying and developing technically sound, consensus-based documentary standards and guidelines

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

NIST Forensic Science Center of Excellence (announced May 2015)
NIST Research Efforts to Aid Forensic Science

SIX CURRENT FOCUS AREAS

1. Ballistics and Associated Tool Marks
2. Digital and Identification Forensics
3. Forensic Genetics
4. Toxins
5. Trace
6. Statistics

Internal NIST research will be supplemented by a new NIST Forensic Science Center of Excellence (FSCOE)

http://www.nist.gov/forensics
• NIST has committed to invest $20M over 5 years in the FSCOE

• **Goals**: (1) improve the statistical foundation for pattern evidence (fingerprints, firearms, tool marks, etc.) and digital evidence (computer, video, and audio analyses) and (2) develop education and training on probabilistic methods for practitioners and other relevant stakeholders

• **Timeline**: Call for proposals (August 19, 2014), solicitation closed (December 11, 2014), award winners announced (May 25, 2015)

• **Awardees**: A consortium effort led by Iowa State involving Carnegie Mellon, University of California-Irvine, and the University of Virginia
Organization of Scientific Area Committees (OSAC)

Forensic discipline-specific “guidance groups” administered by NIST

http://www.nist.gov/forensics/osac/index.cfm
542 members and 131 affiliates (from >1300 eligible) as subject matter experts participating in >100 task groups, 24 subcommittees, 5 scientific areas, 3 resource committees (legal, quality, human factors), and 1 governing board (Forensic Science Standards Board)

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

**Governed by the** OSAC

http://www.enfsi.eu/

**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
- Marking
- Paint & Glass
- Road Accident Analysis
- Scene of Crime
- Textile and Hair

http://www.nist.gov/forensics/osac/
On April 22, 2015, Dr. Linzi Wilson-Wilde from the National Institute of Forensic Science in Melbourne, Australia visited NIST to meet with members of the OSAC planning team to discuss standards development in forensic science.
OSAC Quality Infrastructure Committee (QIC) has developed worksheets for documenting efforts.
This process begins with a standard or guideline that an Organization of Scientific Area Committees (OSAC) Subcommittee has deemed to be technically sound (via a Technical Merit Rating of 1 or 2 on the Quality Infrastructure Committee [QIC] Form 1: Technical Merit Worksheet), and that the Subcommittee QIC liaison has confirmed to be either developed through an established standards development organization (SDO) or through another approved process (QIC Form 2: Standards Development Process Worksheet).

RA-0 OSAC Subcommittees may recommend standards or guidelines to be added to the OSAC Registry of Approved Standards or the OSAC Registry of Approved Guidelines.
No documents reside on the OSAC Registry of Standards or Registry of Guidelines yet
SAC Biology Membership and Initial Terms (2, 3, or 4 years)

<table>
<thead>
<tr>
<th>Members (Term)</th>
<th>Role</th>
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</thead>
<tbody>
<tr>
<td>George Herrin (4)</td>
<td>Chair</td>
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<tr>
<td>Angelo Della Manna (3)</td>
<td>Vice-Chair</td>
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<tr>
<td>DeeDee Hawk (2)</td>
<td>Ex Sec</td>
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<td>Kim Murga (2)</td>
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<td>Robyn Ragsdale (4)</td>
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<tr>
<td>Kathy Moore (2)</td>
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<table>
<thead>
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<th>Members (Term)</th>
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<tbody>
<tr>
<td>John Butler (3)</td>
<td>QIC Liaison, SWGDAM Liaison</td>
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<td>Tom Callaghan (3)</td>
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<td>Robin Cotton (4)</td>
<td>LRC Liaison</td>
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<td>Phillip Danielson (4)</td>
<td>HFC Liaison</td>
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<td>Bruce Weir (3)</td>
<td></td>
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<tr>
<td><strong>TBD Statistician</strong></td>
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</table>

First public SAC meeting was held **February 16, 2015 7-10pm** at the AAFS meeting
Monthly conference calls are conducted to get subcommittee updates
Next public SAC meeting will be **October 15, 2015 7:30-8:45am** at the ISHI meeting
Orlando hotel burning...

