EUROPEAN DNA PROFILING GROUP (EDNAP) MEETING

Vilnius, Lithuania

25 April 2017

Host: Gintautas Sinkunas
Chairman: Niels Morling

A list of participants is attached.

Welcome
Gintautas Sinkunas welcomed members to Vilnius.

Update on exercises
A SNaPshot based method targeting18 common mtDNA mutations Niels Morling
The publication details are:
Weiler et al. A collaborative EDNAP exercise on SNaPshot™-based mtDNA control region typing. Forensic Sci Int Genet 2017; 26: 77-84. doi: 10.1016/j.fsigen.2016.10.014.

Second exercise on methylated DNA and age David Ballard
David Ballard presented the results of the second collaborative EDNAP exercise on age estimation by means of measurements of methylation of selected DNA positions (presentation attached).

Exercise on mRNA typing with NGS Cordula Haas
Cordula Haas had sent a suggestion for a second NGS based study of discrimination between various tissues and body fluids (presentation attached).

Updates from other groups
EUROFORGEN-NoE – General update Theresa Gross
Theresa Gross gave an update on the project that is now a working group under the ISFG (presentation attached).

EMPOP update Walther Parson
Walther Parson gave a short update of the activities of the ISFG (presentation attached).

High quality DNA sequence database - STRidER Walther Parson
Walther Parson informed about the update of the website, https://strider.online. Colleagues are invited to submit data to the database. In the near future, STRider will be used as a screening tool and repository for population genetic information that is sent to Forensic Science International: Genetics (presentation attached).

ISFG report Walther Parson
Walther Parson gave a short update of the activities of the ISFG (presentation attached).

The EU supported project 'VISAGE' Walther Parson

The project will begin 1 May 2017. At the next EDNAP meeting, Walther Parson will give an update.

National Commission on Forensic Science (NCFS) – John Butler Niels Morling

John Butler had sent his personal view on forensic science as a pdf presentation . The presentation was presented and commented by Tom Callaghan and Niels Morling (presentation attached).

Other activities

Interpretation of complex mixtures – SNPs Peter Gill

Peter Gill presented results of interpretation of SNP results obtained with massively parallel sequencing. The open-source, qualitative LRmix and quantitative EuroForMix programmes designed for multi-allelic STRs were modified so that they can be used for calculation of LR of SNP data (abstract attached).

Activity propositions – primary/secondary transfer, etc. Peter Gill

Peter Gill gave a presentation of investigations of secondary transfer, shedder status, activity propositions, etc. (presentation attached).

Future activities Niels Morling

Colleagues from Den Haag offered to organize a collaborative exercise on mtDNA quantification. At least five laboratories expressed interest in participation in the exercise. The exercise will be open for ENFSI members and other interested colleagues. EDNAP members will receive information with e-mail (presentation attached).

Next meetings Niels Morling

Maria Vouropoulous, Athens, has suggested to her laboratory managers that Athens organizes the next EDNAP meeting and meeting of the steering group of the DNA Working Group of ENFSI. The EDNAP members were very happy with the suggestion and would very much like to convene in Athens.

During the meeting of the ENFSI Steering Group it was agreed to give priority to the following periods: 23-26 Oct 2017 (1st priority), 16-19 Oct 2017 (2nd priority), and 30 Oct – 2 Nov 2017 (also 2nd priority), Maria Vouropoulous and Niels Morling will be in contact.

At the ENFSI Steering Group meeting, the colleagues from Rome informed the group that they are planning the EDNAP/CODIS/ENFSI meeting in April 2018, most likely during the week 16–20 April 2017.

Any other business Niels Morling

There was no other business.

Closing of the meeting

The meeting closed with sincere thanks to Gintautas Sinkunas and all other colleagues, who helped to organise the meeting.

Attachments are found at the EDNAP website http://www.isfg.org/EDNAP/Meetings:

- Agenda
- List of participants
- Presentations
  - David Ballard: Report on methylated DNA and age determination
  - Cordula Haas: Suggestion for a second collaborative exercise on mRNA NGS
  - Theresa Gross: Report on EUROFORGEN-NoE

- Walther Parson: EMPOP report
- Walther Parson: STRidER report
- Walther Parson: ISFG report
- John Butler: Forensic Science in the US
- Peter Gill: Activity level propositions
- Peter Gill: Interpretation of complex mixtures – SNPs
- Arnoud Kal: Suggestion for a collaborative exercise on mtDNA quantification.

AGENDA FOR THE EDNAP MEETING

VILNIUS – 25 APRIL 2017

Expected duration: 09.00 - 17.00

Coffee: 10.00 – Lunch: 12.30-13.30 – Coffee: 15.00

Host: Gintautas Sinkunas
Chairman: Niels Morling

Welcome	Gintautas Sinkunas
Update on activities concerning	
mtDNA SNP screening. Weiler et al. A collaborative EDNAP exercise on SNaPshot™-based mtDNA control region typing. Forensic Sci Int Genet 2017; 26: 77-84. doi: 10.1016/j.fsigen.2016.10.014.	Niels Morling
Methylated DNA and age exercise	David Ballard
Exercise on mRNA typing with MPS	Cordula Haas
Suggestions for new collaborative exercises	
Secondary transfer – is the time ready for an EDNAP exercise?	Peter Gill
Updates from other groups	
EUROFORGEN-NoE	Theresa Gross
High quality DNA sequence database	Walther Parson
ISFG – incl. EMPOP/STRidER	Walther Parson
The EU supported project 'VISAGE'	Walther Parson
National Commission on Forensic Science (NCFS) – John Butler	Niels Morling
Other activities	
Interpretation of complex mixtures – an update	Peter Gill
Activity level propositions	Peter Gill
Future activities	
An mtDNA quantification collaborative exercise?	Arnoud Kal
EDNAP meeting in the fall of 2017 – where? Please suggest	Niels Morling
Any other business	Niels Morling

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Methylated DNA & Age Exercise

David Ballard

EDNAP, Vilnius 2017

KING'S College LONDON

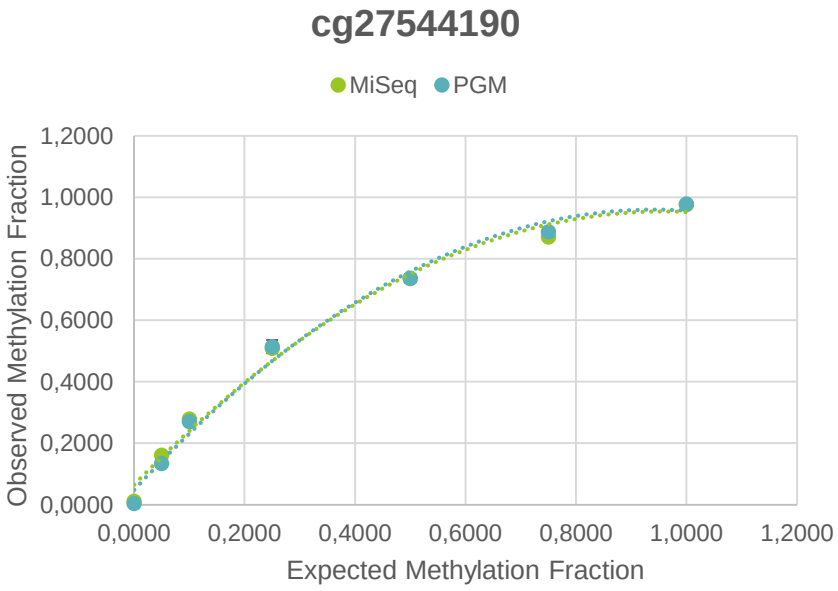
EDNAP EXERCISE

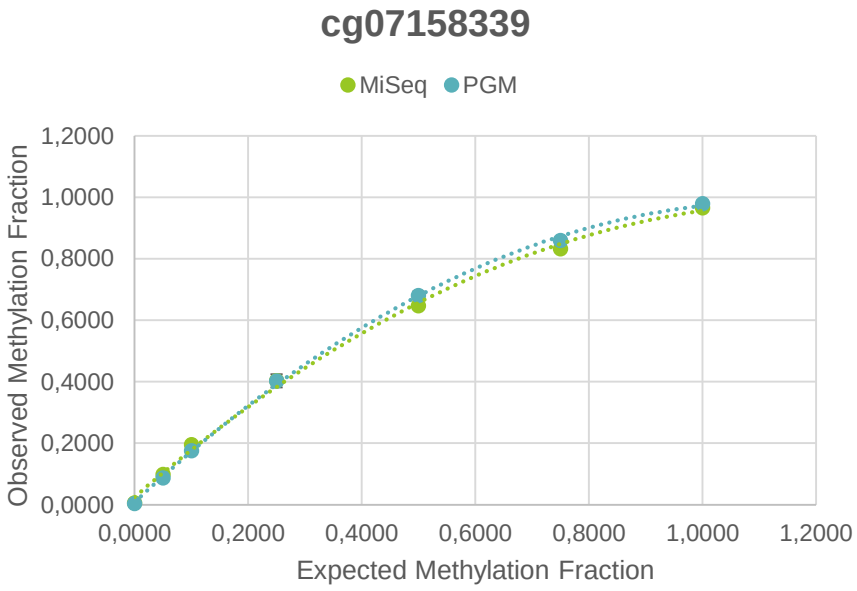
Part 1

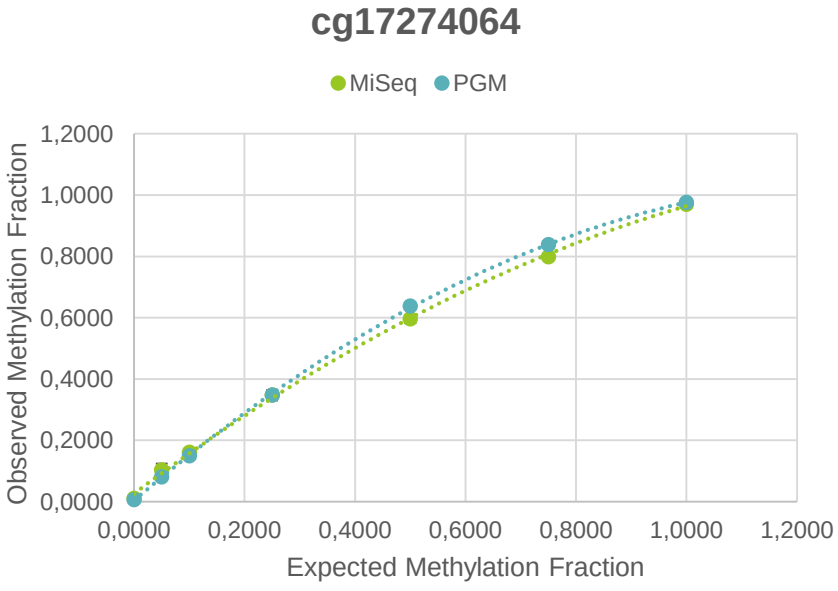
Part 1

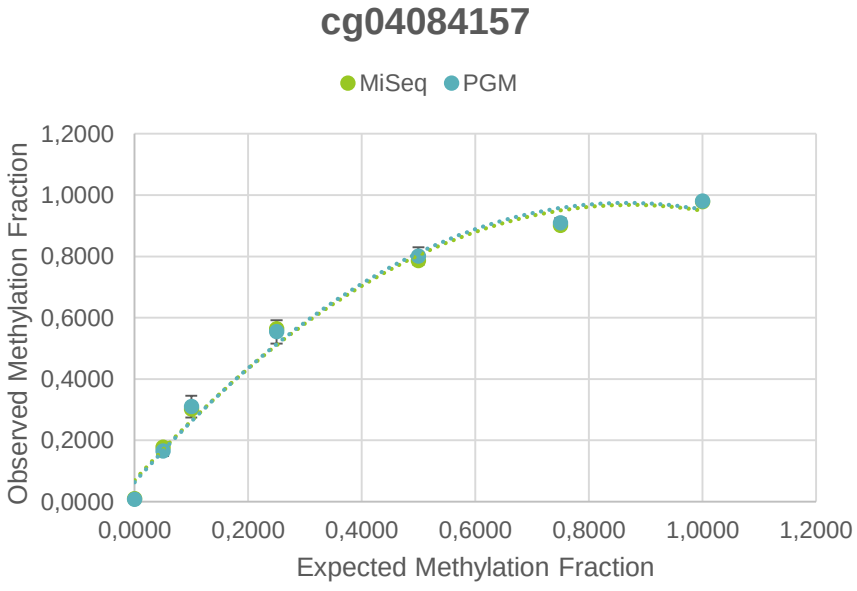
- Results now received from 15 laboratories
  - 8 MiSeq only
  - 5 PGM only
  - 2 MiSeq and PGM
- 7 Methylation standards between 0-100% sent out to all labs