July 5, 2015 – Avanti Hotel caught fire due to a lighting strike

Some SAC Biology members stayed here February 15-16, 2015
Biology/DNA Scientific Area Committee


George Herrin (chair)

3 SWGDAM participants

Not pictured: Bruce Weir
OSAC Biological Methods Subcommittee
Formerly known as “DNA 1”

Kim Murga (chair)

6 SWGDAM participants

Not pictured: Eugene Lien, Amy McGuckian

http://www.nist.gov/forensics/osac/sub-dna-1.cfm
OSAC Biological Data Interpretation and Reporting Subcommittee  
Formerly known as “DNA 2”

7 SWGDAM participants

Not pictured: Tim McMahon

Robyn Ragsdale (chair)

http://www.nist.gov/forensics/osac/sub-dna-2.cfm
SAC Biology/DNA Activity

**Task Groups**
- Terminology (Buel)
- Validation/Method (Weitz)
- Education/Training (Press)
- Sample Id & Collection (Zervos)
- Terminology (Westring)
- Statistical Interpretation (Zabell)
- Probabilistic Genotyping (Sutton)
- Software Validation (Kehl)
- Mixture Interp Verification (Sobieralski/Montpetit)
- Terminology (Baker/Hoofer)
- Standards and Guidelines (O’Brien/Giles)
- Report Writing (Trail/Giles)
- Validation (Lindquist/Hoofer)

**Subcommittees**
- Biological Methods (Murga)
- Biological Data Interpretation and Reporting (Ragsdale)
- Terminology (Della Manna)
- SAC Biology (Herrin)
- Wildlife Forensics (Moore)

**Biology/DNA Scientific Area Committee**
OSAC Biology/DNA SAC Summary

• A public SAC meeting/public comment session will occur as part of the ISHI meeting in Grapevine, Texas on October 15, 2015

• A number of documents are expected to be completed by the end of this year for submission to a Standards Developing Organization (SDO)

• If AAFS is able to stand up their SDO process by early 2016, then this is probably the route that the Biology SAC will use

• How to best handle QAS documents going through an SDO process for inclusion on the OSAC Registry is still under discussion with the FBI & SWGDAM Chair
National Commission on Forensic Science (NCFS)

www.justice.gov/ncfs

NCFS Leadership

Sally Q. Yates
Deputy Attorney General
DOJ Co-Chair

Willie E. May
Director of NIST
NIST Co-Chair

Nelson A. Santos
Vice-Chair (DOJ)

John M. Butler
Vice-Chair (NIST)

32 voting and 8 ex-officio members

Last meeting (6th): April 30-May 1, 2015
Next meeting (7th): August 10-11, 2015
## Current NCFS Subcommittees

http://www.justice.gov/ncfs/subcommittees

*where much of the Commission work occurs…*

<table>
<thead>
<tr>
<th>NCFS Subcommittee</th>
<th># Commissioners</th>
<th># Non-Commissioners</th>
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<tbody>
<tr>
<td>1. Accreditation &amp; Proficiency Testing</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>2. Human Factors &amp; Cognitive Bias</td>
<td>5</td>
<td>13+1</td>
</tr>
<tr>
<td>3. Interim Solutions</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>4. Medico-legal Death Investigation</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>5. Reporting &amp; Testimony</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>6. Scientific Inquiry &amp; Research</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>7. Training on Science &amp; Law</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

Most Commissioners are on multiple subcommittees

57 non-Commissioners contributing to the process

Subcommittee products are discussed and voted on by the full Commission prior to be recommended to the Attorney General
Timeline for Commission Activities

SWGDAM talk (January 9, 2014)
- Commission membership named (January 10, 2014)
- First Commission meeting (February 3-4, 2014)
- Second Commission meeting (May 12-13, 2014)