Methylation Standards 0-100% run on the MiSeq & PGM

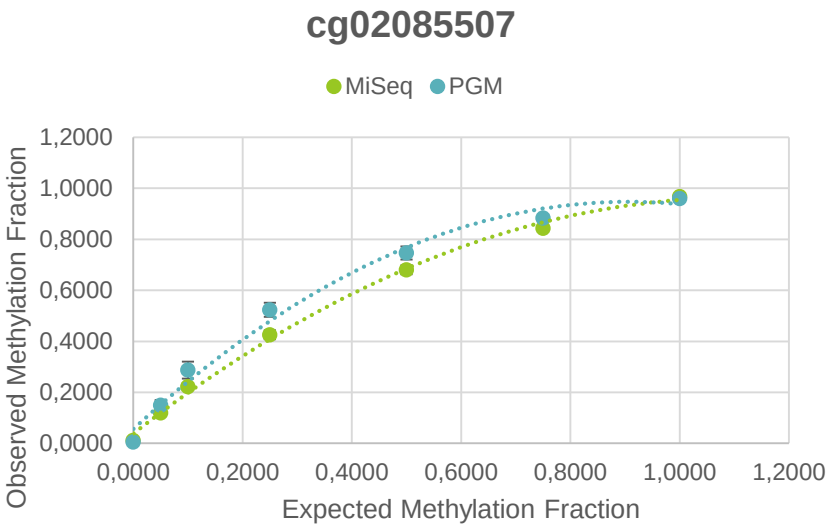


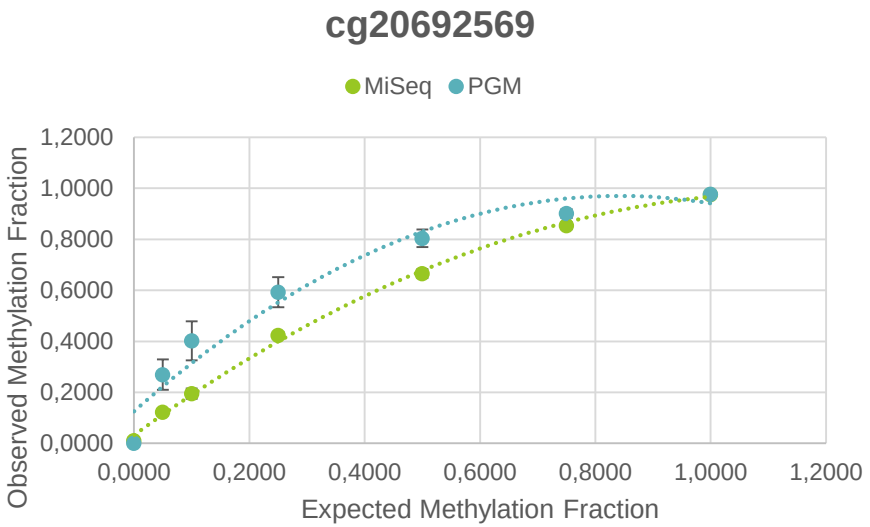


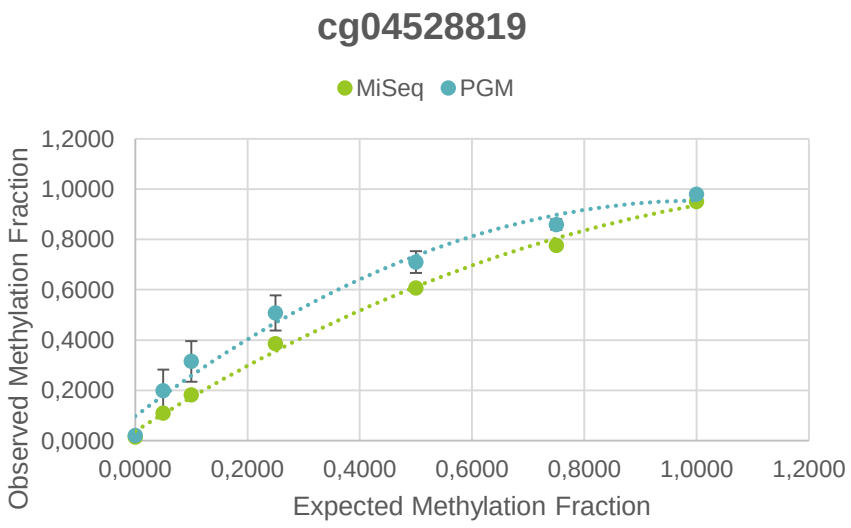


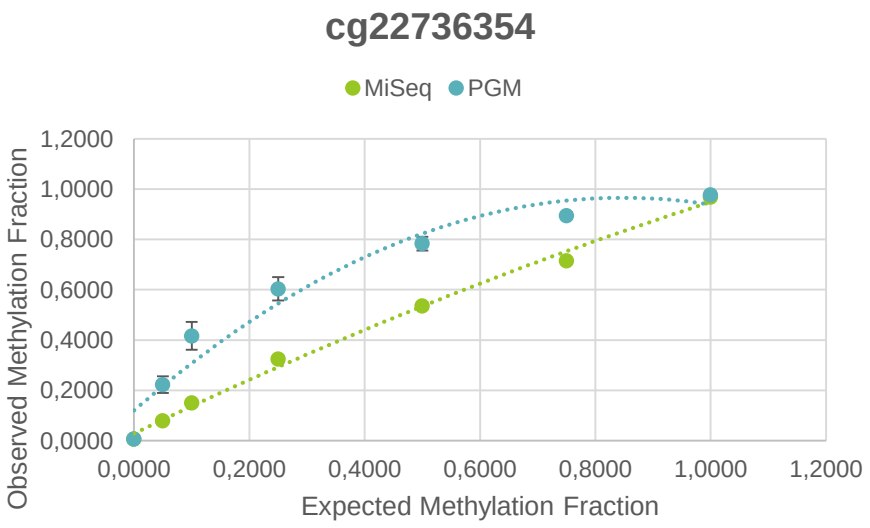


Methylation Standards 0-100% run on the MiSeq & PGM









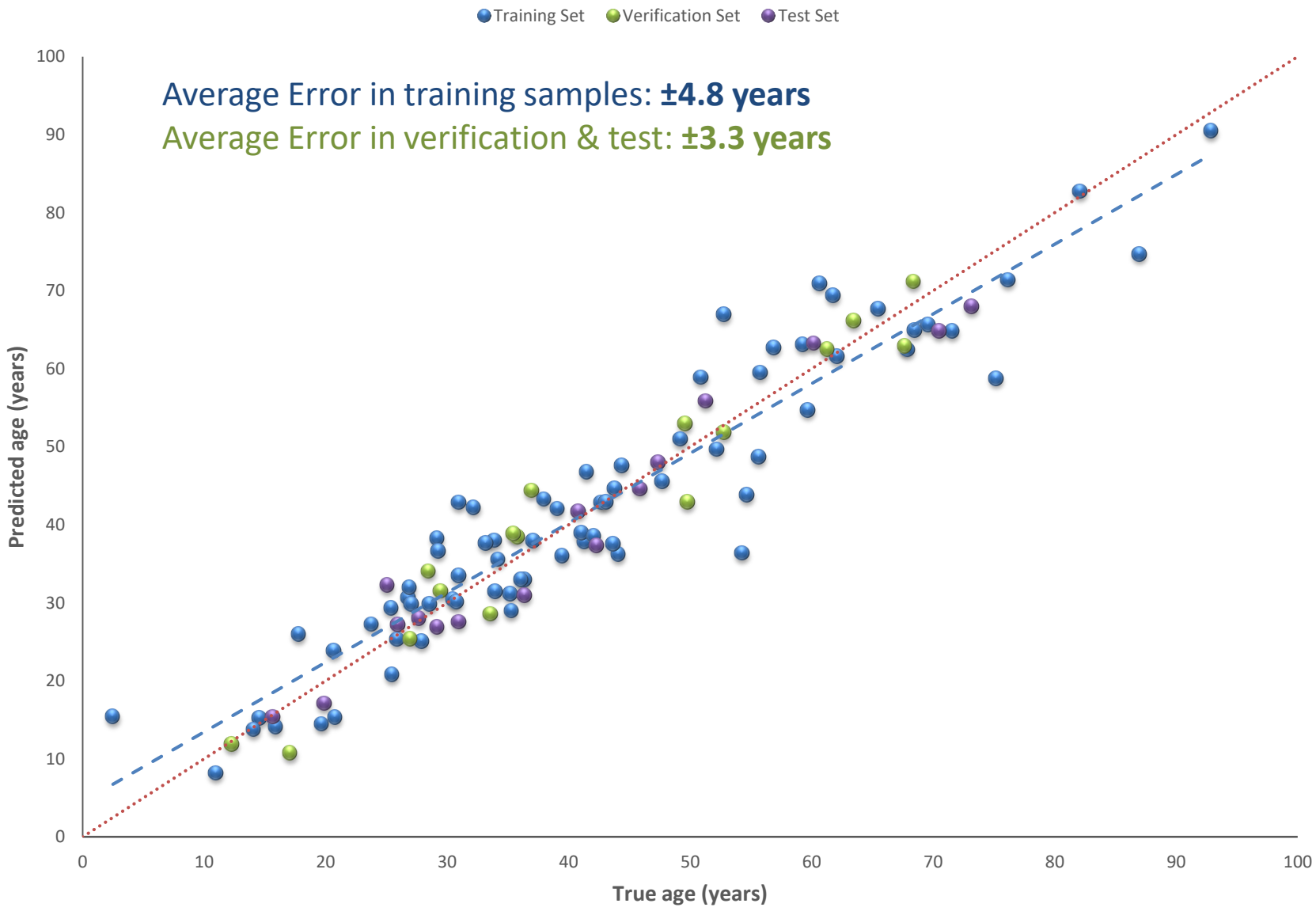
EDNAP EXERCISE

Part 2

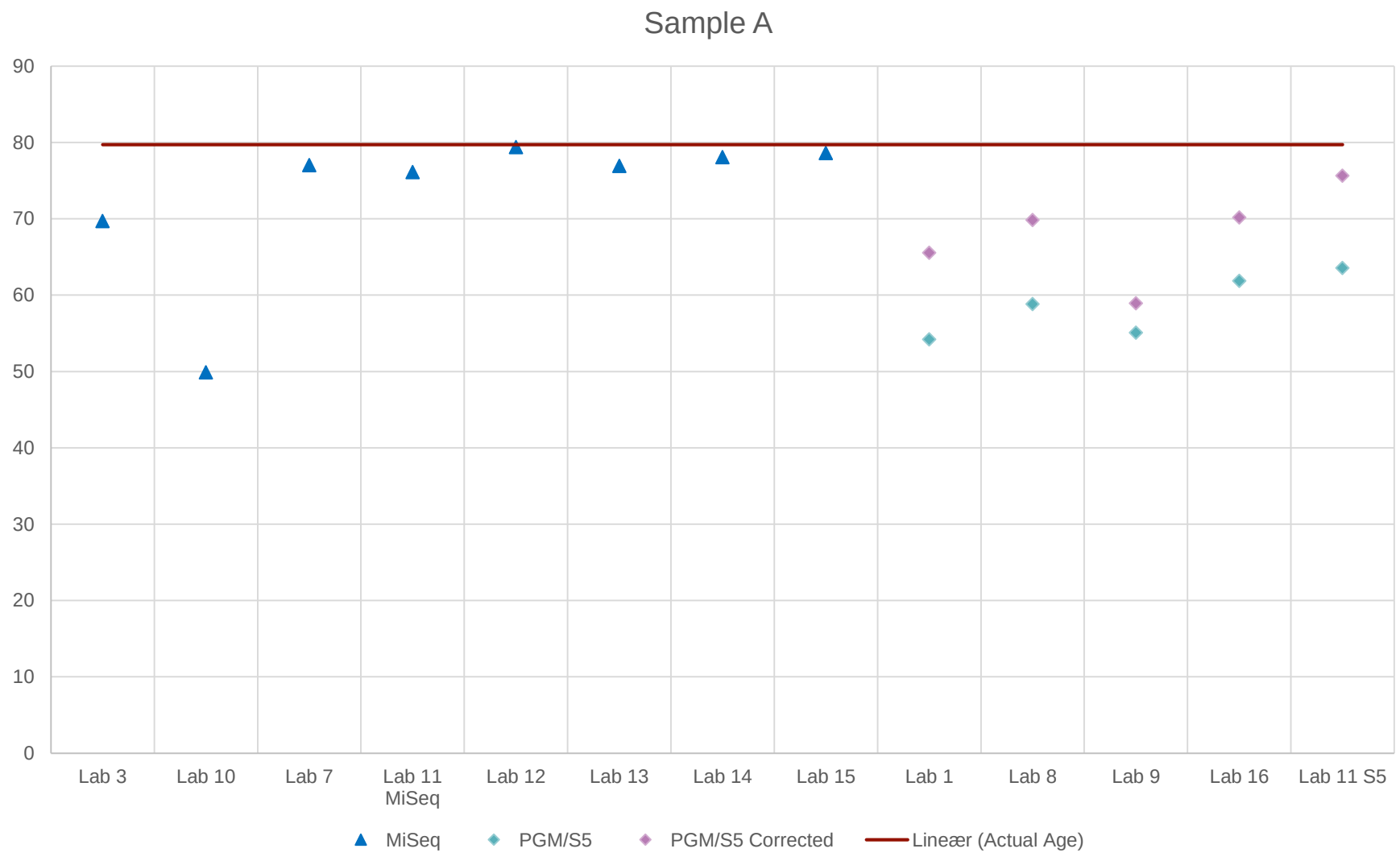
Part 2

- Results now received from 15/15 laboratories
- Samples sent:
  - 7 blood stains (labelled A-G in the following slides)
  - 2 methylation standards
- Also possible to analyse 3-6 samples unique to the laboratory

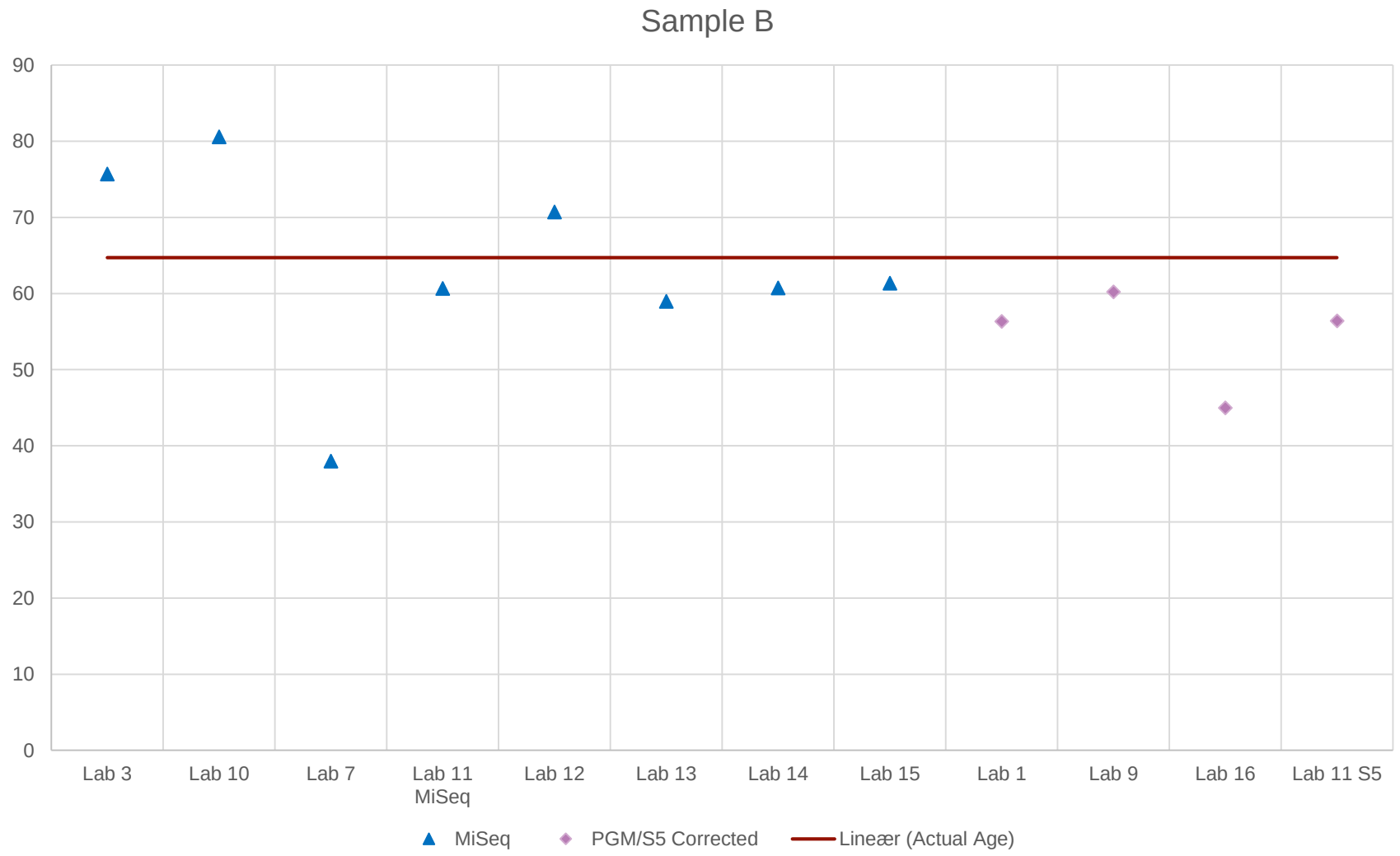
ANN Based Prediction Model



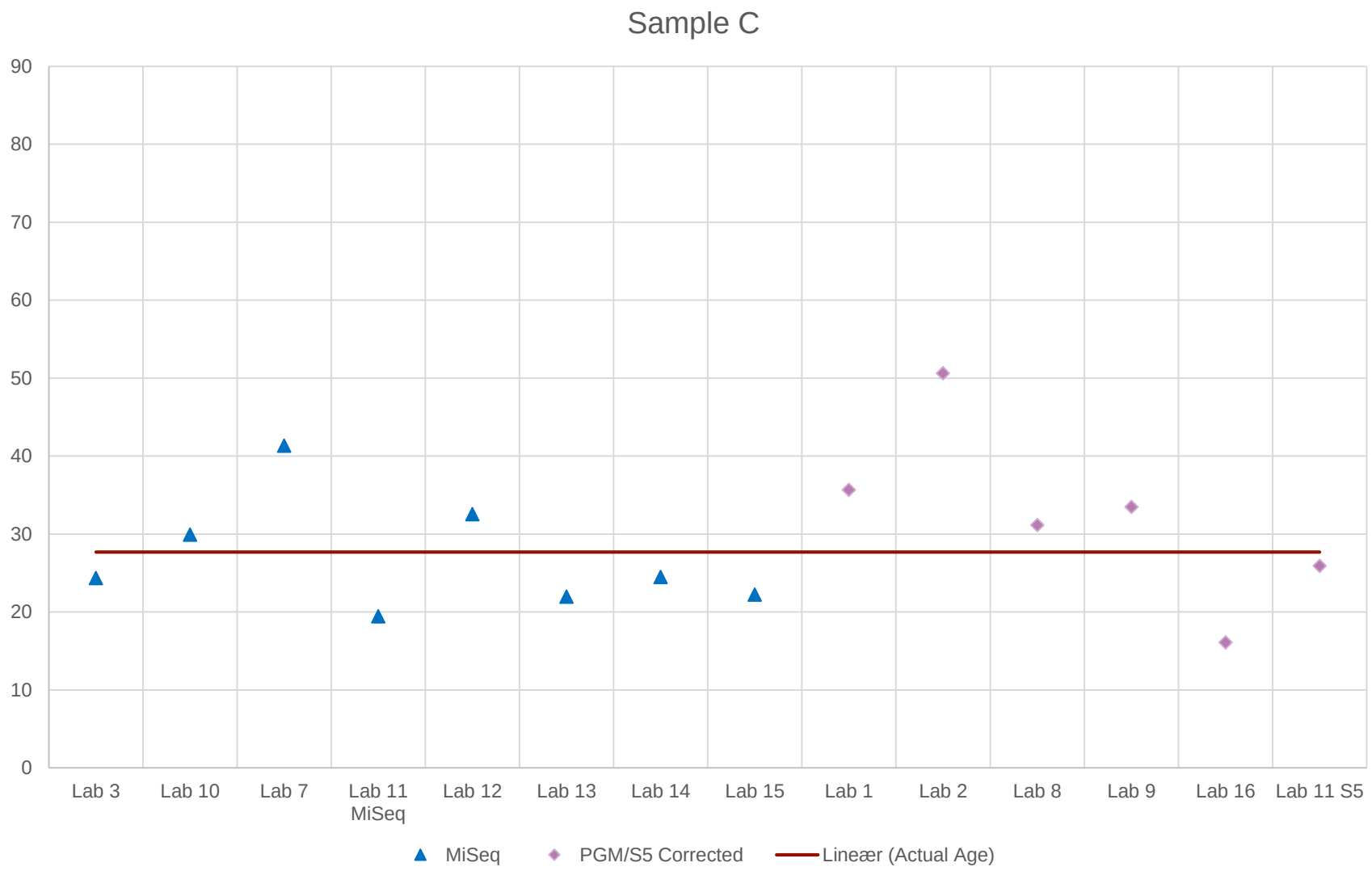
Prediction Results from EDNAP Laboratories



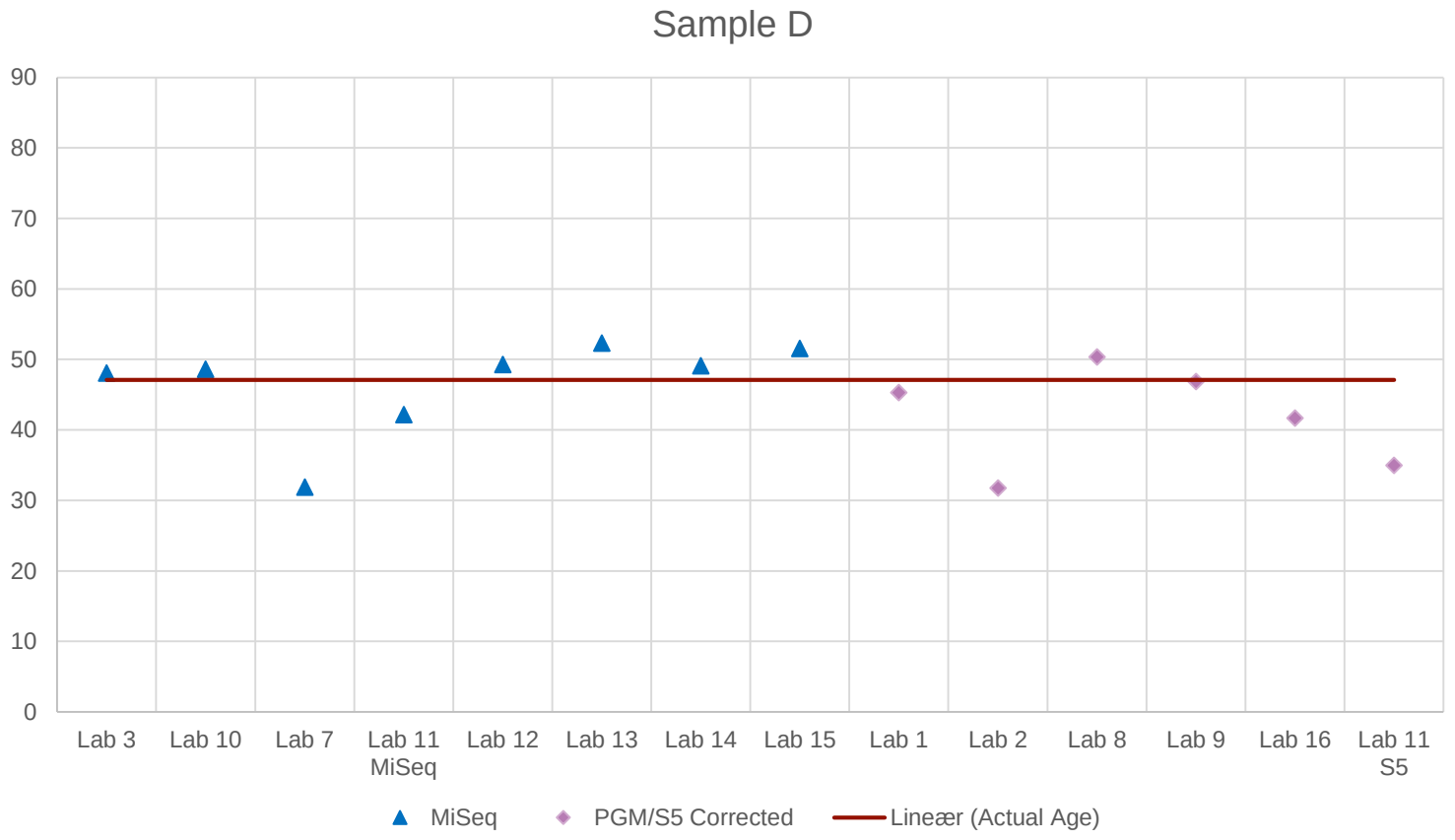
Prediction Results from EDNAP Laboratories