SWGDAM talk (July 17, 2014)
- Third Commission meeting (August 26-27, 2014)
- ISHI meeting presentation (October 1, 2014)
- World Forensics Festival talk (October 14, 2014)
- Fourth Commission meeting (October 28-29, 2014)

SWGDAM talk (January 15, 2015)
- Fifth Commission meeting (January 29-30, 2015)
- Sixth Commission meeting (April 30-May 1, 2015)

SWGDAM talk (July 16, 2015)
- Seventh Commission meeting (August 10-11, 2015)
- Eighth Commission meeting (December 7-8, 2015)

Federal Advisory Committees exist on a 2-year renewal cycle

New Commission charter signed on April 23, 2015

Includes digital evidence
Federal Judge Quits Panel Over Proposed Evidence Rules

• By DEVLIN BARRETT Updated Jan. 29, 2015 7:25 p.m. ET

• Calls Decision to Limit Trials’ Discovery Phase ‘Unsupportable’

• WASHINGTON—A prominent federal judge resigned in protest from a committee advising the Justice Department on the use of scientific evidence after department officials decided the group couldn’t examine how such evidence is made available before a trial.

Judge Jed Rakoff
Federal Judge, Southern District of New York
Ex-officio member of the NCFS

A federal judge Friday returned to a presidential commission on forensic science after the U.S. Justice Department reversed a decision to bar the panel from discussing changes that would give criminal defendants more information about forensic evidence before their trials, a federal official said.

U.S. District Judge Jed S. Rakoff of the Southern District of New York had resigned in protest Wednesday from the Obama administration panel, accusing the department of placing “strategic advantage [for prosecutors] over a search for the truth.”

However, Acting U.S. Deputy Attorney General Sally Q. Yates invited Rakoff to return, saying she had not been aware the commission had worked openly on its plans for nearly a year.
NCFS Meeting 5 Topics
January 29-30, 2015

• Subcommittee Reports & Work Product Discussion
  • Four final work products discussed; three were approved

• Update on Bureau of Justice Statistics law enforcement agency forensic unit survey plans (Speaker: Erica Smith)

• Panel on documentary standards
  • Speakers: Gordon Gillerman, Warren Merkel, Karen Reczek

• Panel on judicial training
  • Speakers: Katheryn Yetter, Judge Jeremy Fogel, Judge Mark Atkinson

• Presentation on accreditation and certification within the MDI community
  • Speaker: Steven Clark

The Letter Writing Campaign and a New Charter for the Commission

• In February and March 2015, DAG Sally Yates and NIST Director Willie May received letters from several Commissioners requesting specific process improvements in the operation of the National Commission on Forensic Science

• DOJ leadership changes, Senate confirmation hearings for the DOJ and NIST co-chairs, and deadlines for charter renewal…

• The first two-year term of the Commission concluded on April 23, 2015 – and another two-year charter was signed (one of the last things Eric Holder did as Attorney General)
NCFS Meeting 6 Topics
April 30-May 1, 2015

• Subcommittee Reports & Work Product Discussion
  • Three final work products were approved

• Discussion of Federal Advisory Committee Act and Commission governance topics → a Bylaws Subcommittee was formed

• Panel on Evidence Preservation and Retention
  • Speakers: Greg Matheson, Steve Campbell, Cynthia Jones, Shannan Williams

• Panel on OSAC Update and Priority Action Report
  • Speakers: Jeremy Triplett, George Herrin, Scott Oulton, Greg Davis, Richard Vorder Bruegge, Austin Hicklin

• Presentation on disaster victim identification within the MDI community
  • Speaker: Frank DePaolo

New Designated Federal Official for the National Commission on Forensic Science

Andrew J. Bruck
Counsel to the Deputy Attorney General
950 Pennsylvania Avenue NW
Washington, DC 20530
Andrew.J.Bruck@usdoj.gov
(202) 305-3481
New Bylaws Subcommittee

- **Purpose**: to define/refine process documents and bylaws governing Commission activities

- **Membership**:
  - DFO: Andrew Bruck
  - Vice-Chairs: Nelson Santos & John Butler
  - OSTP representative: Tania Simoncelli
  - Commission representatives (4):
    - Marilyn Huestis (researcher)
    - Dean Gialamas (practitioner)
    - Pam King (defense attorney)
    - Matt Redle (prosecuting attorney)
National Commission on Forensic Science Notice of Charter Renewal and Solicitation of Applications for Additional Commission Membership

A Notice by the Justice Department on 04/28/2015

49 applicants before solicitation closed on May 28, 2015
6 positions in the process of being filled
(5 who left the NCFS + 1 digital evidence slot)

SUMMARY

In accordance with title 41 of the U.S. Code of Federal Regulations, section 102-3.65(a), notice is hereby given that the Charter for the National Commission on Forensic Science was renewed for an additional two-year period on April 23, 2015. The Attorney General has determined that the National Commission on Forensic Science is necessary and in the public interest in connection with the performance of duties of the Department of Justice and these duties can best be performed through the advice and counsel of this group. This notice will be published in the Federal Register.

<table>
<thead>
<tr>
<th>Date</th>
<th>Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 2014</td>
<td>1. Survey of law enforcement forensic units (directive)</td>
</tr>
<tr>
<td>Jan 2015</td>
<td>2. Accreditation of Medical Examiner and Coroner Offices (policy)</td>
</tr>
<tr>
<td>Jan 2015</td>
<td>3. Certification of Medicolegal Death Investigators (directive)</td>
</tr>
<tr>
<td>Apr 2015</td>
<td>5. Inconsistent Terminology (views)</td>
</tr>
<tr>
<td>Apr 2015</td>
<td>6. Universal Accreditation (policy)</td>
</tr>
<tr>
<td>May 2015</td>
<td>7. Forensic Science and Related Terms (views)</td>
</tr>
</tbody>
</table>

Awaiting notice of Attorney General acceptance of the approved documents
Potential Documents Up for a Vote
(after discussion at the April 30 – May 1, 2015 meeting)

1. Pretrial Discovery of Forensic Materials (views)
2. Testimony using the Term “Reasonable Scientific Certainty” (views)
3. Automated Fingerprint Identification System (AFIS) Interoperability (directive)
5. Root Cause Analysis (RCA) in Forensic Science (directive)
6. Increasing the Number, Retention and Quality of Board Certified Forensic Pathologists (policy)
7. Electronic Networking of Medical Examiner and Coroner Offices in the United States (policy)

Public comment received from April 15 to May 15
Recent NIST Activities in Forensic Science

- NIST/NIJ meetings held since January 2015
- NIST Forensic Science Center of Excellence (May 25)
- NIST Error Management Conference (July 21-24)
- My AAFS Feb 2015 talk on DNA interpretation
- Two recent articles published
  - The future of forensic DNA analysis. *Phil. Trans. R. Soc. B.*
  - U.S. initiatives to strengthen forensic science & international standards in forensic DNA. *FSI Genetics*
- *FSI Genetics* Special Issue
  - Vol. 18, New Trends in Forensic Genetics
  - Introduction plus 13 invited review articles
- Wilmer Souder research & history of forensic science
Recent Forensic Conferences Held at NIST in Collaboration with NIJ

Improving Biometric and Forensic Technology: The Future of Research Datasets
January 26-27, 2015

Forensic Optical Topography Meeting (with NIJ and RTI International)

January 26-27, 2015

March 17-18, 2015

http://www.nist.gov/forensics/conferences_and_events.cfm
Meeting Metrics

• More than 375 people have registered from at least 35 states and 10 additional countries
• 2 keynote speakers (Brandon Mayfield & Steven Wax)
• 8 world-renowned plenary speakers
• 42 sessions across 8 technical tracks
  • 105 individual platform presentations
  • 9 panels
• 19 poster presentations (on display Tues, Wed, Thurs)
• Symposium will close on Friday with a moot court presentation
Why DNA Interpretation Has Become More Challenging in Recent Years