Prediction Results from EDNAP Laboratories



Prediction Results from EDNAP Laboratories



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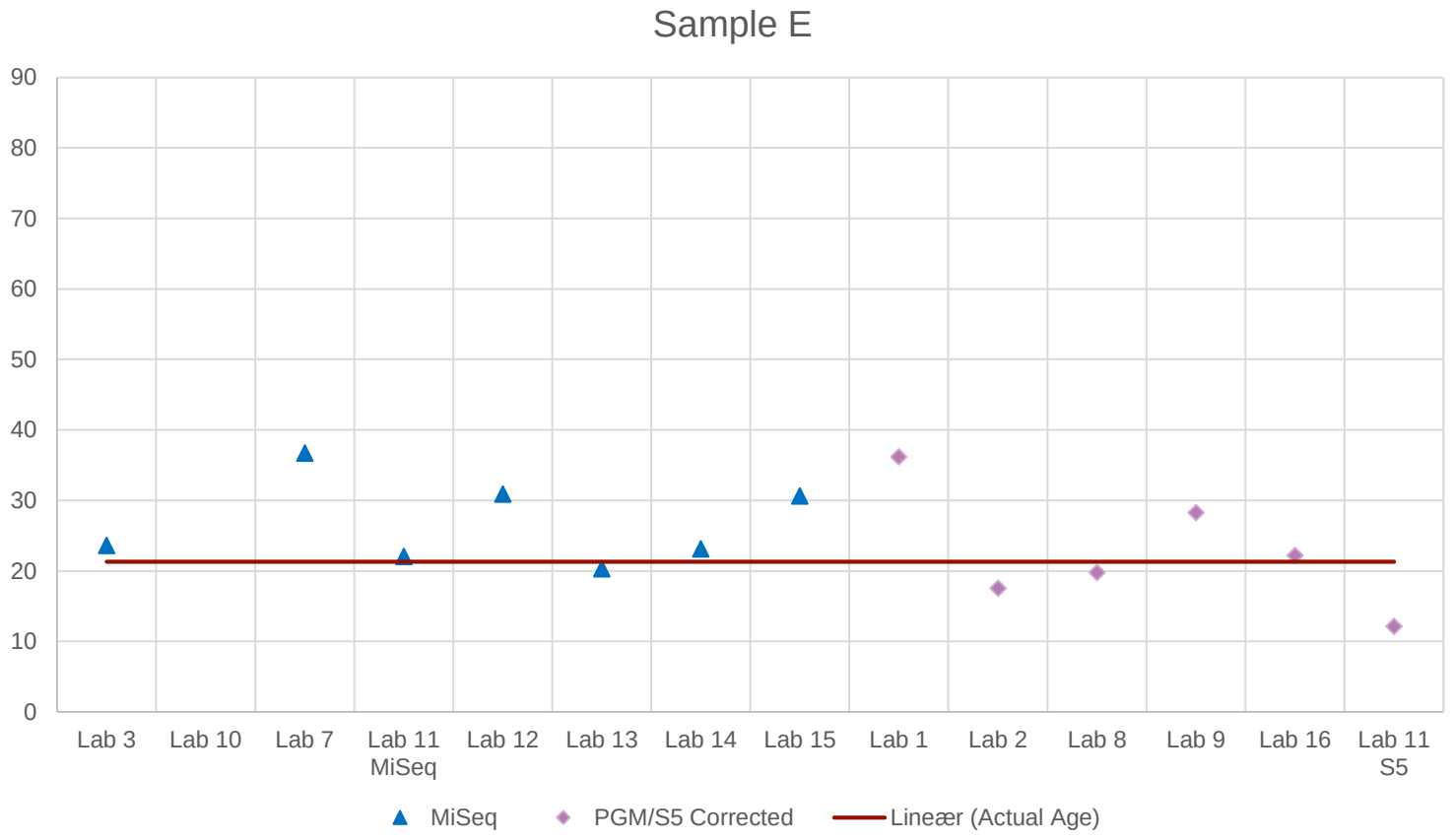
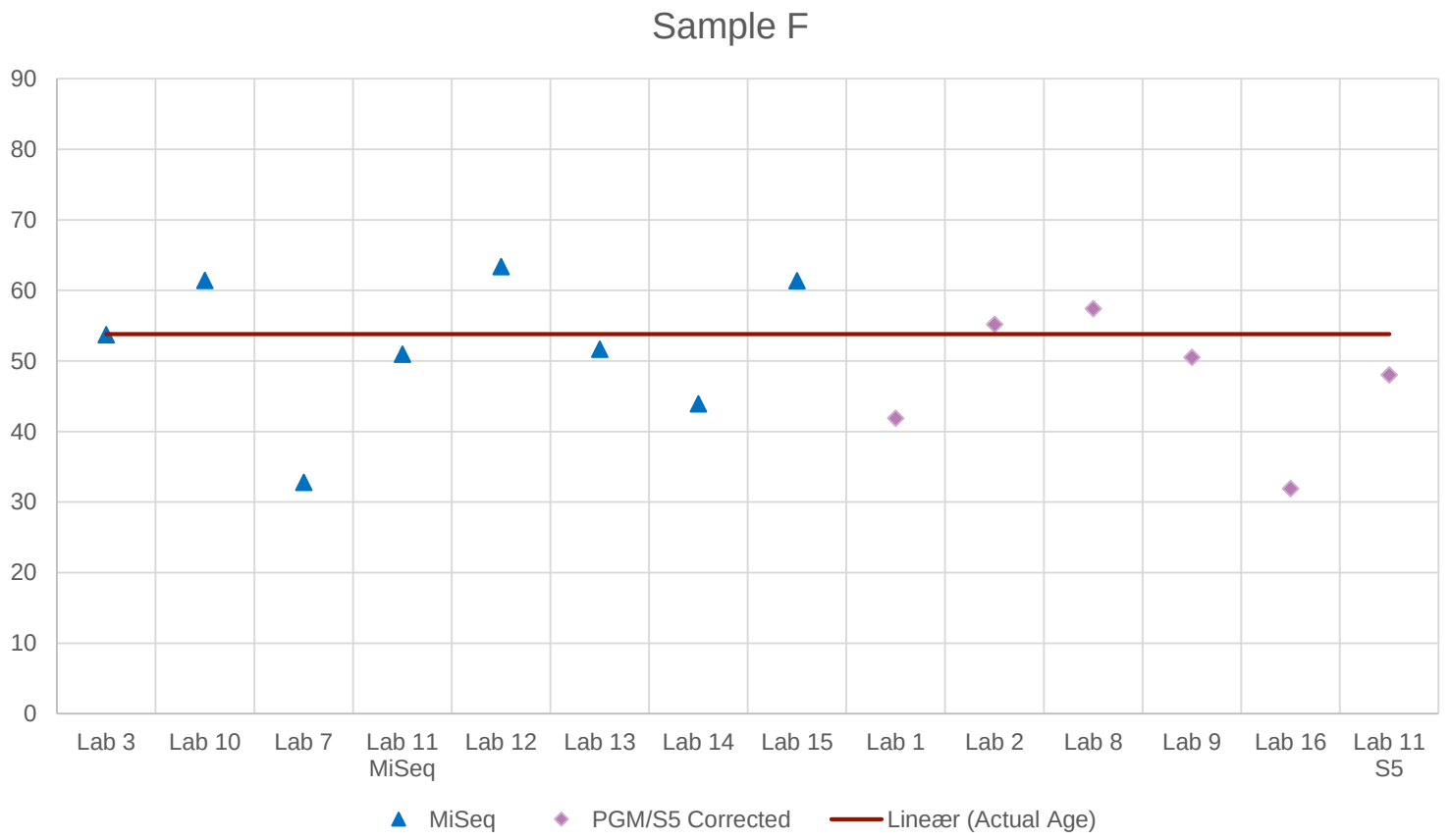
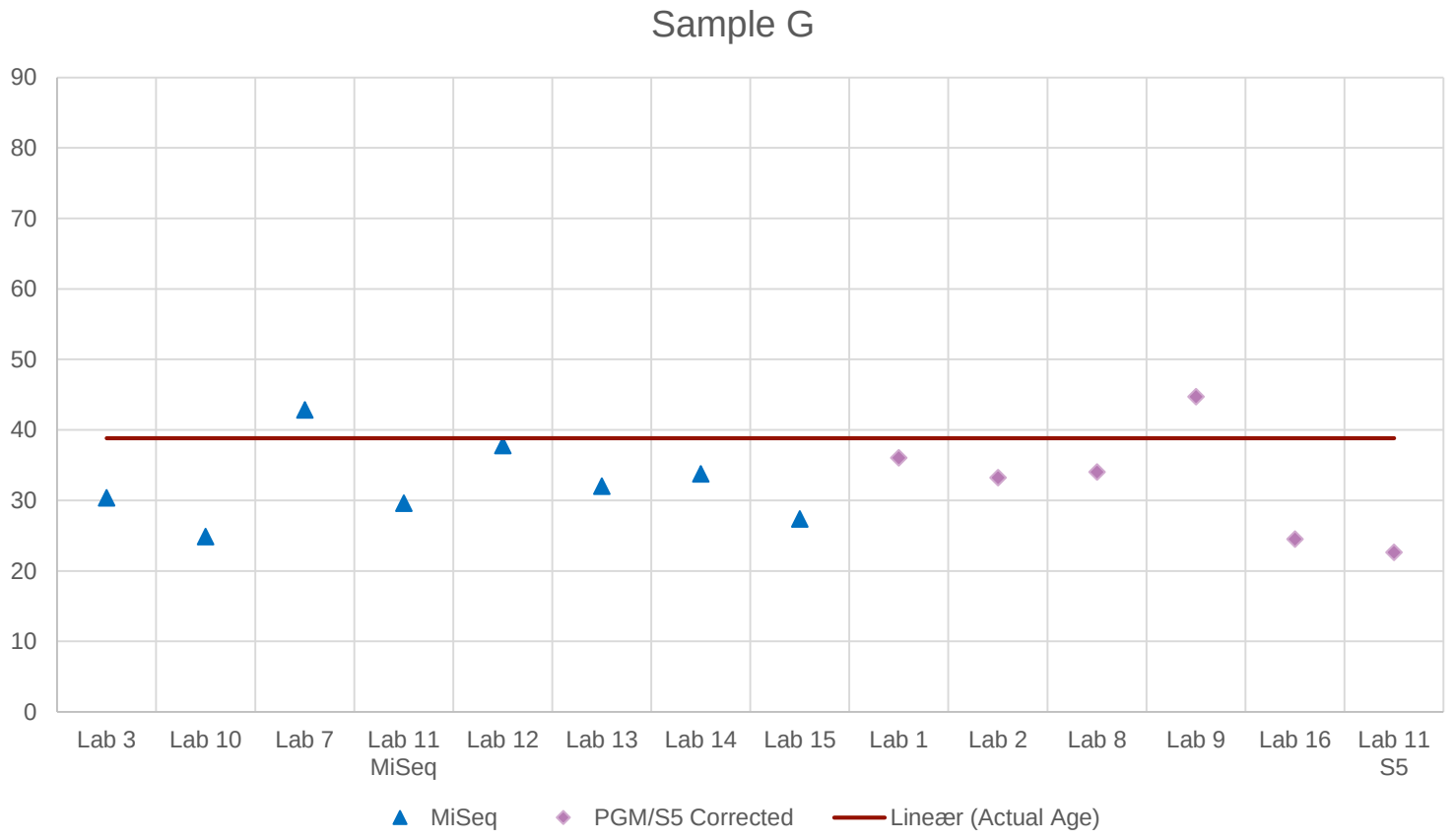


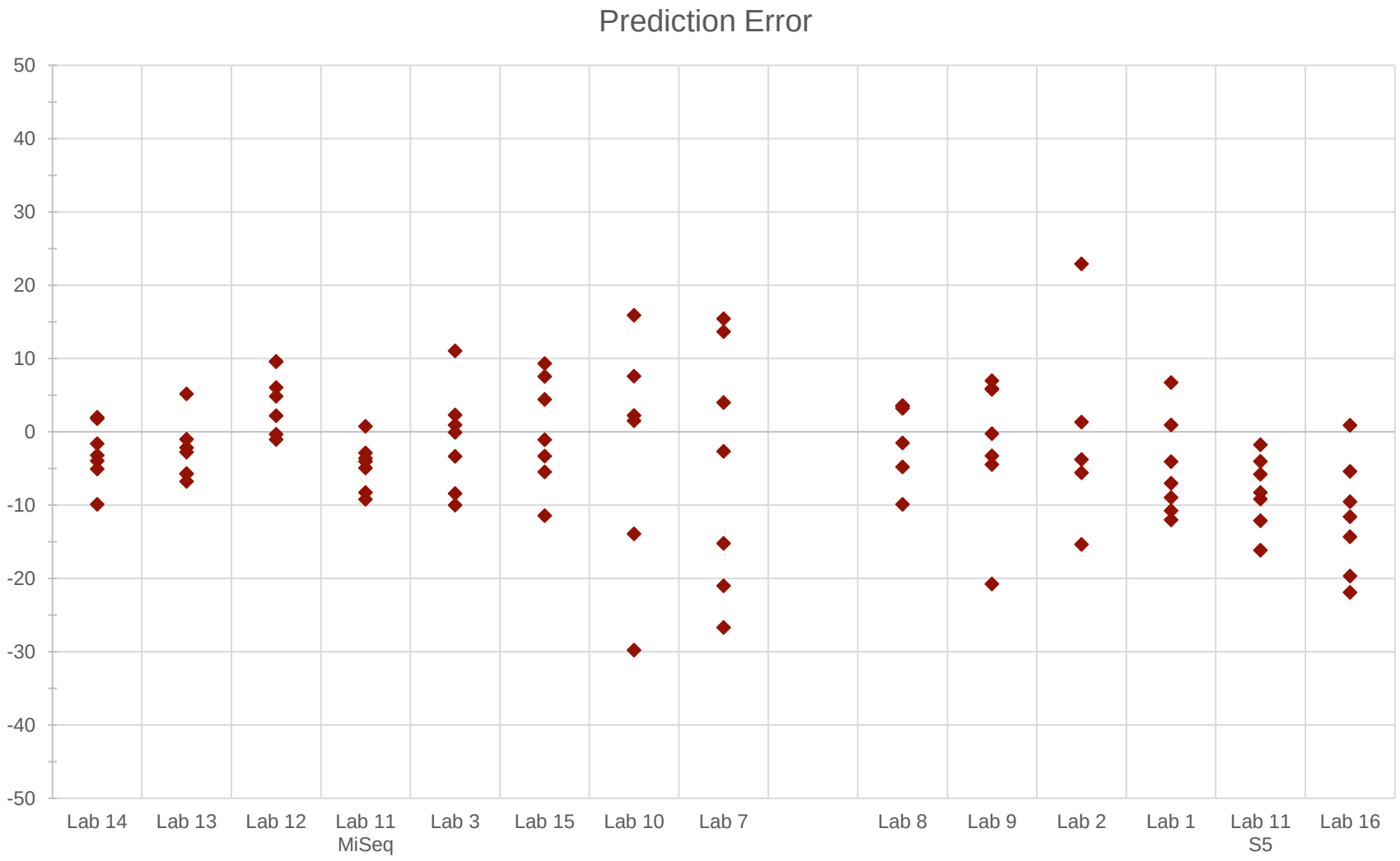
Prediction Results from EDNAP Laboratories



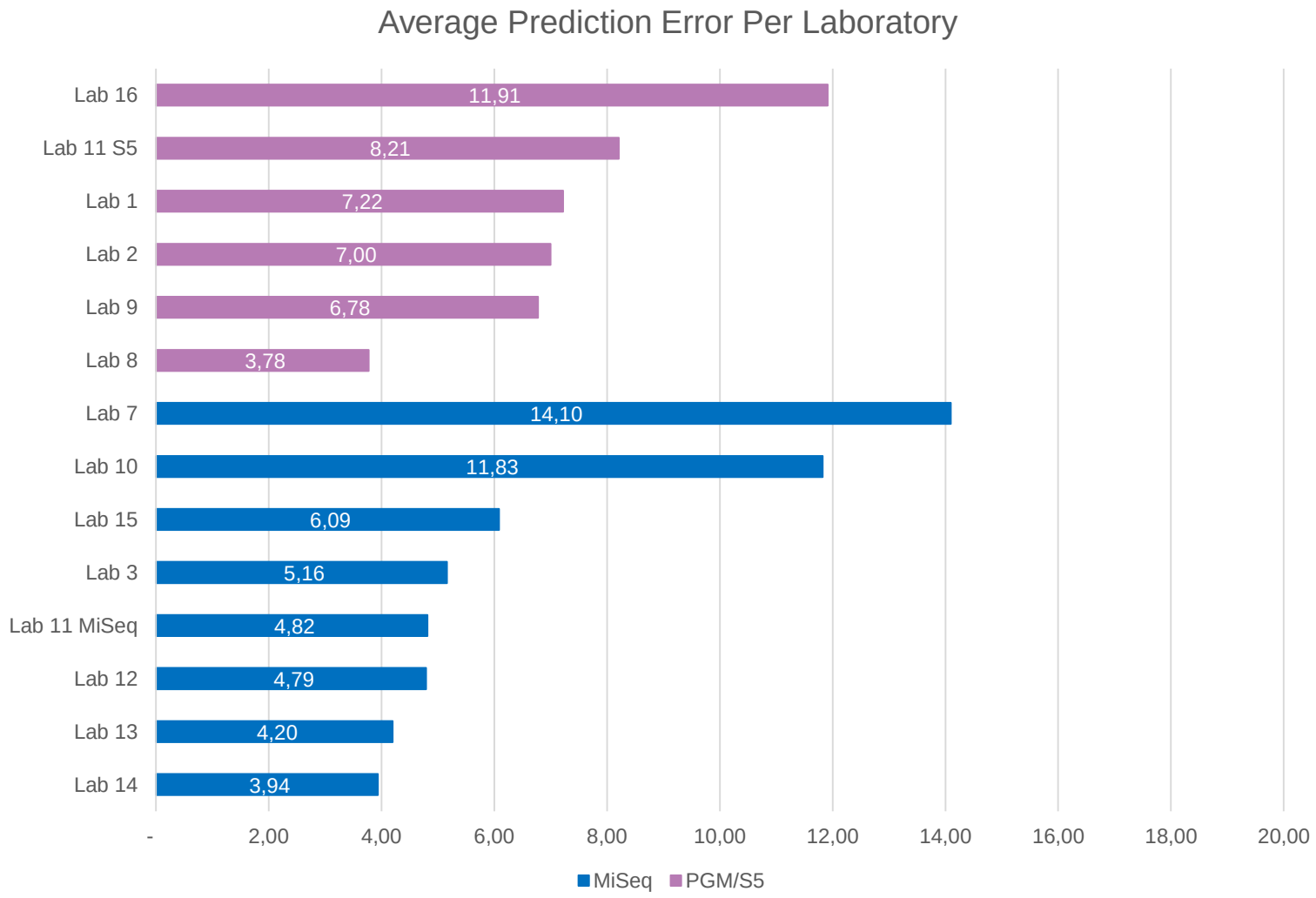
Prediction Results from EDNAP Laboratories



Combined prediction results from EDNAP labs for samples A-G



Combined prediction results from EDNAP labs for samples A-G



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EUROFORGEN / EDNAP mRNA NGS exercise 2

Assay for body fluid/tissue identification & cSNPs

Cordula Haas / Sabrina Ingold / Guro Dørum
Erin Hanson / Jack Ballantyne

25. April 2017, Vilnius

Collaborative exercise mRNA NGS part 2

- only **MiSeq** laboratories (1/2 library kit left from exercise 1)
- targeted **mRNA** NGS approach for the identification of blood, saliva, semen, vaginal secretion, menstrual blood, skin and **cSNPs** assay to associate specific mRNA transcripts to an individual (separate assays)
- RNA extraction (manual or kit), DNase treatment, quantification
- Protocols and primerpools will be provided
- Laboratories will analyse 12 samples provided by UZH
- Results (FASTQ files) will be collected and evaluated by UZH

EUROFORGEN-NoE is funded by the European Commission
within the 7th Framework Programme

Timeline

04/2017 Suggestion for Collaborative exercise, part 2 (mRNA & cSNPs)

06/2017 Shipment of samples, primers, protocols

09/2017 Submission of results

10/2017 Presentation of results at next EDNAP meeting

→ **We will contact the MiSeq laboratories who participated in Exercise 1 directly**

EUROFORGEN-NoE is funded by the European Commission within the 7th Framework Programme

Best wishes from Zurich!

EUROFORGEN-NoE is funded by the European Commission
within the 7th Framework Programme

Recent advances and future perspectives of the European Forensic Genetics Network of Excellence

Theresa Gross
on behalf of
Prof. Dr. Peter M. Schneider
Institute of Legal Medicine
University Hospital of Cologne

EDNAP meeting, Vilnius,
Lithuania, 25th April 2017

EUROFORGEN-NoE is funded by the European Union
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Topics

- **The short term fellowship program**
- **Free online website resources**
  - Publications
  - Videos
  - „Making Sense“ guide
- **Members‘ area online resources**
  - Publications for downloading
  - Resources on ethical, legal and social aspects
  - Online Training Academy
- **Future perspectives**
- **Social media**

EUROFORGEN-NoE is funded by the European Union
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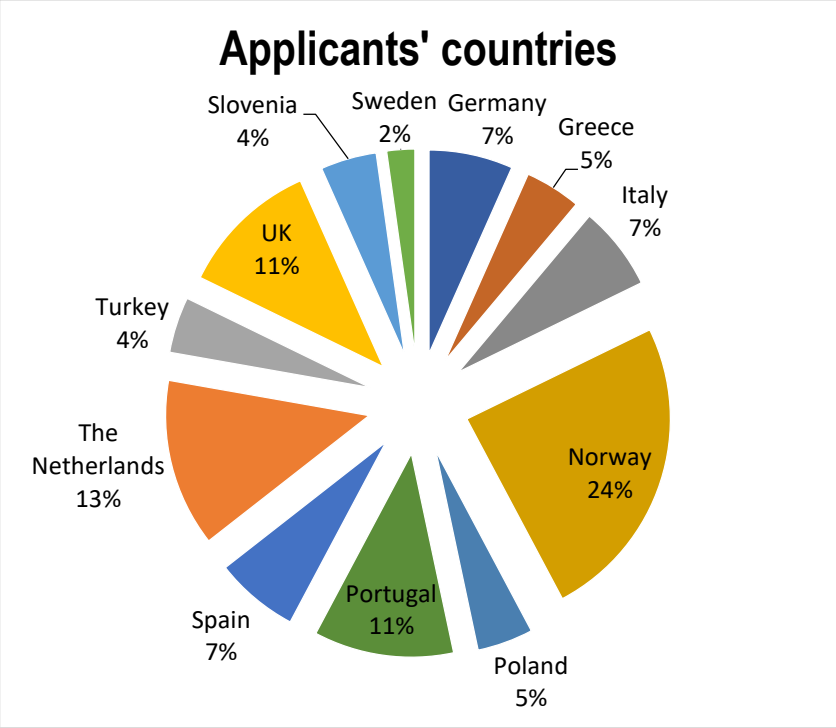
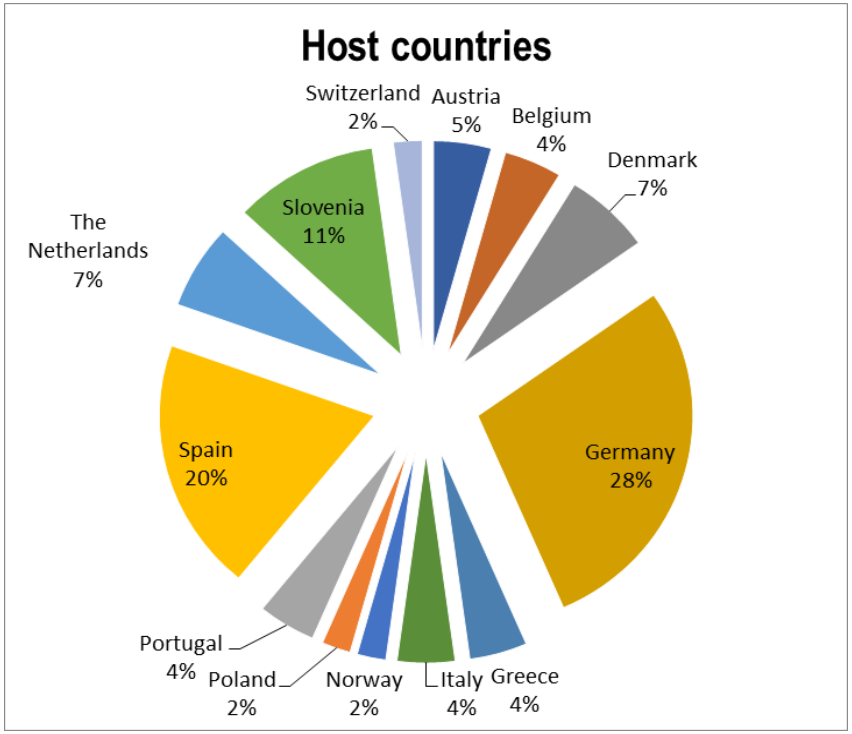
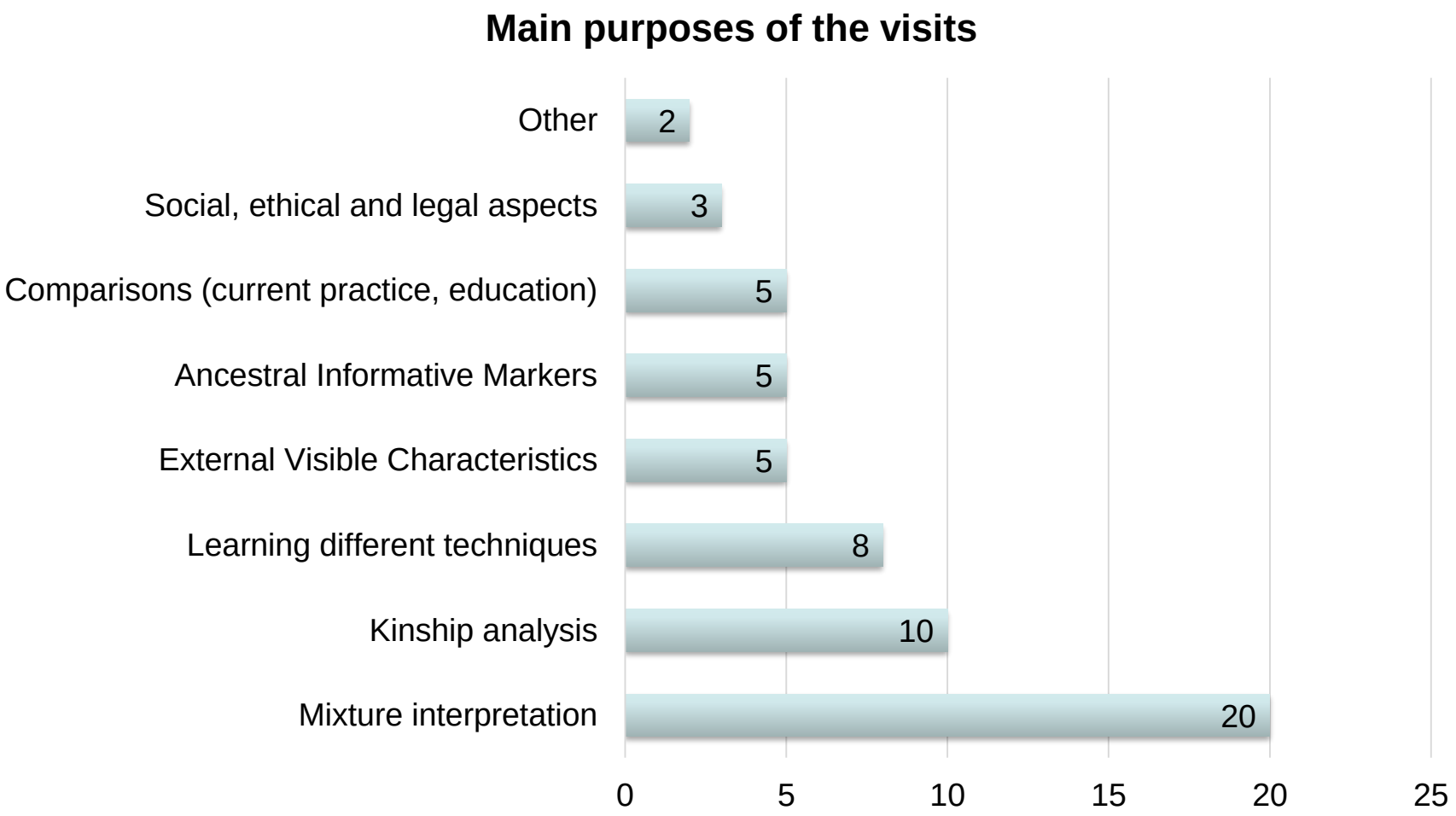
The Short Term Fellowship Program