John M. Butler, Ph.D.
NIST Fellow & Special Assistant to the Director for Forensic Science
National Institute of Standards and Technology
Gaithersburg, Maryland
5 Reasons that DNA Results Are Becoming More Challenging to Interpret

1. More sensitive DNA test results
2. More touch evidence samples that are poor-quality, low-template, complex mixtures
3. More options exist for statistical approaches involving probabilistic genotyping software
4. Many laboratories are not prepared to cope with complex mixtures
5. More loci being added because of the large number of samples in DNA databases

Math Analogy to DNA Evidence

2 + 2 = 4

Basic Arithmetic

2 \times x^2 + x = 10

Algebra

\int_{x=0}^{\infty} f(x) \, dx

Calculus

Single-Source DNA Profile
(DNA databasing)

Sexual Assault Evidence
(2-person mixture with high-levels of DNA)

Touch Evidence
(>2-person, low-level, complex mixtures perhaps involving relatives)

The future of forensic DNA analysis

John M. Butler

National Institute of Standards and Technology, Gaithersburg, MD, USA

The author’s thoughts and opinions on where the field of forensic DNA testing is headed for the next decade are provided in the context of where the field has come over the past 30 years. Similar to the Olympic motto of ‘faster, higher, stronger’, forensic DNA protocols can be expected to become more rapid and sensitive and provide stronger investigative potential. New short tandem repeat (STR) loci have expanded the core set of genetic markers used for human identification in Europe and the USA. Rapid DNA testing is on the verge of enabling new applications. Next-generation sequencing has the potential to provide greater depth of coverage for information on STR alleles. Familial DNA searching has expanded capabilities of DNA databases in parts of the world where it is allowed. Challenges and opportunities that will impact the future of forensic DNA are explored including the need for education and training to improve interpretation of complex DNA profiles.
## Thoughts on the Future of Forensic DNA Analysis

**Table 2. Current practice and future potential for genetic markers used in forensic DNA analysis.**

<table>
<thead>
<tr>
<th>marker</th>
<th>current practice (as of 2014)</th>
<th>future potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>autosomal STRs</td>
<td>core loci used to create DNA profile databases and to perform casework; data generated in laboratories with CE systems</td>
<td>expanded core set of loci enabling more international comparisons; data generated by NGS</td>
</tr>
<tr>
<td>Y-chromosome STRs</td>
<td>casework examination of 12 – 27 Y-STR loci with haplotype frequencies searched in population databases (e.g. YHRD.org); familial searching candidate pool restricted with Y-STR screening</td>
<td>larger population databases to improve haplotype frequency estimates; genetic genealogy database information combined with Y-STR casework data to help provide potential surname of perpetrator in some cases; rapidly mutating Y-STRs used to separate close male relatives</td>
</tr>
<tr>
<td>X-chromosome STRs</td>
<td>population data collected for 12+ loci but only used occasionally in kinship cases</td>
<td>X-STRs and X-SNP markers routinely used to help address challenging kinship questions with testing performed on NGS platform in parallel with autosomal STRs</td>
</tr>
<tr>
<td>mitochondrial DNA</td>
<td>control region Sanger sequencing with haplotype frequencies estimated through population database searches (e.g. EMPOP.org)</td>
<td>full mtGenome by NGS to produce the highest resolution possible; larger population databases to improve haplotype frequency estimates</td>
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<tr>
<td>bi-allelic markers (SNPs and Indels)</td>
<td>a few dozen SNPs examined with multiple SNaPshot assays on CE platforms for simple phenotype or biogeographic ancestry prediction; some population data collected with insertion/deletion (Indel) assays</td>
<td>hundreds of SNPs or Indels for biogeographic ancestry and phenotype predictions tested on NGS platform in parallel with STRs</td>
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<tr>
<td>Black, Nic Daeid</td>
<td>Time to think differently: catalyzing a paradigm shift in forensic science</td>
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<td>Lord CJ Thomas</td>
<td>The legal framework for more robust forensic science evidence</td>
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<td>O’Brien, Nic Daeid, Black</td>
<td>Science in the court: pitfalls, challenges and solutions</td>
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<tr>
<td>Paul Roberts</td>
<td>Paradigms of forensic science and legal process: a critical diagnosis</td>
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<td>Bolliger &amp; Thali</td>
<td>Imaging and virtual autopsy: looking back and forward</td>
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<tr>
<td>Anil Jain &amp; Arun Ross</td>
<td>Bridging the gap: from biometrics to forensics</td>
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<tr>
<td>Christophe Champod</td>
<td>Fingerprint identification: advances since the 2009 National Research Council report</td>
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<tr>
<td>John Butler</td>
<td>The future of forensic DNA analysis</td>
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<tr>
<td>Claude Roux et al.</td>
<td>The end of (forensic science) world as we know it? The example of trace evidence</td>
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<tr>
<td>Ken Furton et al.</td>
<td>Advances in the use of odour as forensic evidence through optimizing and standardizing instruments and canines</td>
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<tr>
<td>Tettey &amp; Crean</td>
<td>New psychoactive substances: catalyzing a shift in forensic science practice?</td>
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<tr>
<td>Ian Evett</td>
<td>The logical foundations of forensic science: towards reliable knowledge</td>
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<tr>
<td>Arian van Asten et al.</td>
<td>The interface between forensic science and technology…</td>
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<tr>
<td>Alastair Ross</td>
<td>Integrating research into operational practice</td>
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<tr>
<td>Itiel Dror</td>
<td>Cognitive neuroscience in forensic science: understanding &amp; utilizing the human element</td>
<td></td>
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</table>
U.S. initiatives to strengthen forensic science & international standards in forensic DNA

John M. Butler*

National Institute of Standards and Technology, Gaithersburg, MD, USA

• This review article covers recent U.S. activities to strengthen forensic science including the formation of the National Commission on Forensic Science and the Organization of Scientific Area Committees

• DNA documentary standards and guidelines from organizations around the world are also included

### Table 8

Summary of available documentary standards and guidelines on forensic DNA. If an earlier version of a document has been superseded, then only the latest version (as of April 2015) is noted.