- 45 fellowships awarded to applicants from 12 countries, visiting host labs or workshops in other 13 countries





The Short Term Fellowship Program



EUROFORGEN-NoE is funded by the European Union
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No more EUROFORGEN funding - are there any other fellowships offered?

- The **ISFG** is offering up to 10 travel fellowships for scientists to support transnational exchange visits annually between collaborating research groups for specific projects related to forensic genetics.
- Each fellowship includes financial support for travel and accommodation of up to **EUR 1,000 for visits within the same continent, and EUR 2,000 for visits from continent to continent.**
- Applicants must be ISFG members and have to submit a written application.
- See *https://www.isfg.org/Members+Area/Overview*

ISFG International Society for Forensic Genetics

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Recent research publications

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Project publications

The original articles listed below have been published in scientific journals, and mainly describe results from Work Package 3. In case of co-authorship, the work of one or several of the contributing authors has been funded by EUROFORGEN-NoE.

2016

A 17-month time course study of human RNA and DNA degradation in body fluids under dry and humid environmental conditions.

International journal of legal medicine. 2016 Nov;130(6):1431-1438

Authors: Sirker M, Schneider PM, Gomes I

PubMed.gov

Newsletter (3/2016)

Dowload here

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Recent research publications

- Ø. Bleka et al.: EuroForMix: An open source software based on a continuous model to evaluate STR DNA profiles from a mixture of contributors with artefacts. FSI Genetics. 2016; 21:35-44

- M. Eduardoff, T.E. Gross et al.: Inter-laboratory evaluation of the EUROFORGEN Global ancestry-informative SNP panel by massively parallel sequencing using the Ion PGM™. FSI Genetics. 2016; 23:178-89

- M. Sirker et al.: A 17-month time course study of human RNA and DNA degradation in body fluids under dry and humid environmental conditions. Int. J. Legal Med. 2016;130:1431-1438

- M. Sirker et al.: Evaluating the forensic application of 19 target microRNAs as biomarkers in body fluid and tissue identification. FSI Genetics. 2017; 27:41-49

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Recent consortium publications

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Information on Consortium publications

Welcome to the project dissemination site! Here you can find most recent Consortium publications authored by EUROFORGEN project partners:

'A Guide to Legal and Ethical Principles and Practices in Forensic Genetics'

Dr Denise Syndercombe Court, Kristiina Reed, Prof Robin Williams and Dr Matthias Wienroth

Since their first appearance in the 1980's, forensic DNA profiling technologies have become an increasingly important aspect of criminal, security, and mass disaster investigations. This has been made possible by a combination of technical, organizational and legislative developments which include improvements in DNA extraction and analysis processes, the establishment of national and international laboratory standards, judicial acceptance of the robustness of DNA evidence, and the growth of national forensic DNA databases as a means of storing, searching and comparing crime scene DNA profiles with profiles obtained from known individuals and retained under a variety of legal regimes. This EUROFORGEN deliverable exemplifies the view of

Newsletter (3/2016)

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Recent research publications

- ‘A Guide to Legal and Ethical Principles and Practices in Forensic Genetics’ D. Syndercombe Court, K. Reed, R. Williams, M. Wienroth
- ‘A comparative audit of legislative frameworks within the European Union for the collection, retention and use of forensic DNA profiles’ K. Reed, D. Syndercombe Court
- ‘Public perspectives on established and emerging forensic genetics technologies in Europe’ R. Williams, M. Wienroth
- 'Ethical, Social and Policy Aspects of Forensic Genetics: A Systematic Review‘ R. Williams, M. Wienroth
- ‘A state-of-the-art description of handling biological evidence from crime scene to court room’ The EUROFORGEN Consortium
- All publications available on EUROFORGEN website

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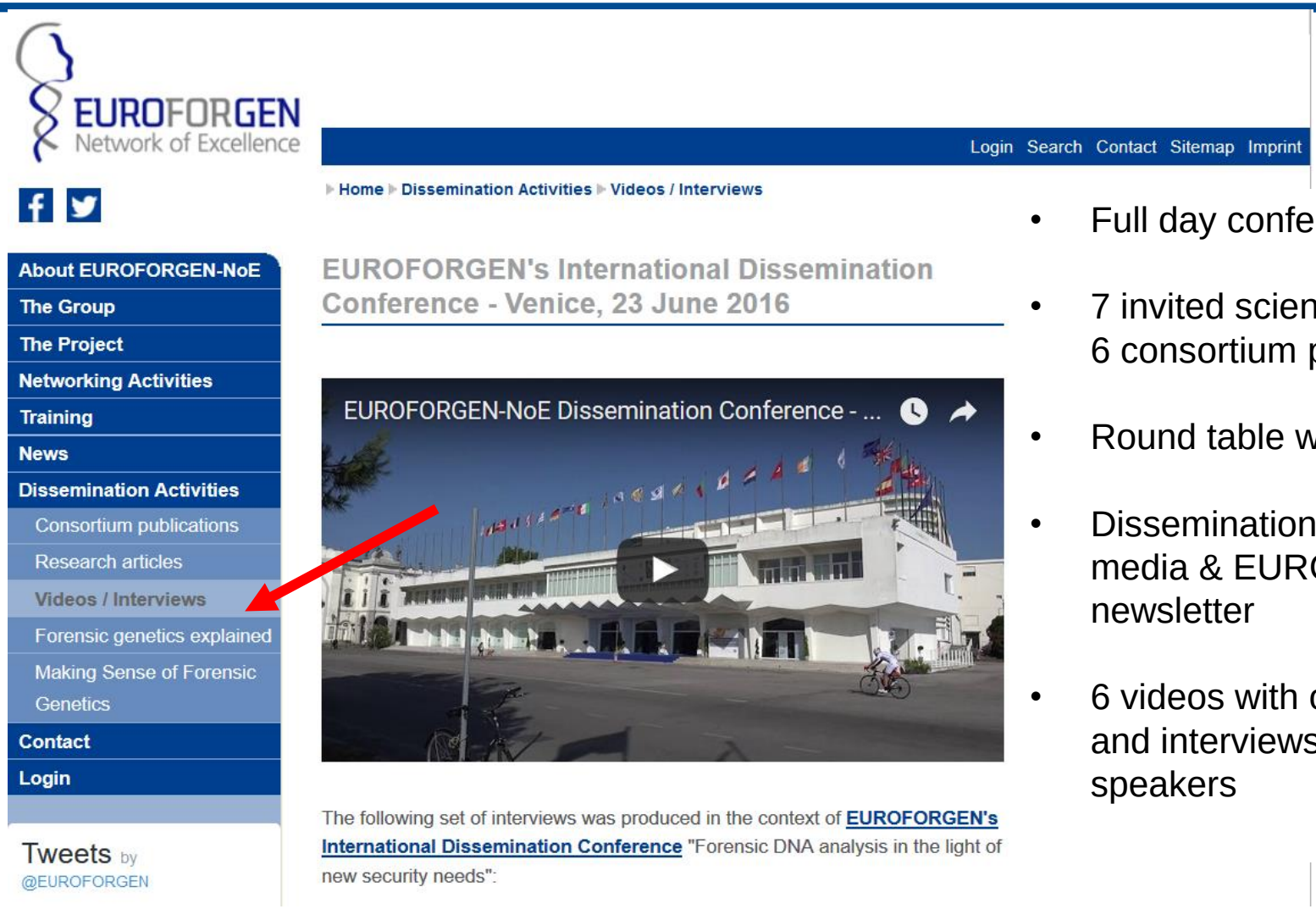
Venice 2016: Dissemination Conference



- Full day conference (9-18 h)
- 7 invited scientists and 6 consortium partners
- Round table with 6 speakers
- Dissemination via social media & EUROFORGEN newsletter
- 6 videos with overview and interviews with 5 speakers

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„Forensic Genetics explained“

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The following set of videos was produced by different EUROFORGEN partners and presents a variety of interesting "Questions and Answers" on Forensic Genetics:

- Iva Gomes/Theresa Groß/Miriam Sirker (UHC): **DNA identification I**
  Languages: **English**, **German**, **Spanish**, **Portuguese**
- Iva Gomes/Theresa Groß/Miriam Sirker (UHC): **DNA identification II**
  Languages: **English**, **German**, **Spanish**, **Portuguese**
- Marielle Vennemann/Hannah Holtkötter/Kristina Schwender (WWU):
  Presumptive test for blood: Kastle-Meyer
  Presumptive testfor semen: Phosphatase
- Gordula Haas/Sabrina Ingold (UZH): **mRNA as a tissue-specific forensic genetic marker**
- Manfred Kayser (Erasmus MC): **Forensic Use of Y chromosome DNA**
- Walther Parson (IMU): **When to use mitochondrial DNA in forensic genetics**
- Tomasz Kupiec (JU): **DNA from bones**
  Languages: **English**, **Polish**
- Manuel Fondevila (USC): **What is meant by “prediction of biogeographic ancestry”?**
- Manuel Fondevila (USC): **¿Qué entendemos por determinación del origen biogeográfico?**
- María de la Puente (USC): **What are the advantages of multialellic SNPs in identity testing?**
- Vania Pereira/Marie-Louise Kampmann (UCPH): **Forensically relevant NGS technologies**
- Ewelina Pospiech (JU): **What is Forensic DNA Phenotyping?**
- Athena Vidaki (Erasmus MC): **Age prediction in forensic genetics**
- Guro Dorum/Navreet Kaur (UMB): **The prosecutors fallacy & defence lawyers fallacy**
- Rafaela Granja (USC): **What is ”Familial searching”?**

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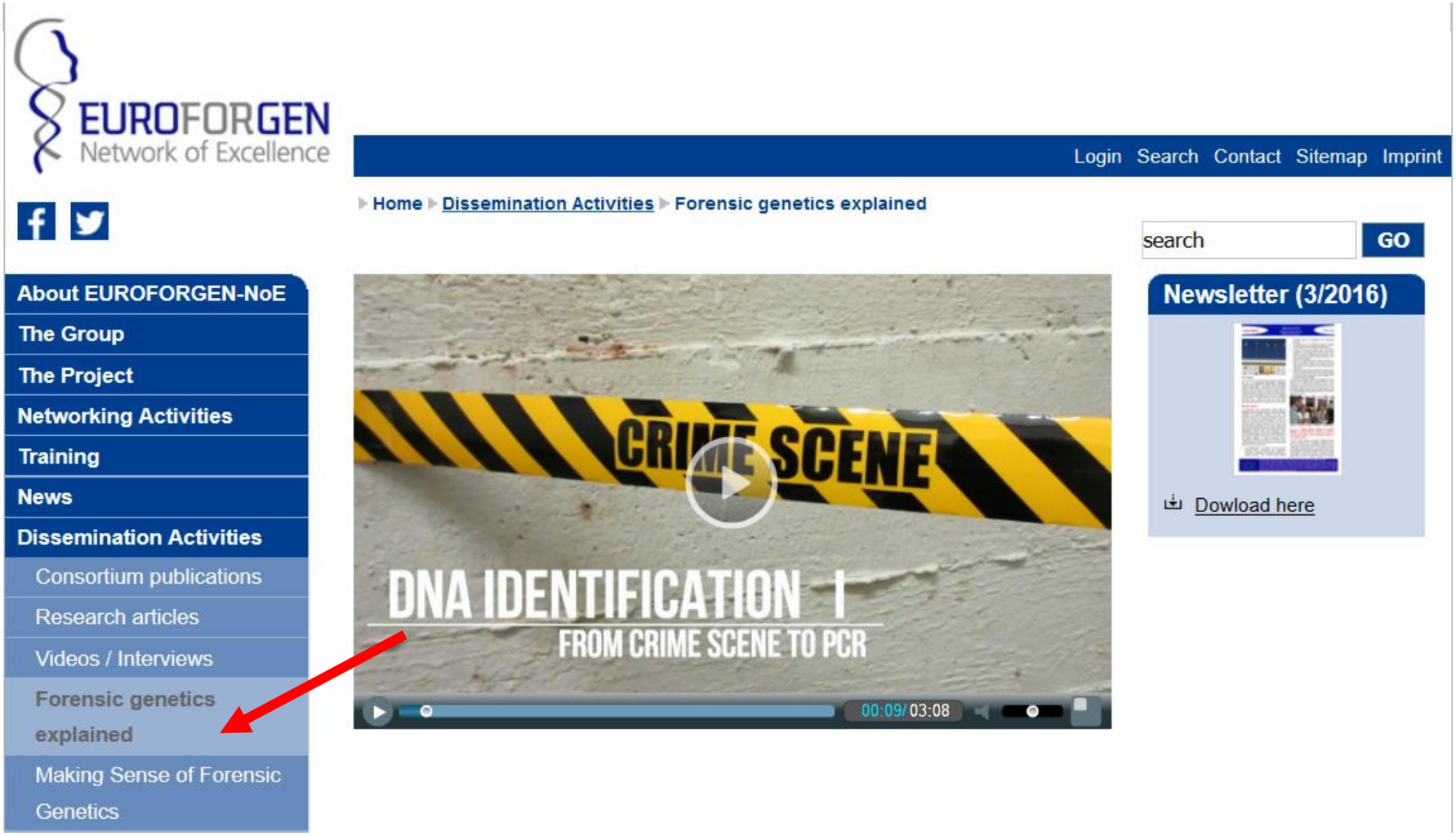

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„Making Sense of Forensic Genetics“

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Making Sense of Forensic Genetics

What can DNA tell you about a crime?

DNA is present in most cells of our body. It is unique to each of us, and we leave a trail of it everywhere we go. Forensic investigators take advantage of this, using our DNA to draw conclusions about where we've been and who we've interacted with. DNA analysis has revolutionised forensic science. However, forensic experts have raised concerns that how DNA can be used in criminal investigations and in court is often misunderstood and misrepresented.

EUROFORGEN researchers have invited the UK charity organization „Sense about Science“ to work on a public engagement project, to address these misconceptions and produce *Making Sense of Forensic Genetics*. This guide

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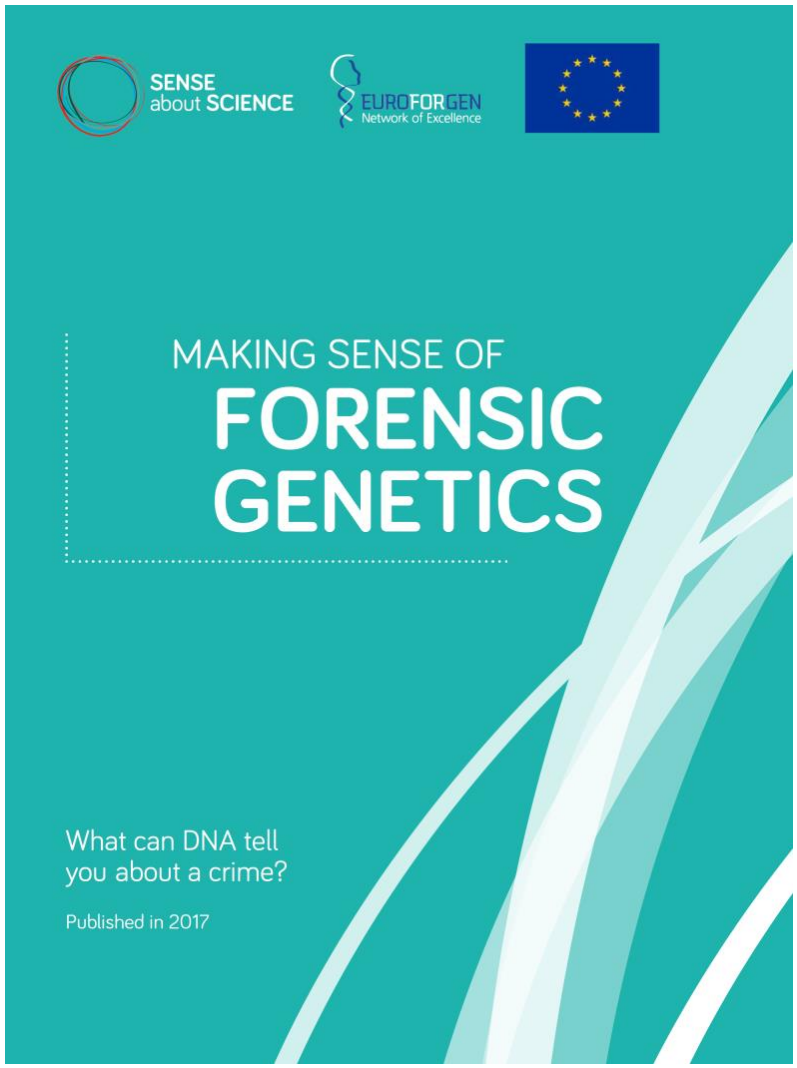
„Making Sense of Forensic Genetics“



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01 What can we detect? 8

DNA can come from almost all types of biological sources and is analysed using a variety of techniques. Which technique investigators choose depends on the amount of DNA available and the questions they are trying to answer. As forensic DNA techniques have developed over time, their ability to detect smaller and smaller amounts of DNA has increased. This has brought justice to the perpetrators of unsolved crimes, but it also raises the risk of wrongful acquittals and convictions if appropriate safeguards are not in place.

02 Where can we detect DNA? 14

Our DNA is everywhere. We're constantly shedding it, passing it to other people, and moving it around. This means that sometimes DNA detected at a crime scene has nothing to do with the crime. Because of this, investigators need to consider when and how DNA might have been deposited onto a surface or object.

03 Context is key 17

DNA doesn't solve crimes in isolation. DNA profiling is an effective investigative tool to be used within the wider context of all other evidence in a case.

04 What are DNA databases for? 21

Matching DNA profiles from crime scene material with those stored in DNA databases has been one of the most significant innovations in crime fighting in recent history, providing vital intelligence and saving police forces time and money. However, the use of DNA databases has also raised concerns about privacy, data security, and fairness.