<table>
<thead>
<tr>
<th>Source (date)</th>
<th>Document title</th>
<th>Reference</th>
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<tbody>
<tr>
<td>DNA Advisory Board (1998/</td>
<td>FBI Quality Assurance Standards (QAS) for forensic and databasing laboratories</td>
<td>[29,30]</td>
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<tr>
<td>1999)</td>
<td></td>
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<td>SWGDAM (2011)</td>
<td>Revised FBI QAS for forensic and databasing laboratories and accompanying audit documents</td>
<td>[82]</td>
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<td>SWGDAM (2010)</td>
<td>Interpretation guidelines for autosomal STR typing by forensic DNA testing laboratories</td>
<td>[83]</td>
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<td>SWGDAM (2012)</td>
<td>Validation guidelines for DNA analysis methods</td>
<td>[84]</td>
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<tr>
<td>SWGDAM (2013)</td>
<td>Interpretation guidelines for mitochondrial DNA analysis by forensic DNA testing laboratories and mitochondrial DNA nomenclature examples document</td>
<td>[85,86]</td>
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<tr>
<td>SWGDAM (2013)</td>
<td>Training guidelines</td>
<td>[87]</td>
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<tr>
<td>SWGDAM (2014)</td>
<td>Guidelines for missing persons casework</td>
<td>[88]</td>
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<tr>
<td>SWGDAM (2014)</td>
<td>Interpretation guidelines for Y-chromosome STR typing</td>
<td>[89]</td>
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<tr>
<td>SWGDAM (2014)</td>
<td>Guidelines for STR enhanced detection methods</td>
<td>[90]</td>
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<tr>
<td>SWGDAM (2015)</td>
<td>Guidelines for the collection and serological examination of biological evidence</td>
<td>[91]</td>
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<tr>
<td>ENFSI DNA WG (2010)</td>
<td>Recommended minimum criteria for the validation of various aspects of the DNA profiling process</td>
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<tr>
<td>ENFSI DNA WG (2010)</td>
<td>Training DNA staff: concept training document</td>
<td>[93]</td>
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<td>ENFSI DNA WG (2010)</td>
<td>Contamination prevention guidelines</td>
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<td>ENFSI DNA WG (2014)</td>
<td>DNA database management: review and recommendations</td>
<td>[95]</td>
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<td>Interpol (2009)</td>
<td>Interpol handbook on DNA data exchange and practice</td>
<td>[96]</td>
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<tr>
<td>UK Forensic Regulator (2012)</td>
<td>The interpretation of DNA evidence</td>
<td>[98]</td>
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<td>UK Forensic Regulator (2014)</td>
<td>Forensic science providers: codes of practice and conduct</td>
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<td>UK Forensic Regulator (2014)</td>
<td>DNA analysis: codes of practice and conduct</td>
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<td>UK Forensic Regulator (2014)</td>
<td>Allele frequency databases and reporting guidance for the DNA-17 profiling</td>
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<tr>
<td>UK Forensic Regulator (2014)</td>
<td>DNA contamination detection—the management and use of staff elimination DNA databases</td>
<td>[102]</td>
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<td>UK Forensic Regulator (2014)</td>
<td>Forensic science providers: validation</td>
<td>[103]</td>
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</tbody>
</table>

FSI Genetics is the #1 Journal in the Forensic Science & Legal Medicine Category

<table>
<thead>
<tr>
<th>Rank</th>
<th>Journal</th>
<th>2014 Impact Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Forensic Science International: Genetics</em></td>
<td>4.604</td>
</tr>
<tr>
<td>2</td>
<td><em>International Journal of Legal Medicine</em></td>
<td>2.714</td>
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<tr>
<td>3</td>
<td><em>Forensic Science International</em></td>
<td>2.140</td>
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<tr>
<td>4</td>
<td><em>Regulatory Toxicology and Pharmacology</em></td>
<td>2.031</td>
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<tr>
<td>5</td>
<td><em>Forensic Science, Medicine, &amp; Pathology</em></td>
<td>1.983</td>
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<tr>
<td>6</td>
<td><em>Science &amp; Justice</em></td>
<td>1.417</td>
</tr>
<tr>
<td>7</td>
<td><em>Legal Medicine</em></td>
<td>1.238</td>
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<tr>
<td>8</td>
<td><em>Journal of Forensic Sciences</em></td>
<td>1.160</td>
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</tbody>
</table>