05 The meaning of a match 25

Not all DNA matches are equally informative. Just because DNA from a crime scene matches a suspect's DNA, this doesn't necessarily mean they contributed it. Crime stain DNA is often missing some of the markers needed to generate a full DNA profile; in such cases several people may be a 'match', but none may be the contributor. For this reason forensic scientists often employ statistics to convey the meaning of the strength of the evidence.

06 Predicting appearance and biogeographic ancestry from DNA 28

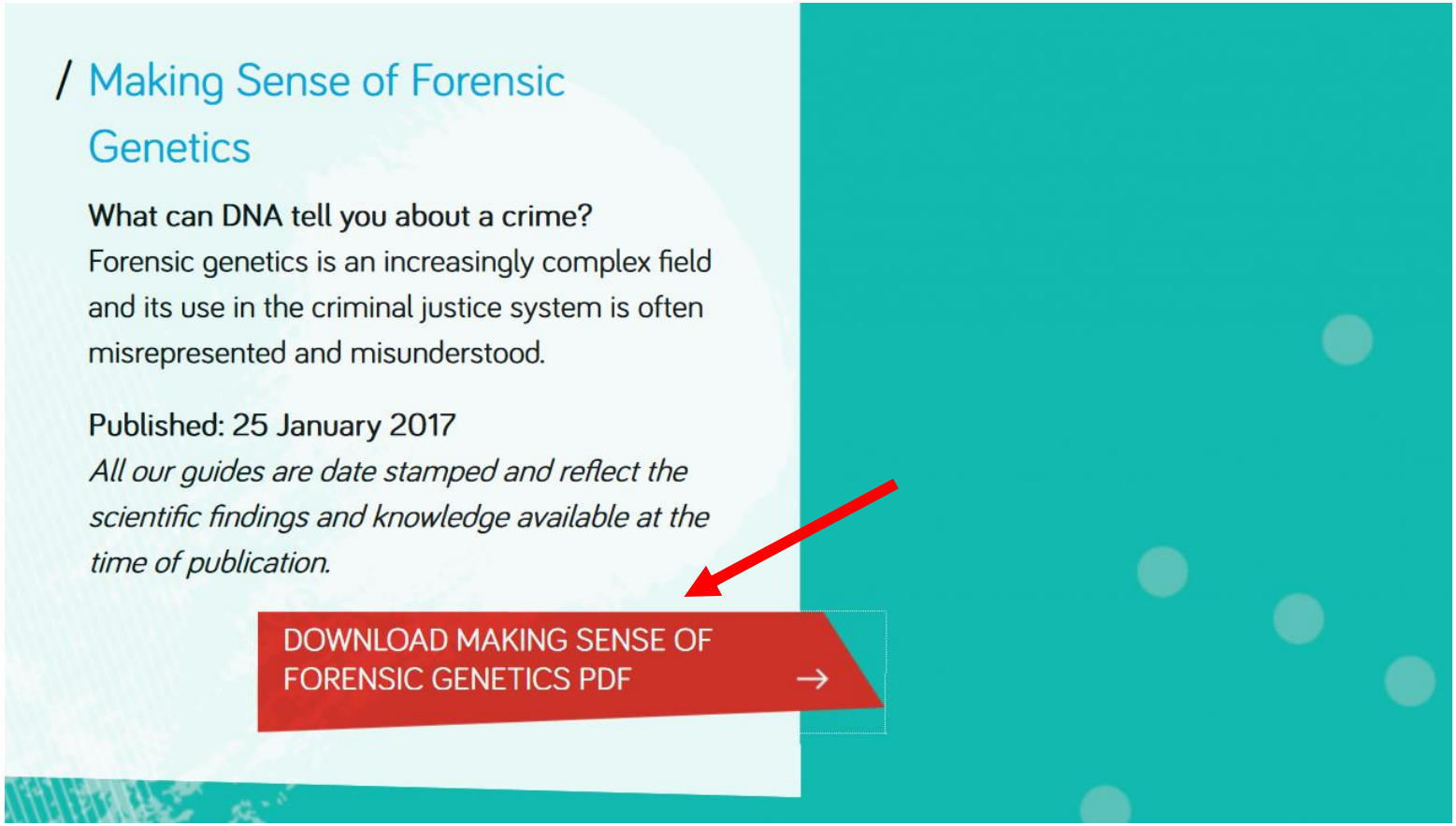
The latest advances in forensic genetics enable externally visible characteristics such as hair or eye colour to be predicted from someone's DNA. This could be a powerful investigative tool, but the possibilities of what is currently achievable have sometimes been exaggerated.

07 Delving deeper 37

More information and sources.

„Making Sense of Forensic Genetics“

http://senseaboutscience.org/activities/making-sense-of-forensic-genetics/



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The Virtual Institute of Research for Forensic Genetics

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European Virtual Institute of Research in Forensic Genetics - access query

You are interested in becoming a member of the European Virtual Institute of Research in Forensic Genetics?

If you are a scientist working at a forensic genetics laboratory, or a professional working in an institution of the justice system, you are invited to join the Virtual Institute. Please see our Newsletter 3/2014 for further details.

Please enter your personal contact data, and the data of your institution below. We will verify your request and come back to you in the following days.

One requirement to get access to the EUROFORGEN-NoE Virtual Institute of Research in Forensic Genetics is the participation of your institution by submitting the EUROFORGEN-NoE questionnaire.

Your EUROFORGEN-NoE team.

- **Dedicated "for members only" area of website**
  - Accessible after individual registration to obtain a user name and password
  - All colleagues working in institutions who have submitted their contact data with a questionnaire will be admitted
  - Please do not hesitate to inquire if you are not sure about the participation of your lab!

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Virtual Institute for Forensic Genetic Research in Europe

Our website will provide a framework for exchange of expertise and data, not only between consortium members but with any other individuals or institutions working in forensic genetics in Europe. It will bring together the knowledge and resources centered on forensic genetics tools and education at a European level, and allow researchers, forensic practitioners, stakeholders and legal experts to interact with the network. Currently, the following resources are available:

- **EUROFORGEN Course Material:** Up-to-date lectures and presentations on major topics of forensic genetics derived from the "Train the Trainers" workshop series.
- **EUROFORGEN publications:** Original publications from EUROFORGEN Consortium members available for downloading.
- **Ethical, Legal and Social Aspects of Forensic Genetics:** a selection of the most significant commentaries on forensic genetic policies and practices relevant to the topic in question.
- **Recommended Open Software:** a list with open software tools is displayed together with a brief description on their applications.
- **Online Training Academy - Webinars:** presentations and recordings of the EUROFORGEN webinar series.
- **Online Training Academy - Lectures:** recorded lectures prepared by EUROFORGEN consortium partners on a variety of topics in the field of forensic genetics.

Please use the blog for your feedback, and your suggestions for improvement. The contents will be regularly updated and expanded.

Newsletter (3/2016)

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The Virtual Institute: ELSA Resource Database

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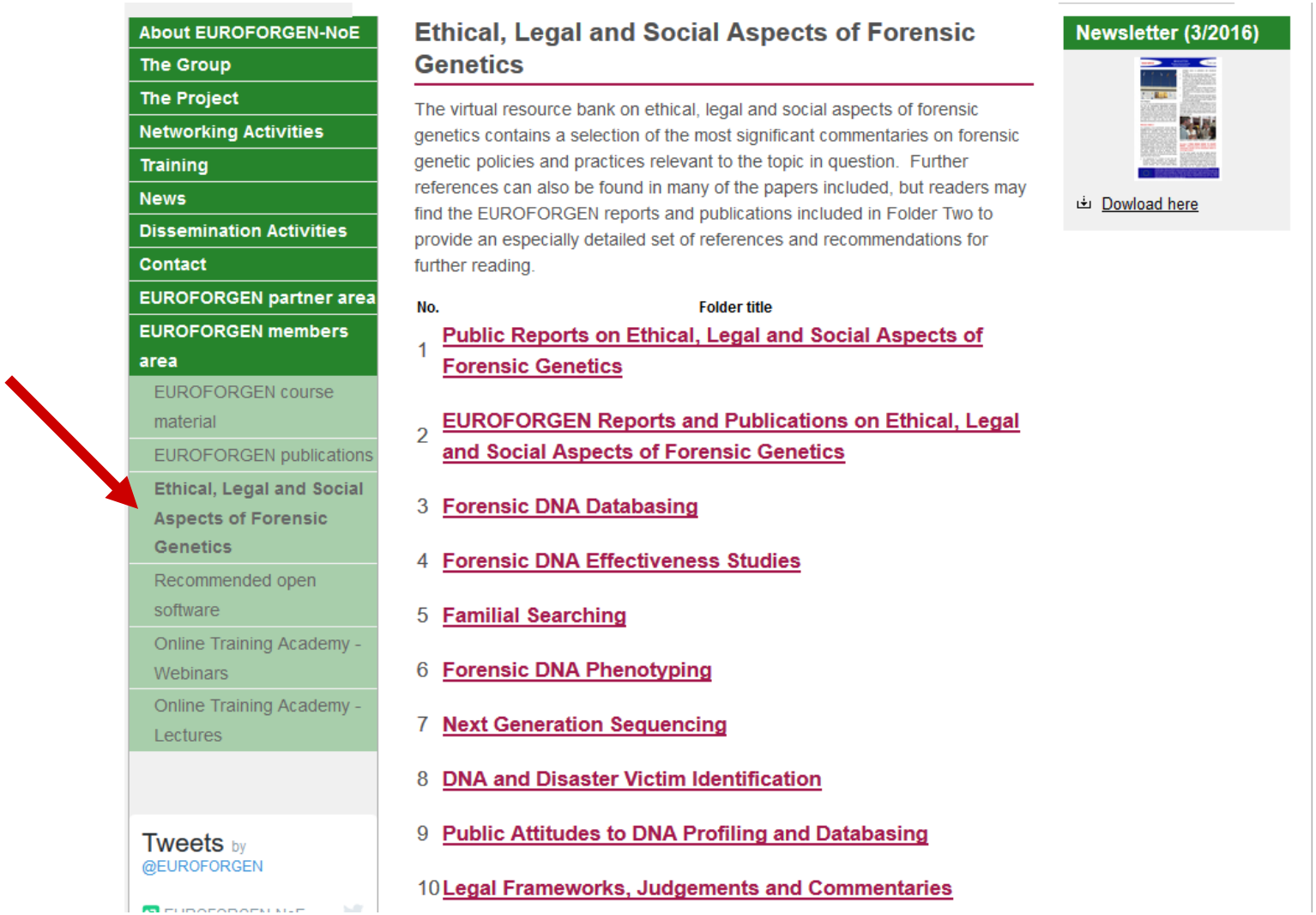

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The Virtual Institute: Online Training Academy - Webinars

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  - Online Training Academy - Lectures

Online Training Academy - Webinars

Below, please find the presentations and recordings of the EUROFORGEN webinar series. Thank you for your interest!

Webinar No. 1: Relationship Inference with Familias

- Date and time: Wednesday, 9th November 2016, 11 a.m. (CET)
- Speaker: Prof. Thore Egeland, Norwegian University of Life Sciences
- Presentation
- Recording

Webinar No. 2: Probabilistic assessment of complex mixtures: validation of software and courtroom experiences

- Date and time: Monday, 21st November 2016, 10 a.m. (CET)
- Speaker: Prof. Peter Gill, Norwegian Institute of Public Health (NIPH)
- Presentation
- Recording

Webinar No. 3: Filosofía de la interpretación de la evidencia de ADN forense y comunicación del valor de la prueba

- Date and time: Monday, 28th November 2016, 3 p.m. (CET)
- Speaker: Prof. Ángel Carracedo, University of Santiago de Compostela (USC)
- Presentation
- Recording

Webinar No. 4: SNPs and Mining Genomic Databases to Know More About Forensic Loci

Newsletter (3/2016)

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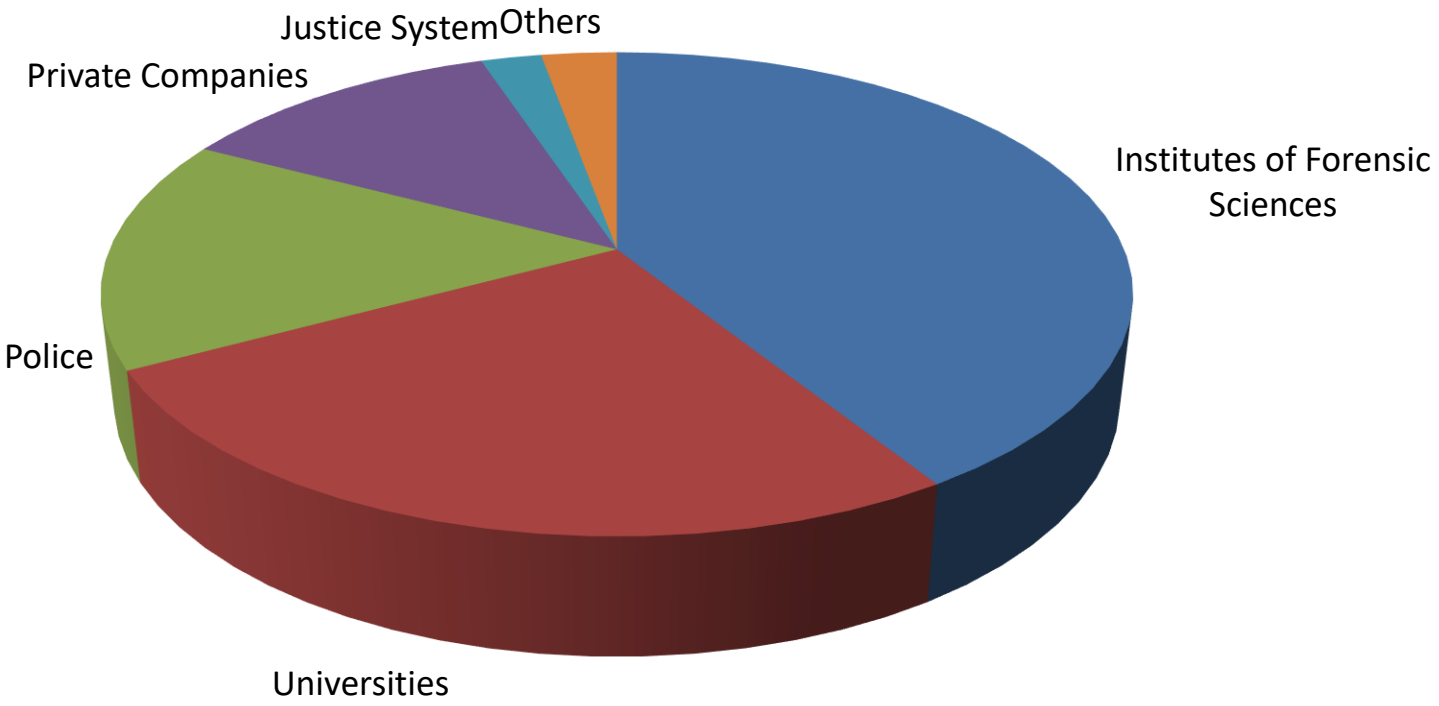
The Virtual Institute:
Online Training Academy - Webinars

- 5 webinars with 495 participants from 40 countries



The Virtual Institute:
Online Training Academy - Recorded Lectures

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  - **Online Training Academy - Lectures**

Online Training Academy - Recorded Lectures

Below, please find further recorded lectures prepared by EUROFORGEN consortium partners on a variety of topics in the field of forensic genetics:

- Titia Sijen (NFI): **Prevalence on human cell material: DNA and RNA profiling, public and private objects and activity scenarios**
- Titia Sijen (NFI): **Body fluid and Organ typing throughout mRNA profiling**
- Manfred Kayser (Erasmus MC): **Forensic use of Y chromosome DNA**
- Walther Parson (IMU): **Quality Control in Forensic Mitochondrial Genetics**
- Walther Parson (IMU): **Mitochondrial DNA Alignment**
- Wojciech Branicki (JU): **Predictive DNA analysis (in Polish)**
- Wojciech Branicki (JU): **Predictive DNA analysis (in English)**
- Peter Gill (NIPH): **Presenting DNA evidence in court, focus: role of the expert witness in an adversarial system**
- Marielle Vennemann (WWU): **Presenting DNA evidence in court, focus: inquisitorial system**
- Denise Syndercombe Court (KCL): **The UK National DNA Database**
- Øyvind Bleka (NIPH): **Several lectures, tutorials and practical sessions on the use of the probabilistic software for mixture interpretation "EuroForMix"**

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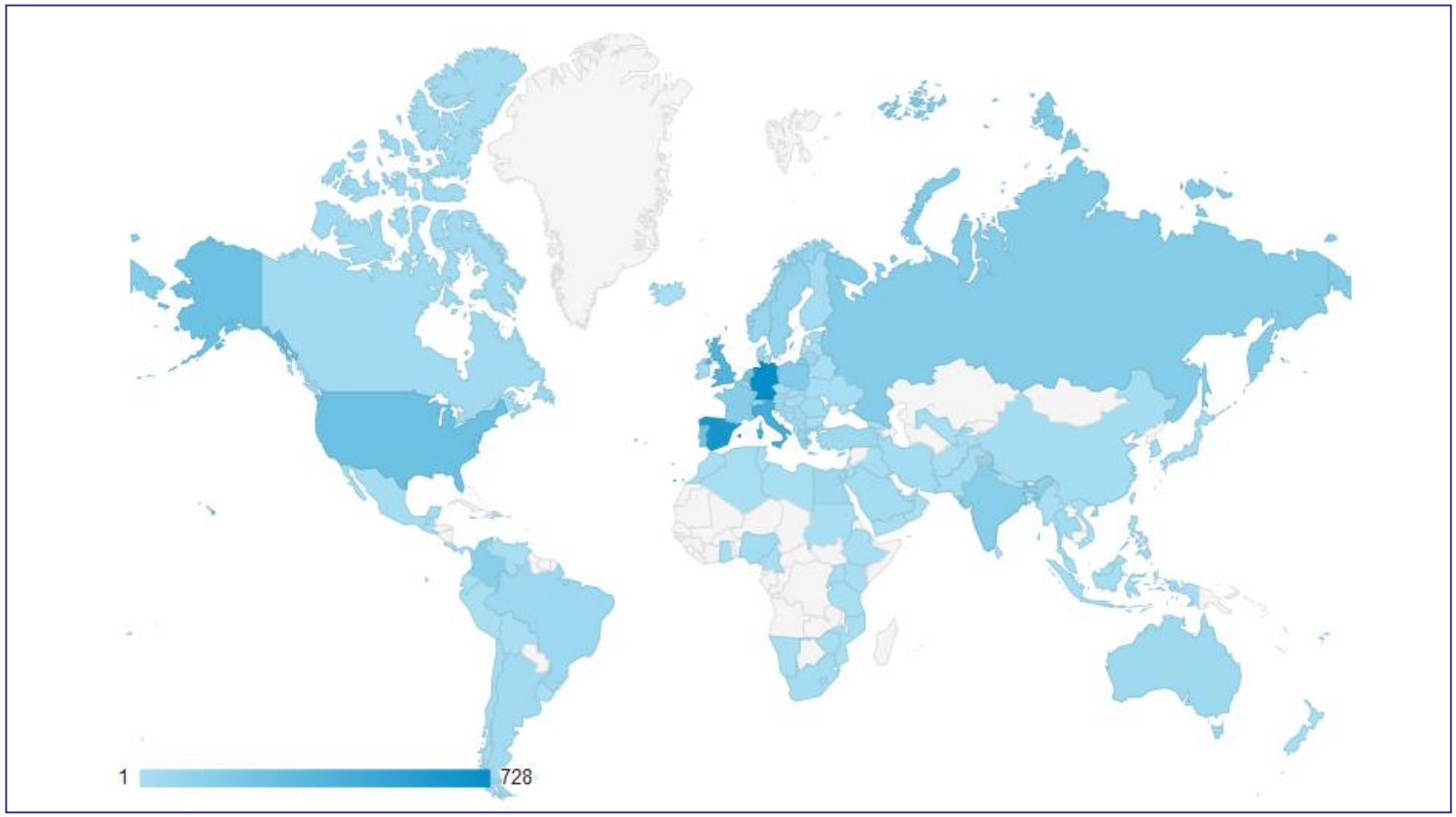
EUROFORGEN Website – Visitors (Oct. 2015 – Dec. 2016)

- 5,651 visits with an average session duration of 7 min 10 sec.
- Average 5.81 pages opened per session (sessions under 2 seconds excluded)
- 58.73 % of all visits (3,319) were new visitors



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- **Introducing the first EUROFORGEN Summer School**
  - scheduled for **July 17-21, 2017**, to take place in **Santiago de Compostela, Spain**
  - Audience: Students of Law and Biomedical Sciences, Judiciary, Police personnel at different educational levels
  - Covering relevant basic and advanced topics in forensic genetics
  - Not funded by EC, moderate tuition fees will be charged
- **The EUROFORGEN Summer School will continue**
  - Taking place annually at changing locations in Europe
  - Addressing the needs of the community
  - Supporting the platform of the Virtual Institute of Research in Forensic Genetics in collaboration with EDNAP and ISFG

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Future perspectives

- EUROFORGEN-NoE will continue to serve the forensic genetics community by
  - Integrating its activities into the framework of the ISFG, starting a series of open educational summer schools
  - the first EUROFORGEN Summer School scheduled for July 17-21, 2017, to take place in Santiago de Compostela
  - Providing advanced training resources to CEPOL and ENFSI
  - Maintaining online educational and training resources
  - Supporting academic educational programs
- Dissemination activities will continue with support from all network members
  - Non-English language versions of “Making Sense” guide in preparation

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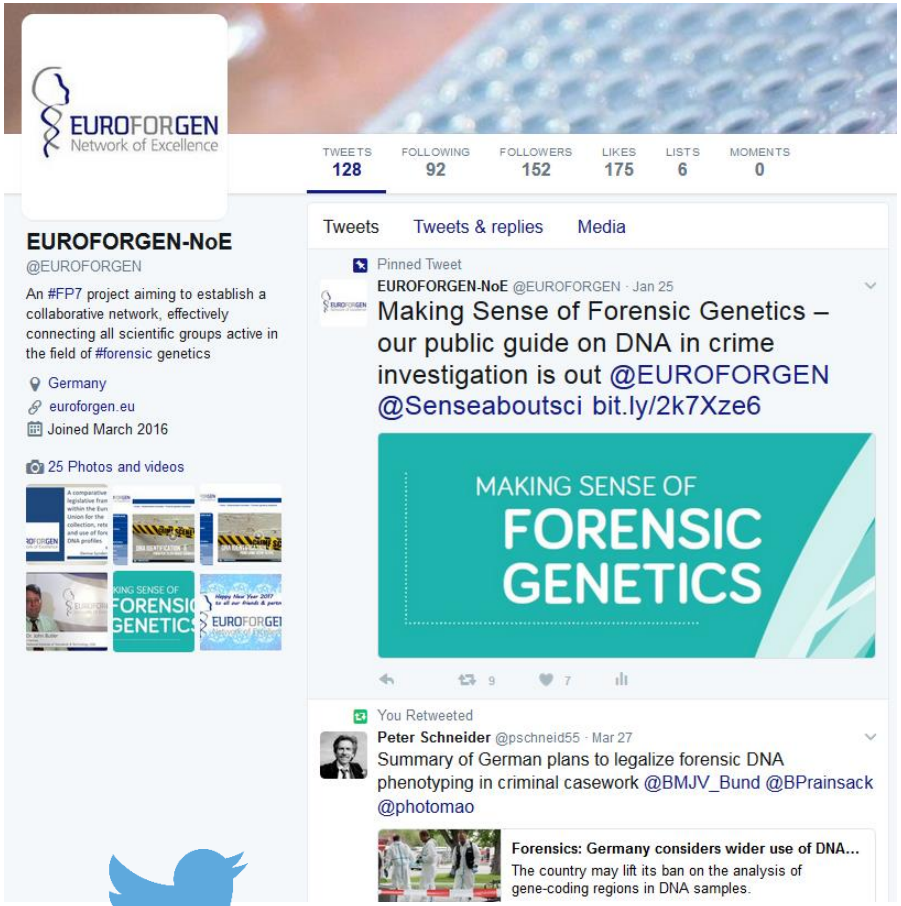
Social media



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Thank you very much for your attention!

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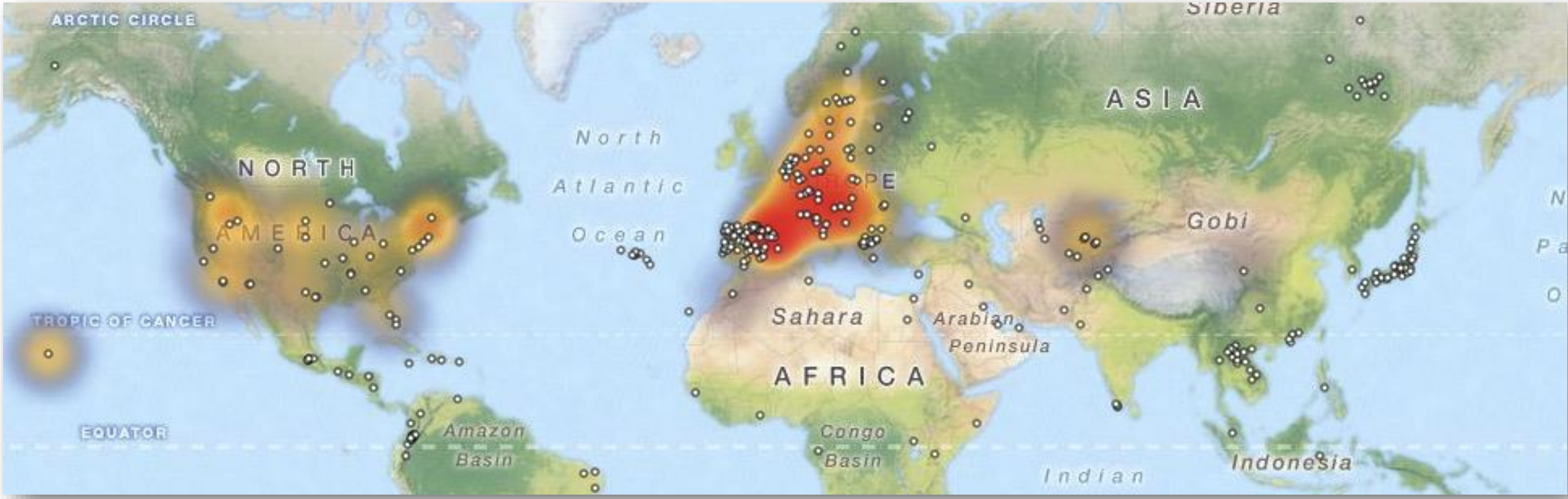


new URL
https://empop.online/

EMPOP Update

Dr. Walther Parson
assoc. Prof. Institute of Legal Medicine, Medical University of Innsbruck, Austria
adj. Prof. Forensic Science Program, Penn State University, PA, USA
walther.parson@i-med.ac.at

EMPOP

Publications

Meetings

New alignment software

1. Desmyter, S., et al. (2016). "Hairy matters: MtDNA quantity and sequence variation along and among human head hairs." Forensic Sci Int Genet **25**: 1-9.

2. Gandini, F., et al. (2016). "Mapping human dispersals into the Horn of Africa from Arabian Ice Age refugia using mitogenomes." Sci Rep **6**: 25472.

3. Heupink, T. H., et al. (2016). "Ancient mtDNA sequences from the First Australians revisited." Proc Natl Acad Sci U S A **113**(25): 6892-6897.

4. Serin, A., et al. (2016). "Mitochondrial DNA control region haplotype and haplogroup diversity in South Eastern Turkey." Forensic Sci Int Genet **24**: 176-179.

5. Turchi, C., et al. (2016). "The mitochondrial DNA makeup of Romanians: A forensic mtDNA control region database and phylogenetic characterization." Forensic Sci Int Genet **24**: 136-142.

6. Rathbun, M. M., et al. (2017). "Considering DNA damage when interpreting mtDNA heteroplasmy in deep sequencing data." Forensic Sci Int Genet **26**: 1-11.

7. Weiler, N. E., et al. (2017). "A collaborative EDNAP exercise on SNaPshot-based mtDNA control region typing." Forensic Sci Int Genet **26**: 77-84.

Meetings 2016/2017

1. NGS workshop AAFS, Las Vegas, NV USA, Feb 2016
2. Haploid Markers 2016, Berlin, Germany, May 2016
3. EMPOP workshop Stettin, Poland, Sep 2016
4. EMPOP workshop Rio de Janeiro, Brazil, Oct 2016
5. EMPOP course CODIS Meeting, Norman, OK Nov 2016
6. SWGDAM Meeting, Fredericksburg, VA, Jan 2017
7. EMPOP workshop GEDNAP Meeting, Giessen, Germany, Feb 2017

EMPOP workshop Rio de Janeiro

Upcoming meetings

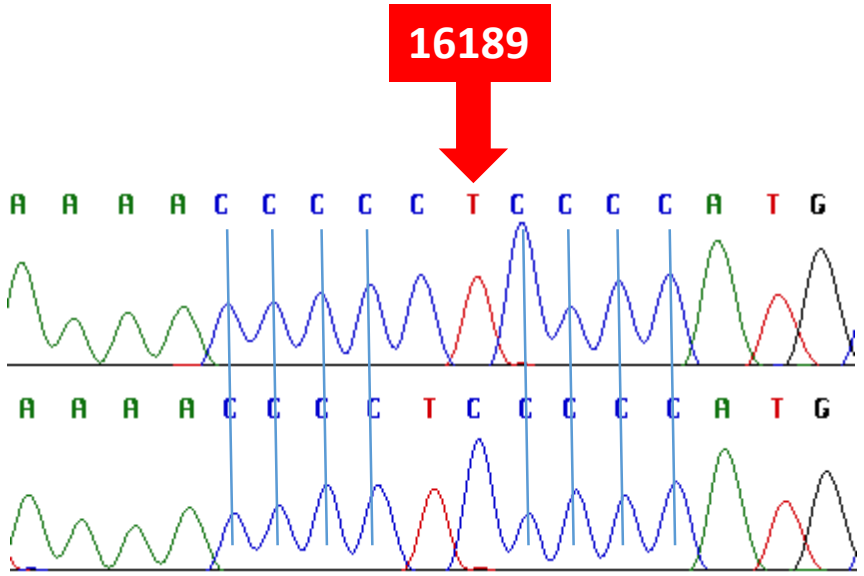
EMPOP workshop ISFG world conference Seoul, S-Korea, Aug 2017

EMPOP workshop NFI, Sep 2017

Haploid Markers 2018, Bydgoszcz, Poland, May 2018

Development of software for automated phylogenetic alignment of mitochondrial DNA sequences

Sequence alignment can be ambiguous

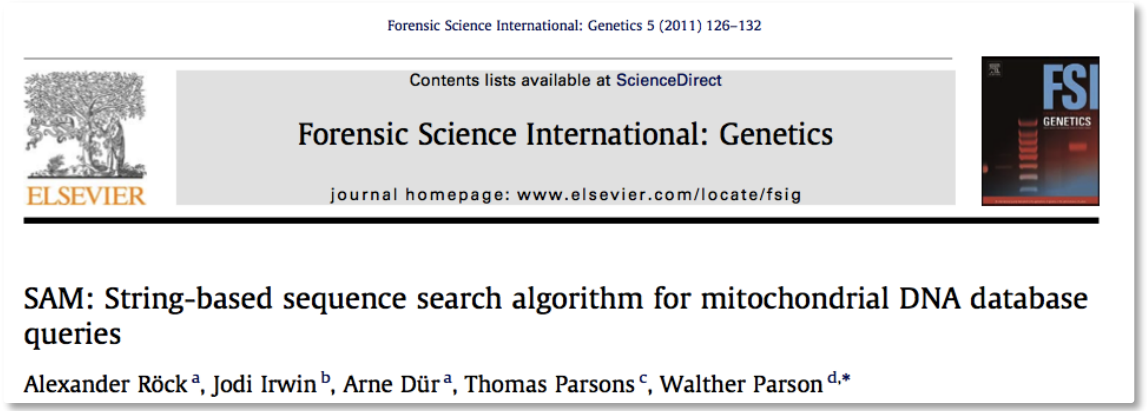


Alignment 1	=	Alignment 2
16188T 16189C		16188- 16193+C

Effect of alignment on database searches

Search method	Alignment 1	Alignment 2
rCRS-coded	28 matches	0 matches

EMPOP V3 R11; N = 34,617


Forensic Science International: Genetics 5 (2011) 126–132

Contents lists available at ScienceDirect

Forensic Science International: Genetics

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

ELSEVIER

SAM: String-based sequence search algorithm for mitochondrial DNA database queries

Alexander Röck [a], Jodi Irwin [b], Arne Dür [a], Thomas Parsons [c], Walther Parson [d,*]

Search method	Alignment 1	Alignment 2
SAM	28 matches	28 matches

EMPOP V3 R11; N = 34,617

The **S**tring **A**lignment **M**ethod (SAM) guarantees that sequences are found in EMPOP regardless of the alignment

Reporting is disentangled from **database** searches

BUT
This does not solve the lack of harmonized and consistent alignment of mtDNA, which some labs require

We have developed a new version of SAM that turns FASTA strings back in phylogenetic alignment as suggested by Bandelt and Parson 2008

Bandelt and Parson (2008) Consistent treatment of length variants in the human mtDNA control region: a reappraisal, Int J Legal Med 122:1-21

Rule 1. Phylogenetic rule

Rule 2. Anchor 16189 and 310

Rule 3. 3' alignment

2013 Adopted by SWGDAM

2014 Recommended by ISFG

Problem of unweighted Maximum Parsimony

Maximum Parsimony Creates Jumping Alignment

Phylogenetic Alignment

	USA031	USA067	
7 mutations	16111T	16111T	8 mutations
	16189C	16189C	
		16191.1C	
	16192T	16192T	
	16223T	16223T	
	16290T	16290T	
	16319A	16319A	
	16362C	16362C	

One difference

Max Parsimony

	USA031	USA067	
7 mutations	16111T	16111T	7 mutations
	16189C	16189C	
	16192T	16192.1T	
	16223T	16223T	
	16290T	16290T	
	16319A	16319A	
	16362C	16362C	

Two differences

Maximum Parsimony Creates Jumping Alignment

Phylogenetic Alignment

	motif a	motif b	
4 mutations	…	…	3 mutations
	16183C	16183C	
	16188T	16188T	
	16189C	16189C	
	16193-		
	…	…	

One difference

Max Parsimony

	motif a	motif b	
1 mutation	…	…	3 mutations
	16183-	16183C	
		16187T	
		16189C	
	…	….	

Four differences

New Alignment Software - SAMCost

SAM

- converts **rCRS-coded haplotypes** to **FASTA-like strings**
- performs **unaligned search** with database FASTA-like strings
- outputs search results for **matches** and **neighbors**

SAMCost

- outputs phylogenetic rCRS-coded haplotype
- (performs haplogrouping; currently done with EMMA)

Phylogenetic Alignment with SamCost

- Under this model, the database user would **not be required** to have a precise knowledge of the phylogeny used in the database
- SamCost **removes nomenclature subjectivity** on the user's side, **standardizes database searches** and **standardizes phylogenetic alignment**

Phylogenetic Alignment with SamCost

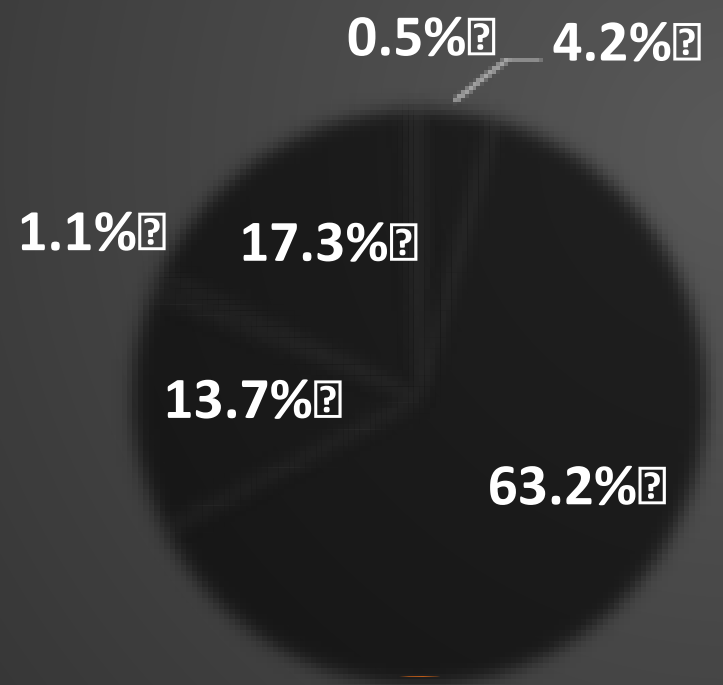
- **Alignment** and **nomenclature** is based on the **phylogeny** of mtDNA
- Based on accepted phylogenetic alignment rules (Bandelt and Parson, 2008)
- SAMCost approximates phylogeny using **Maximum Likelihood**
- SAMCost uses updated **Phylotree** nomenclature

SAMCost Alignment Results Using EMPOP

Description	# of samples	Percentage
Total # of samples	34,617	100
# of unchanged alignments	34,427	99.45
# of changed alignments*	**190**	**0.55**

* changing alignments mainly due to ambiguous conventions in regions where mutation rate is too high for consistent phylogenetic signature

Alignment changes grouped by region (n=190)



around position 60

around position 310

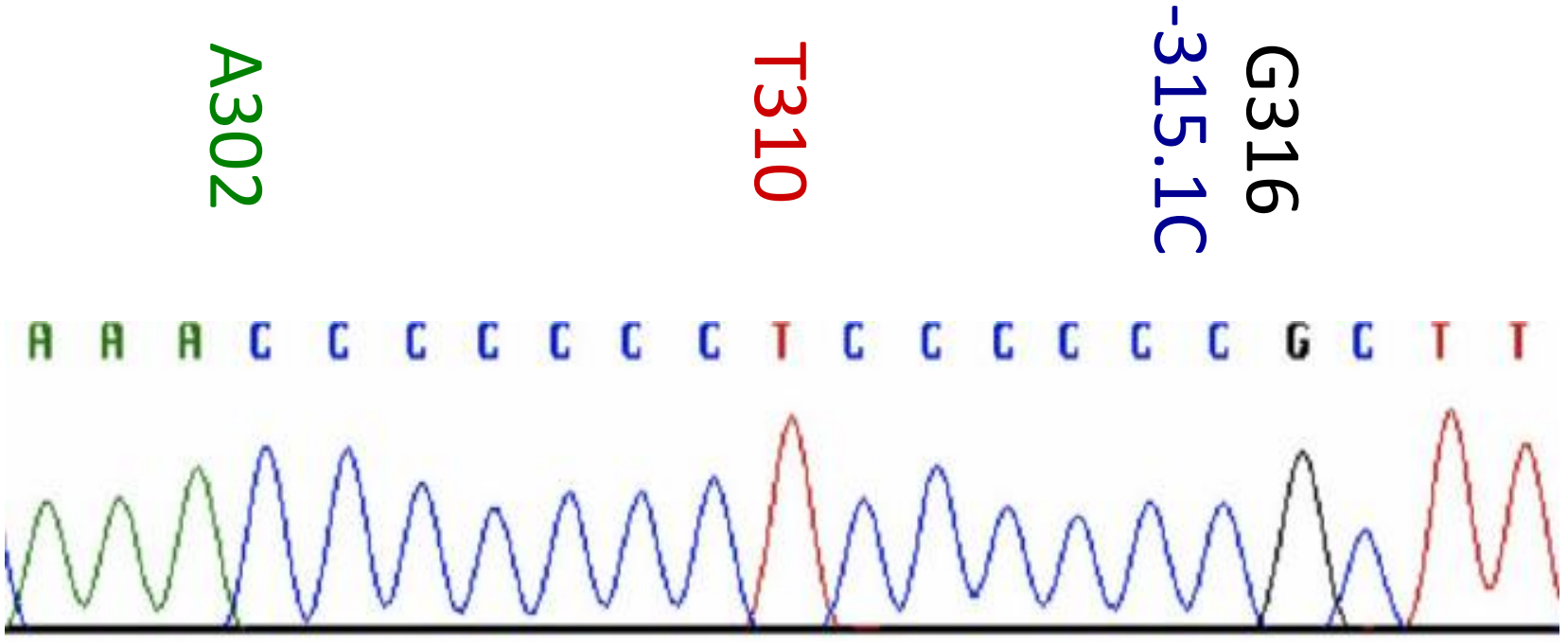
around position 455

around position 960

around position 16189

around position 16260

SamCost Alignment Changes Around 310C



SamCost Alignment Changes Around 310C

AAACCCCCCCTCCCCCGCTT	rCRS
AAACCCCCCCTCCCCCCGCTT	315.1C (99.8% T310; R11)
Current alignment	
AAACCCCCCCCCCCCCGCTT	310C
AAACCCCCCCCCCCCGCTT	310C 315-
AAACCCCCCCCCCCGCTT	310C 315- 314-
AAACCCCCCCCCCGCTT	310C 315- 314- 313-