Impact Factors have improved over the years for FSI Genetics

- **2008**: 1.367
- **2009**: 2.421
- **2010**: 2.877
- **2011**: 3.082
- **2012**: 3.861
- **2013**: 3.202
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Article Title (Invited Review Articles)</th>
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<tbody>
<tr>
<td>John Butler</td>
<td>U.S. initiatives to strengthen forensic science &amp; international standards in forensic DNA</td>
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<tr>
<td>Titia Sijen</td>
<td>Molecular approaches for <strong>forensic cell type identification</strong>: on mRNA, miRNA, DNA methylation, and microbial markers</td>
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<tr>
<td>Manfred Kayser</td>
<td><strong>Forensic DNA phenotyping</strong>: predicting human appearance from crime scene material for investigative purposes</td>
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<tr>
<td>Chris Phillips</td>
<td>Forensic genetic analysis of <strong>bio-geographical ancestry</strong></td>
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<tr>
<td>Robin Cotton &amp; Matthew Fisher</td>
<td><strong>Properties of sperm and seminal fluid</strong>, informed by research on reproduction and contraception</td>
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<tr>
<td>Claus Børsting &amp; Niels Morling</td>
<td><strong>Next generation sequencing</strong> and its applications in forensic genetics</td>
</tr>
<tr>
<td>Erica Romsos &amp; Peter Vallone</td>
<td><strong>Rapid PCR of STR markers</strong>: applications to human identification</td>
</tr>
<tr>
<td>Peter Gill et al.</td>
<td><strong>Genotyping and interpretation of STR-DNA</strong>: low-template, mixtures and database matches – 20 years of research and development</td>
</tr>
<tr>
<td>K. Gettings et al.</td>
<td><strong>STR allele sequence variation</strong>: current knowledge and future issues</td>
</tr>
<tr>
<td>Just, Irwin, Parson</td>
<td><strong>Mitochondrial DNA heteroplasmy</strong> in the emerging field of <strong>massively parallel sequencing</strong></td>
</tr>
<tr>
<td>Toni Diegoli</td>
<td>Forensic typing of short tandem repeat markers on the <strong>X and Y chromosomes</strong></td>
</tr>
<tr>
<td>Ogden &amp; Linacre</td>
<td><strong>Wildlife forensic science</strong>: a review of genetic geographic origin assignment</td>
</tr>
<tr>
<td>Maria Brión et al.</td>
<td><strong>Massive parallel sequencing</strong> applied to the <strong>molecular autopsy</strong> in sudden cardiac death in the young</td>
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ISFG Meeting (August 29-Sept 5, 2015)
http://www.isfg2015.org

• **10 Educational Workshops**

• **6 Plenary Lectures** by Peter Gill, Bruce Weir, Chris Tyler-Smith, Manel Esteller, Robin Williams, and Tomasz Grzybowski

• **57 oral presentations and >300 posters**
  • SWGDAM participants speaking: Katherine Gettings, Tamyra Moretti, Jack Ballantyne, John Butler, Doug Hares, Mike Coble, Jodi Irwin, Peter Vallone, Lutz Roewer, Jo-Anne Bright, John Buckleton
Dr. Wilmer Souder: Early Handwriting Expert

- **National Bureau of Standards** (1911-1913, 1917-1954)
  - His PhD research at the University of Chicago 1913-1916 on the photoelectric effect led to Robert Millikan receiving the 1923 Nobel Prize in Physics
- Chief of the NBS Identification Laboratory (est. ~1921) and Dental Research Laboratory (est. 1919)
- Based on notebook records recently rediscovered, he served as a Federal expert in hundreds of handwriting, typewriter and ballistic identification cases during the 1920s through the 1950s
- Helped set up the FBI Laboratory in 1932 and provided training to the FBI and other forensic labs in document examination and ballistics
- Testified for the prosecution in the Bruno Hauptmann (Charles Lindberg baby kidnapping) trial in 1935
- Active member of IAI and IACP and many other scientific organizations

*NBS changed its name to NIST in 1988*
A page from one of Wilmer Souder’s notebooks (rediscovered June 2015)

Typewriting casework received from the Department of Justice – Charles Appel (first FBI Laboratory employee) on October 28, 1933 (10-28-33)

All [material returned] to Appel on October 30, 1933 (10-30-33)

Convicted on Appel’s testimony
“The honest expert never looks upon the outcome of his work as a result of luck, the reward of a game, or victory in a battle of wits. He has built his qualifications through hard work. He establishes his conclusions through exacting procedures; he presents his testimony in the face of keen opposition and asks no favor beyond an honest consideration of the facts disclosed. Having done so, he has fulfilled the high obligations of his profession.

“Justice is sometimes pictured as blindfolded. However, scientific evidence usually pierces the mask.”

National Commission on Forensic Science (NCFS):
www.justice.gov/ncfs

Organization of Scientific Area Committees (OSAC):
www.nist.gov/forensics/osac/index.cfm

www.nist.gov/forensics

301-975-4049 john.butler@nist.gov