SamCost Alignment Changes Around 310C

Alignment and nomenclature around **310C** is currently ambiguous and **not harmonized**

e.g. 310-, 309- 310-, etc …

New convention in accordance with cost model:
place deletions (due to reduction of C-stretch) **around 309**, because this region already harbours indels

e.g. 309- 309+C 309+CC, etc …

SamCost Alignment Changes Around 310C

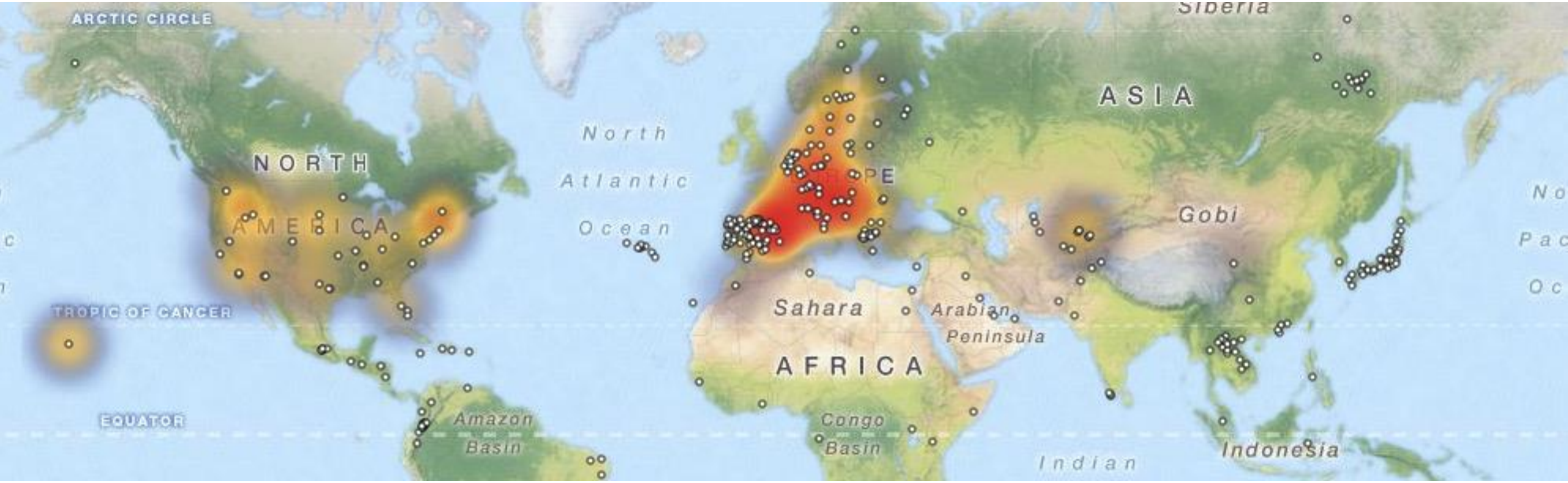
Old convention	New convention
310C	309- 310C 315+C
310C 315-	308- 309- 310C 315+C
310C 315- 314-	307- 308- 309- 310C 315+C
310C 315- 314- 313-	306- 307- 308- 309- 310C 315+C

SamCost Alignment Changes Around 310C

- (Phylogenetic law) *Sequences should be aligned with regard to the current knowledge of the phylogeny. In the case of multiple equally plausible solutions, one should strive for maximum (weighted) parsimony. Variants flanking long C tracts, however, are subject to extra conventions in view of extensive length heteroplasmy.*
- (C tract conventions) *The long C tracts of HVS-I and HVS-II should always be scored with 16189C and 310C, respectively, so that phylogenetically subsequent interruptions by novel C to T changes are encoded by the corresponding transition. Length variation of the short A tract preceding 16184 should be notated in terms of transversions.*
- (Indel scoring) *Indels should be placed 3′ with respect to the light strand unless the phylogeny suggests otherwise.*

Bandelt and Parson 2008

Automated phylogenetic mtDNA sequence alignment



Dr. Walther Parson
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New developments - “SAMCost”

SWGDAM laboratories evaluated SAMCost results and sent observations/questions to EMPOP (March 22, 2017)

Currently evaluated by EMPOP - feedback soon

Summary

- Database searches should be performed in **alignment-free** format to **guarantee** that matching haplotypes are **not missed** due to nomenclature
- Still, mtDNA haplotypes are communicated **relative** to the **rCRS**
- The forensic community has agreed on the **phylogenetic alignment** of mtDNA haplotypes (e.g. ISFG, SWGDAM, ENFSI, EDNAP)
- **Manual** phylogenetic alignment is **subjective** and prone to error
- We suggest **harmonization** of phylogenetic alignment supported by software
- This requires **adaptation** of conventions in length variant regions.
- Need to test **robustness** experimentally

Acknowledgements

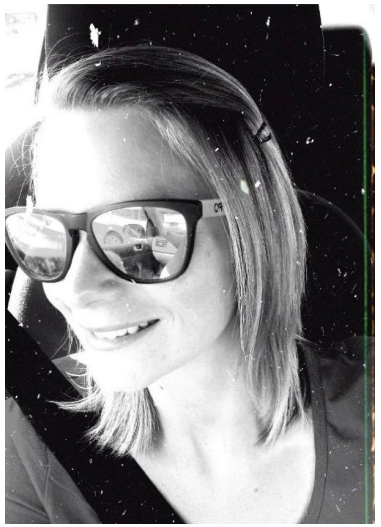
R. Scheithauer

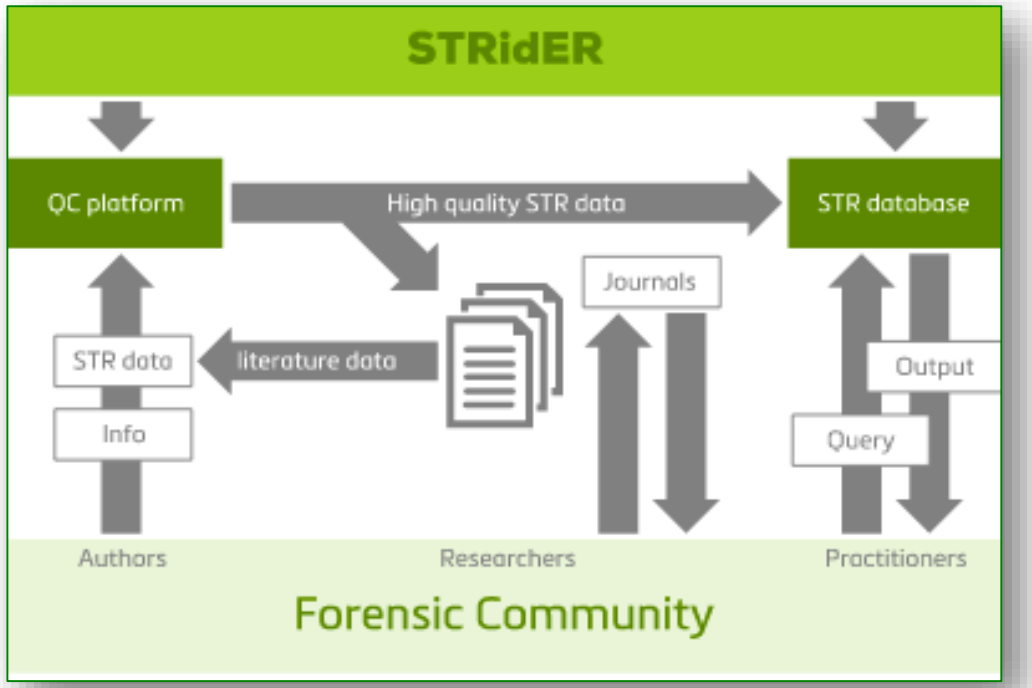
CR and mitogenome

EMPOP database

ISFG Commission on mtDNA
EMPOP collaborators

Arne Dür
Gregor Kofler
IT Team Innsbruck
EMPOP Team Innsbruck
Nicole Huber





D8S1179

Allele	AUSTRIA	BELGIUM	BOSNIA AND HERZEGOWINA	CZECH REPUBLIC	DENMARK	FINLAND	FRANCE	GERMA
	222	206	171	200	200	230	208	
8	1.8018e-2	7.2816e-3	5.8480e-3	7.5000e-3	1.5000e-2	1.7391e-2	2.4039e-2	1.2840
9	1.8018e-2	1.2136e-2	8.7719e-3	5.0000e-3	1.0000e-2	8.6956e-3	9.6154e-3	1.2840
10	9.4595e-2	8.7379e-2	5.8479e-2	5.5000e-2	9.7500e-2	8.2609e-2	8.4135e-2	8.7613
11	1.0135e-1	9.7087e-2	3.2164e-2	1.0000e-1	8.0000e-2	1.3261e-1	8.8942e-2	7.7795
12	1.6216e-1	1.5049e-1	1.8713e-1	1.5250e-1	1.3000e-1	1.3261e-1	1.3462e-1	1.4199
13	2.9054e-1	3.1311e-1	3.4210e-1	3.5000e-1	3.4500e-1	3.5217e-1	3.1490e-1	3.1269
14	1.9144e-1	1.6990e-1	2.1637e-1	2.1250e-1	2.0750e-1	1.8478e-1	2.0433e-1	1.9864
15	1.0360e-1	1.2379e-1	1.1403e-1	9.7500e-2	8.5000e-2	5.6522e-2	1.0336e-1	1.1933
16	1.8018e-2	3.3981e-2	3.2164e-2	2.0000e-2	2.0000e-2	1.5217e-2	3.6058e-2	3.0211
17	2.2522e-3	4.8544e-3	2.9240e-3		5.0000e-3	1.0870e-2		6.0423

STRidER Update

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GMI DNA STRidER

STRidER

STRs for Identity ENFSI Reference database, v2

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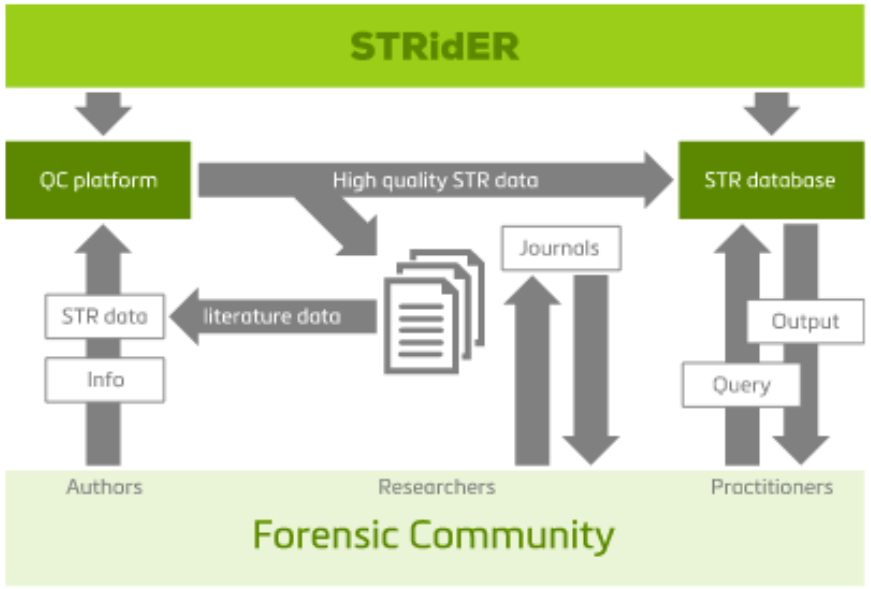
Welcome to STRidER!

STRidER (**STRs** for **I**dentity **E**NFSI **R**eference Database) is the expanded and enhanced version of the ENFSI STRbASE (2004-2016). This curated online high quality STR allele frequency population database enables scientifically reliable **STR genotype probability estimates** and provides **quality control** of autosomal STR data. A suite of software tools has been developed at the Institute of Legal Medicine, Medical University of Innsbruck (LINK: https://gerichtsmedizin.at/) to scrutinize STR population data and thus increase the quality of datasets to ensure reliable allele frequency estimates. STRidER acts as **frequency database and software platform** for the development of novel tools for STR data QC and other forensic analyses.

STRidER serves the STR community in forensics and beyond in inter-related ways:

- The high-quality autosomal STR allele frequency database can be directly queried
- Allele frequency tables of STR loci from diverse populations can be downloaded and used for third party software
- Centralized STR data quality control is offered prior to publication
- Accepted datasets will become rapidly available online and receive a unique and traceable STRidER accession number
- Allele frequencies and forensic/population genetic parameters are calculated from datasets
- Individual STR genotypes are not accessible on STRidER to comply with privacy regulations



STRidER in the field of forensic STR typing (from Bodner et al. 2016)

The **concept of STRidER** has been developed together with the DNA Commission of the ISFG) and is outlined in *Bodner M, Bastisch I, Butler JM, Fimmers R, Gill P, Gusmão L, Morling N, Phillips C, Prinz M, Schneider PM, Parson W (2016) Recommendations of the DNA Commission of the International Society for Forensic Genetics (ISFG) on quality control of autosomal Short Tandem Repeat allele frequency databasing (STRidER): Forensic Sci Int Gen 24:97-102.*

The STRidER online platform is work in progress. Additional datasets and features will continuously become available. To receive periodic news and stay updated about STRidER, register here for the STRidER newsletter.

Please consider **citing STRidER** [https://www.isfg.org/Publication;Bodner2016] when using it with your research.

new URL
https://strider.online/

Forensic Science International: Genetics 24 (2016) 97–102

Contents lists available at ScienceDirect

Forensic Science International: Genetics

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

Recommendations of the DNA Commission of the International Society for Forensic Genetics (ISFG) on quality control of autosomal Short Tandem Repeat allele frequency databasing (STRidER)

Martin Bodner[a], Ingo Bastisch[b], John M. Butler[c], Rolf Fimmers[d], Peter Gill[e,f], Leonor Gusmão[g,h,i], Niels Morling[j], Christopher Phillips[k], Mechthild Prinz[l], Peter M. Schneider[m], Walther Parson[a,n,*]

STRidER newsletter

Recommendations of the DNA Commission of the International Society for Forensic Genetics (ISFG) on quality control of autosomal Short Tandem Repeat allele frequency databasing (STRidER)

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Content

I) Positioning STRidER relative to other existing databases (STRbase, ALFRED, pop STR, popAffiliator, ALLST*R); **important element of QC**

II) Rationale, concept and workflow of **QC** via STRidER

III) Benefits to forensic and other scientific community

IV) Transparency, traceability and protection of data

V) Outloook: **STR sequence data** in STRidER (MPS)

NCBI BioProject—STRseq

Mission: To provide high-confidence STR allele sequence records with uniform annotation, facilitating exchange of information across forensic laboratories.

- Collaborators with large datasets “seed” the BioProject
- NIST evaluates raw sequence data with agnostic bioinformatic pipeline
- GenBank record for **all unique sequences**
- BioProject searchable by string (BLAST), locus, allele…

```
LOCUS          AF123456       196 bp  DNA     linear  PRI     19-Jan-2017
DEFINITION     Homo sapien microsatellite D21S11 sequence
ACCESSION      AF123456
VERSION        AF123456.1
DBLINK         BioProject:    PRJNA12345
ORGANISM       Homo sapien
REFERENCE      1 (bases 1 to 196)
AUTHORS        Gettings, K.B., Kiesler, K.M., Steffen, C.R., Borsuk, L.A., and P.M. Vallone.
TITLE          U.S. Population Sequence Data for 27 Autosomal STR Loci, 24 YSTR Loci and 7 XSTR Loci
JOURNAL        Forensic Science International: Genetics
COMMENT        Annotation ("bracketing") of the repeat region is consistent with the guidance of the ISFG (International Society for Forensic
               Genetics), PMID: 26844919. Lower case letters in the bracketed repeat region below (rpt_unit_seq) denote uncounted bases.
               The given length-based allele value was determined using the designated length-based technology. Variation in the length-based
               allele between individuals or assays can result from indels in flanking regions.
               This information is provided as part of the STR Sequencing Project (STRseq), a collaborative effort of the international
               forensic DNA community. The mission of this Project is to provide high-confidence STR allele sequence data and uniform
               characterization, facilitating exchange of information across forensic laboratories and compatibility with preceding
               technology. For questions or feedback, please contact strseq@nist.gov. Allele frequency data can be accessed in the
               strider.online database.

##humanSTR-START##
Sample source          ::     Genomic DNA
Sequencing technology  ::     MiSeq ForenSeq
Coverage               ::     >30X
Length-based allele    ::     28
Length-based tech.     ::     ABI3500xl GlobalFiler
STR locus name         ::     D21S11
STR locus alt. name    ::
Chromosomal location   ::     21q21.1
GRCh38 coordinates     ::     CHR21:19181953-19182149
GRCh38 repeat_region   ::     CHR21:19181973-19182099
##humanSTR-END##

FEATURES       Location/Qualifiers
variation              10..10
                       /db_xref="dbSNP:rs123456"
                       /note="SNP A/C"
repeat_region  21..144
                       rpt_type="tandem"
                       rpt_unit_seq=  "[TCTA]4 [TCTG]6 [TCTA]3 ta [TCTA]3 tca [TCTA]2 tccata [TCTA]10"
                       satellitemicrosatellite="D21S11"
variation              182..182
                       /db_xref="dbSNP:rs12345"
                       /note="SNP C/T"
ORIGIN
1      ATTCCCCAAG TGAATTGCCT TCTATCTATC TATCTATCTG TCTGTCTGTC TGTCTGTCTG
61     TCTATCTATC TATATCTATC TATCTATCAT CTATCTATCC ATATCTATCT ATCTATCTAT
121    CTATCTATCT ATCTATCTAT CTATCGTCTA TCTATCCAGT CTATCTACCT CCTATTAGTC
181    TGTCTCTGGA GAACA
//
```

NCBI BioProject—STRseq and **STRidER**

Collaboration in QC and exchange of data

STRidER


DNA
SeqEx
STR Sequencing & Exchange

Objectives

Promote the implementation of MPS technology for improved STR profiling and international data exchange

Evaluate the impact of STR sequencing on National DNA databases (EU Prüm, CODIS)

Facilitate and standardize forensic STR sequence allele nomenclature

STRidER

STRs for identity ENFSI Reference database, v2

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Kit: Globalfiler

	D3S1358	VWA	D16S539	CSF1PO	TPOX
	Y indel	D8S1179	D21S11	D18S51	DYS391
	D2S441	D19S433	TH01	FGA	
	D22S1045	D5S818	D13S317	D7S820	SE33
	D10S1248	D1S1656	D12S391	D2S1338	

- [x] check/uncheck all
- [x] AUSTRIA
- [x] BELGIUM
- [x] BOSNIA AND HERZEGOWINA
- [x] CZECH REPUBLIC
- [x] DENMARK
- [x] FINLAND
- [x] FRANCE
- [x] GERMANY
- [x] GREECE
- [x] HUNGARY
- [x] IRELAND
- [x] MONTENEGRO
- [x] NORWAY
- [x] POLAND
- [x] SLOVAKIA
- [x] SLOVENIA
- [x] SPAIN
- [x] SWEDEN
- [x] SWITZERLAND

Submit | Clear Form

STRidER

STRs for identity ENFSI Reference database, v2

The CSV file requires *commas (,)* as delimiters and *double quotes (")* as field enclosure characters.
Download a sample CSV file.

File format ◉CSV ○GeneMapper

CSV file Durchsuchen... Keine Datei ausgewählt.

- ☑ check/uncheck all
- ☑ AUSTRIA
- ☑ BELGIUM
- ☑ BOSNIA AND HERZEGOWINA
- ☑ CZECH REPUBLIC
- ☑ DENMARK
- ☑ FINLAND
- ☑ FRANCE
- ☑ GERMANY
- ☑ GREECE
- ☑ HUNGARY
- ☑ IRELAND
- ☑ MONTENEGRO
- ☑ NORWAY
- ☑ POLAND
- ☑ SLOVAKIA
- ☑ SLOVENIA
- ☑ SPAIN
- ☑ SWEDEN
- ☑ SWITZERLAND

Submit

Frequencies

These tables include allele frequencies and number of samples (n) from the most recent database release sorted by marker and country.
In these tables, „1" represents all rare alleles shorter than the accepted allele categories. The value „99" represents all rare alleles longer than the accepted categories.

This data can be downloaded as XML file.

VWA

Allele	AUSTRIA	BELGIUM	BOSNIA AND HERZEGOWINA	CZECH REPUBLIC	DENMARK	FINLAND	FRANCE	GERMANY	GREECE	HUNGARY	IRELAND	MONTENEGRO	NORWAY	POLAND	SLOVAKIA	SLOVENIA	SPAIN	SWEDEN
	222	206	171	200	200	230	208	662	208	224	304	200	202	206	247	207	449	424
11								7.5529e-4										
12									4.8077e-3									
13			1.1696e-2					2.2659e-3	2.4038e-3	2.2321e-3			2.4753e-3		2.0243e-3	2.4155e-3	6.6815e-3	1.1792e-3
14	1.0586e-1	1.0680e-1	1.1111e-1	1.0000e-1	7.0000e-2	1.3043e-1	8.6539e-2	9.7432e-2	9.3750e-2	1.1161e-1	1.1349e-1	1.4500e-1	8.6634e-2	7.7670e-2	1.1943e-1	1.0145e-1	1.1024e-1	9.4340e-2
15	9.2342e-2	1.2136e-1	1.2573e-1	9.7500e-2	9.7500e-2	5.2174e-2	1.2740e-1	1.0347e-1	7.9327e-2	1.1384e-1	1.0197e-1	9.0000e-2	9.9010e-2	8.4951e-2	1.1943e-1	1.2077e-1	1.2361e-1	8.9623e-2
16	1.7568e-1	1.9903e-1	2.0468e-1	1.7500e-1	2.6000e-1	1.7609e-1	2.4038e-1	2.2130e-1	1.6827e-1	2.0536e-1	2.1875e-1	1.7500e-1	2.2277e-1	2.2330e-1	1.9231e-1	1.8599e-1	2.4276e-1	2.0991e-1
17	2.8604e-1	2.7185e-1	2.3977e-1	3.1250e-1	2.3000e-1	2.7174e-1	2.3317e-1	2.5453e-1	3.1731e-1	3.0134e-1	2.7138e-1	2.8750e-1	2.8960e-1	2.7670e-1	2.7530e-1	2.8985e-1	2.7171e-1	2.6533e-1
18	2.5901e-1	2.0146e-1	2.1053e-1	2.2750e-1	2.4000e-1	2.0435e-1	2.1154e-1	2.2054e-1	2.4279e-1	1.7634e-1	1.9243e-1	2.1250e-1	1.9802e-1	2.4757e-1	2.0445e-1	2.1739e-1	1.7038e-1	2.4174e-1
19	7.2072e-2	8.0097e-2	9.0643e-2	7.2500e-2	8.2500e-2	1.3696e-1	8.6539e-2	8.6103e-2	7.4519e-2	7.1429e-2	9.3750e-2	7.2500e-2	8.6634e-2	8.0097e-2	7.6923e-2	5.5556e-2	6.1247e-2	7.9009e-2
20	9.0090e-3	1.9418e-2	5.8480e-3	1.5000e-2	1.7500e-2	2.1739e-2	1.4423e-2	1.2840e-2	1.4423e-2	1.5625e-2	8.2237e-3	1.7500e-2	1.4852e-2	9.7087e-3	1.0122e-2	2.1739e-2	1.3363e-2	1.6509e-2
21					2.5000e-3	6.5217e-3		7.5529e-4	2.4038e-3	2.2321e-3						4.8309e-3		2.3585e-3

TH01

Allele	AUSTRIA	BELGIUM	BOSNIA AND HERZEGOWINA	CZECH REPUBLIC	DENMARK	FINLAND	FRANCE	GERMANY	GREECE	HUNGARY	IRELAND	MONTENEGRO	NORWAY	POLAND	SLOVAKIA	SLOVENIA	SPAIN	SWEDEN
	222	206	171	200	200	230	208	662	208	224	304	200	202	206	247	207	454	425

Formulae

Actual matching probability	
$P_m = 2p_i p_j$	Heterozygotes
$P_m = p_i^2$	Homozygotes

A minimum allele frequency of 5/2n [1] is used for calculations.

[1] National Research Council. (1996) The evaluation of forensic DNA evidence. National Academy Press, Washington D.C.

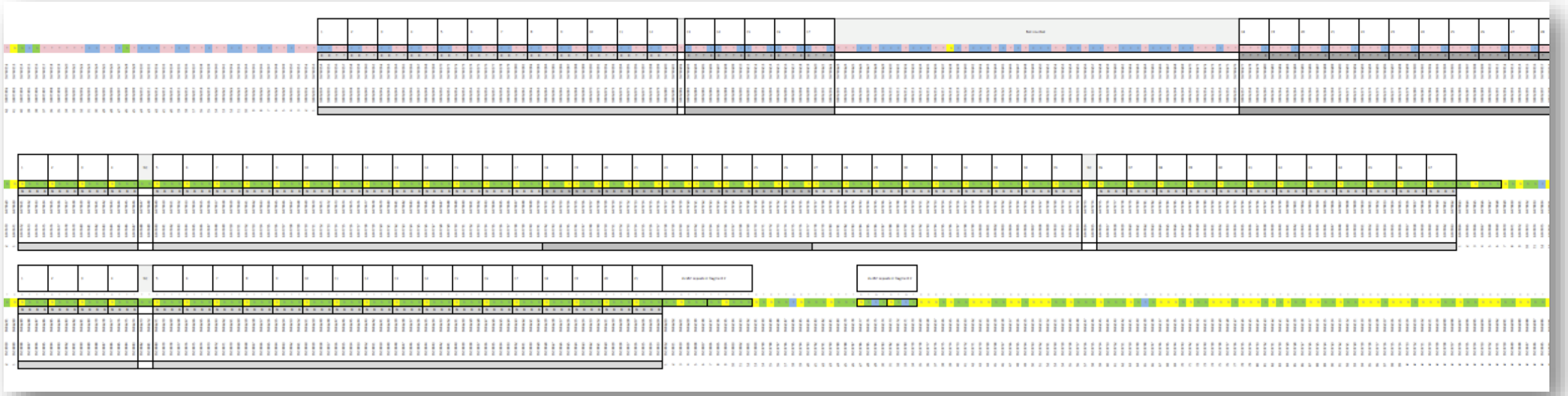
STR Sequence Nomenclature

The file 'STR Sequence Structure (Supplementary File S1)' is an updated set of forensic STR sequences that accompany the article:

Parson W, Ballard D, Budowle B, Butler JM, Gettings KB, Gill P, Gusmão L, Hares DR, Irwin JA, King JL, de Knijff P, Morling N, Prinz M, Schneider PM, Van Neste C, Willuweit S, Phillips C: **Massively parallel sequencing of forensic STRs: Considerations of the DNA commission of the International Society for Forensic Genetics (ISFG) on minimal nomenclature requirements.** Forensic Science International Genetics 2016, 22: 54-63 (doi: 10.1016/j.fsigen.2016.01.009; available at http://www.isfg.org/Publication;Parson2016).

Major changes to this file are currently ongoing. When the review process is finished, a new version of Supplementary File S1 containing updated information will be available for download here. To stay updated about STRidER, register here for the STRidER newsletter.

The updates since the last version are:



STRidER STRs for identity ENFSI Reference database, v2

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Change tracking

1) Name changed to STRidER, website to strider.online, ssl
2) New HOME tab to introduce the new database and QC platform project
3) Newsletter enabled (via HOME tab)
4) Query and batch query (according to questionnaire among ENFSI labs)
   - only uncorrected actual match probability is calculated (2pq or p^2), query profile is not added to database
   - correction factors (Nichols & Balding, Fst,...) are not offered any longer
   - F alleles no longer allowed
   - the only correction used is MAF (5/2n) for rarer alleles or alleles not contained in database
   - new batch query file
5) STR Nomenclature tab introduced to host updates of ESM1 of ISFG considerations

Acknowledgements

R. Scheithauer

Monopoly 2010

Monopoly 2014

DNA SeqEx
STR Sequencing & Exchange

ISFG Commission on MPS of STRs
ISFG Commission on STRidER

ENFSI laboratories

Peter Gill
Ingo Bastisch
Chris Phillips
Katherine Gettings
Jonathan King
Martin Bodner

STRidER

ISFG Update

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www.isfg.org

ISFG International Society for Forensic Genetics

Dr. Walther Parson Sign off

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WELCOME

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to the **International Society for Forensic Genetics** – ISFG. The society aims to promote scientific knowledge in the field of genetic markers as applied to forensic science.This is mainly being achieved through regular meetings of either regional or international nature, our journal **Forensic Science International: Genetics** and the work of our expert DNA commissions. Check the publications page for access to recent **international congress proceedings** and **scientific recommendations** by the ISFG. These publications can be accessed openly.

Scientists with interest in forensic genetics who want to *join the ISFG* may click here to apply for membership.

ISFG membership includes free access to the print and online editions of Forensic Science International: Genetics. Please log in to read and download articles via the section reserved for members. ISFG members have also access to the workshop presentations and lectures of invited speakers at the most recent ISFG congresses.

OPEN SOURCE SOFTWARE: The ISFG DNA Commission has started an initiative to develop **open source biostatistical software for mixture interpretation**. Please visit our new software development site for forensic casework and participate in our projects [last update: December 2014]!

CONFERENCES

SmartRank release & workshop in The Hague Sept. 2016

SmartRank release & workshop in The Hague Sept. 2016 SmartRank is a robust likelihood ratio software that enables searching of national DNA-databases […]

Posted 5 days ago by Peter M. Schneider

Workshop for forensic DNA scientists in Nov. 2016

Workshop for forensic DNA scientists in Nov. 2016 The workshop 'Beyond the source, beyond the science?' will be held on 24-25 November 2016 at […]

Posted 2 months ago by Peter M. Schneider

ESWG Meeting in Budapest, 31.08.-03.09.2016

ESWG Meeting in Budapest, 31.08.-03.09.2016 The English Speaking Working Group of the ISFG will hold its annual meeting this year in Budapest, Hungary, […]

Posted 3 months ago by Peter M. Schneider

Courses in forensic statistics and DNA evidence interpretation at the University of Lausanne

Courses in forensic statistics and DNA evidence interpretation at the University of Lausanne Certificate of Advanced Studies (CAS) in Statistics […]

Posted 8 months ago by Peter M. Schneider

ISFG

The International Society for Forensic Genetics is an **international association** promoting scientific knowledge in the field of genetic markers analyzed for forensic purposes.

The ISFG has been founded in **1968** and has 1243 members from 84 countries (04/2017).

How to become a member?

How to become a member?

- Goto ISFG webpage and click link for membership
- Enter your details
- Nominate 2 reference persons (ISFG members) that support your membership (good to ask them first)
- Have 60 Euro/year ready to spend

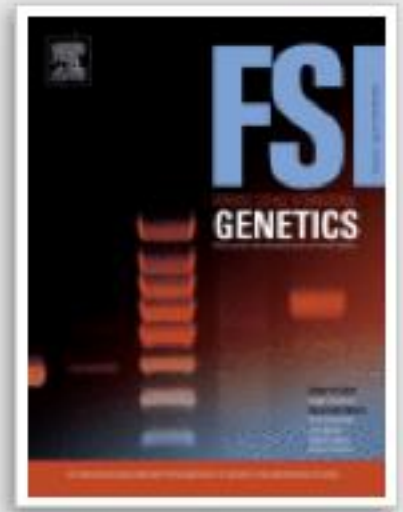
Executive committee discusses application

Why should I become a member?

- Because it is cool
- Reduced fee for conferences
- Free access to *Forensic Sciences International Genetics*

Forensic Science International Genetics

On the Cover



Subscribe to Journal

Journal Ranking

Ranked 1 out of 15 journals in ISI Medicine, Legal category

© Journal Citation Reports, published by Thomson Reuters 2015

Journal Ranking

Ranked 1 out of 15 journals in ISI Medicine, Legal category

2016 Journal Citation Reports © Thomson Reuters

Journal rankings

Medicine, Legal

1	FORENSIC SCI INT-GEN	4.988
2	INT J LEGAL MED	2.862
3	REGUL TOXICOL PHARM	2.227
4	SCI JUSTICE	1.959
5	FORENSIC SCI INT	1.950
6	FORENSIC SCI MED PAT	1.896
7	J LAW MED ETHICS	1.613
8	LEGAL MED-TOKYO	1.442
9	J FORENSIC SCI	1.322
10	J FORENSIC LEG MED	0.870
11	AUST J FORENSIC SCI	0.833
12	AM J FOREN MED PATH	0.795
13	MED SCI LAW	0.569
14	RECHTSMEDIZIN	0.324
15	ROM J LEG MED	0.144

#1 of 15

ISFG Working parties

German speaking WP
English speaking WP
French speaking WP
Italian speaking WP
Spanish and Portuguese speaking WP
Chinese speaking WP
Korean speaking WP
Japanese speaking WP
EDNAP - European DNA Profiling Group

ISFG - World conferences

2005 Azores (POR)
2007 Copenhagen (DEN)
2009 Buenos Aires (ARG)
2011 Vienna (AUT)
2013 Melbourne (AUS)
2015 Krakow (POL)
2017 Seoul (KOR)
2019 Prague (CZE)
2021 ???

Short-term travel fellowships

ISFG Short Term Fellowship Program

The ISFG is offering up to **10 travel fellowships** for scientists **to support transnational exchange visits** between collaborating research groups for specific projects related to forensic genetics. Each fellowship includes financial support for travel and accommodation of up to EUR 1,000 for visits within the same continent, and EUR 2,000 for visits from continent to continent. In each category, 5 fellowships will be awarded. The fellowship program will be renewed annually depending on available funding.

All details on the application procedure can be found in the enclosed **Terms of Reference for Short Term Fellowships**. The first application deadline is March 1st 2017 for planned fellowship visits until end of March 2018. Decisions will be announced prior to April 15th 2017.

9 requests received

evaluated by ISFG Fellowship Review Board

all 9 reviewed positively

Travel bursaries

TRAVEL BURSARIES FOR ISFG 2017 IN SEOUL

The ISFG is offering up to **10 travel bursaries for young scientists** below the age of 35 years, who have submitted an abstract, to attend the biannually held International ISFG Congresses. These travel bursaries will be offered for the first time to attendees of the ISFG 2017 in Seoul. Each bursary includes an amount of EUR 1,000 as well as free registration for the ISFG Congress (to be paid to the Congress Organizer by the ISFG).

All details on the application procedure can be found in the enclosed **Terms of Reference for Congress Travel Bursaries**. The application deadline is the same as the abstract submission deadline, i.e. April 1, 2017.

applications currently under consideration

more than 540 submitted abstracts (under evaluation)

established and new pre-congress workshops

find out more http://www.isfg2017.org/

“See you in Seoul”

ISFG Educational Workshops

The ISFG will organize and hold Educational Workshops in 2018
Location and date will be discussed and announced via the ISFG website and the news letter to members

ISFG executive committee meeting Berlin, May 16

EDNAP and ENFSI DNA WG Meetings
April 25-28, 2017

Recent U.S. Activities in Forensic Science:

A NIST Update from John Butler

John M. Butler, PhD
NIST Fellow & Special Assistant to the Director for Forensic Science

NIST FORENSIC SCIENCES

NIST Disclaimer

Points of view are those of the author and do not necessarily represent the official position or policies of the US Department of Justice or the National Institute of Standards and Technology.

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 endorsement by the National Institute of Standards and Technology nor does it imply that any of the materials, instruments or equipment identified are necessarily the best available for the purpose.

This presentation does not include any information from the NIST Applied Genetics Group and research being conducted on forensic DNA

September 2015 issue

Forensic Science International: Genetics

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

U.S. initiatives to strengthen forensic science & international standards in forensic DNA

John M. Butler*

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

OPEN SOURCE (freely available)

- 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

Butler, J.M. (2015) U.S. initiatives to strengthen forensic science & international standards in forensic DNA. *FSI Genetics* (volume 18, pp. 4-20) http://www.sciencedirect.com/science/article/pii/S1872497315300284

NIST Forensic Science Efforts

Partnership with Department of Justice

National Commission on Forensic Science (NCFS)

Department of Justice FACA co-led by NIST
setting policy

Organization of Scientific Area Committees (OSAC)

NIST-administered
>540 members of the community
establishing standards and best practices

Assessing scientific foundations and method validation for select forensic disciplines

NIST Funded Internal Research Programs

NIST FORENSIC SCIENCES

~$7.5M/year invested

NIST Forensic Science Center of Excellence

IOWA STATE · Carnegie Mellon University · University of California Irvine · University of Virginia

CoE: ~$4M/year invested for 5 years (2015-2020)

International Symposium on Forensic Science Error Management

432 participants (11 countries)

MOU between DOJ and NIST

publicly available on the NCFS website

MEMORANDUM OF UNDERSTANDING BETWEEN
THE DEPARTMENT OF JUSTICE
AND
THE NATIONAL INSTITUTE OF STANDARDS [illegible] TECHNOLOGY
IN SUPPORT [illegible]
THE NATIONAL COMMISSION [illegible] NCE AND THE
ORGANIZATION [illegible] ITTEES

This MOU expired on April 23, 2017. It primarily impacts the NCFS charter, which was not renewed by DOJ

X. Signatures:

For the Department of Ju[illegible] Institute of [illegible]ds and Technology:

Date: 4 August 2015

Date: 05 August 2015

DOJ-NIST MOU (2013-2015; **2015-2017**)

Section VI. B. National Institute of Standards and Technology:

NCFS

1. Will appoint a Senior NIST Official to serve as the Co-Chair of the Commission;

OSAC

2. Will administer and coordinate all necessary support for the Scientific Area Committees, subject to the following provisions;

   a. Scientific Area Committees have no authority to make decisions on behalf of either Party or the Commission and may not provide advice directly to the federal government, any federal agency or officer, or any other entity.

   b. Scientific Area Committees may collaborate with relevant voluntary standards development organizations or professional organizations for the development of consensus guidance before releasing their proposed guidance to the public.

   c. Scientific Area Committees do not report to the Commission and are not federal advisory committees in accordance with the Federal Advisory Committee Act, as amended, 5 U.S.C. App.2.

Research

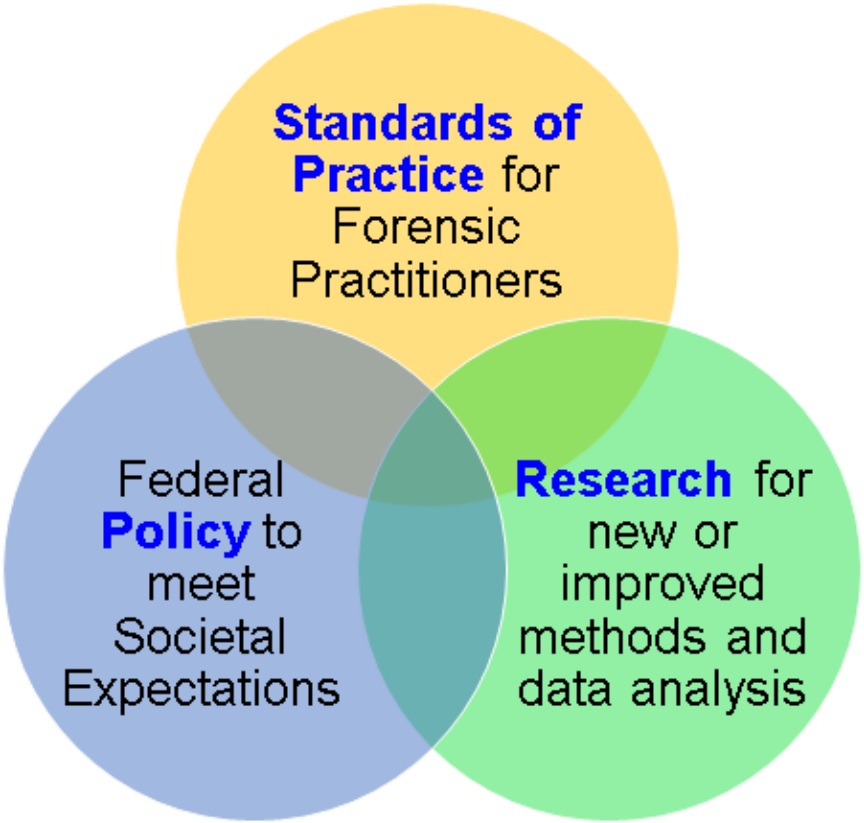
3. Will conduct research supporting the development and dissemination of methods, standards, and technical guidance for forensic science measurements;

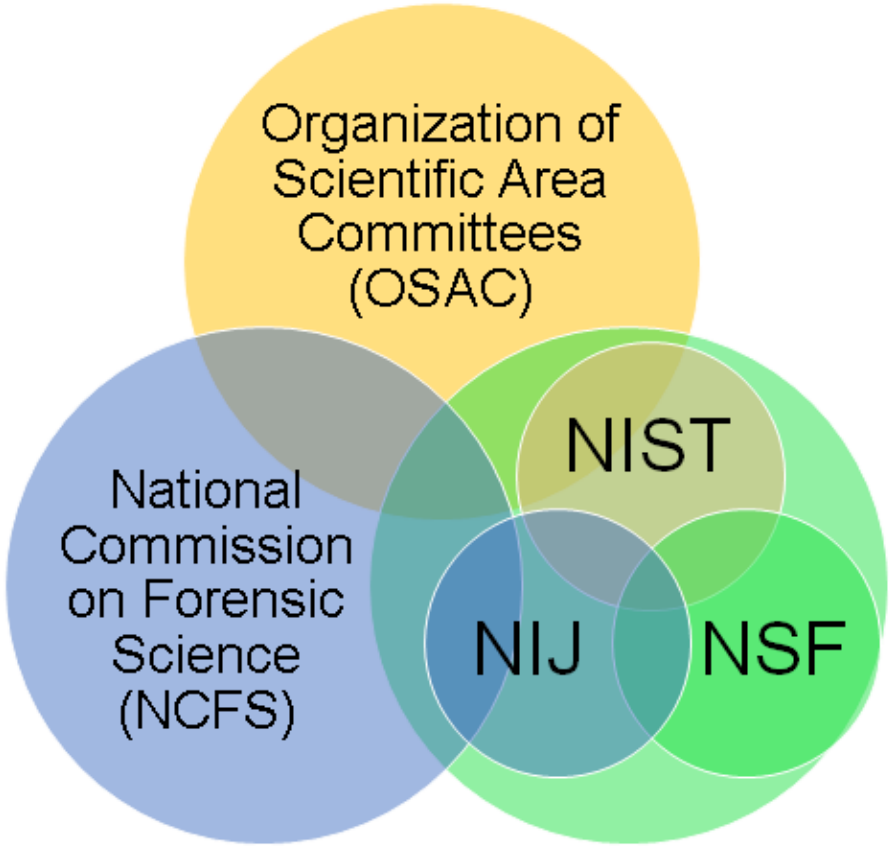
Validation

4. Will test and validate select existing forensic science practices and standards as appropriate.

https://www.justice.gov/ncfs/file/761051/download

Policy – Practice – Research
are all inter-related





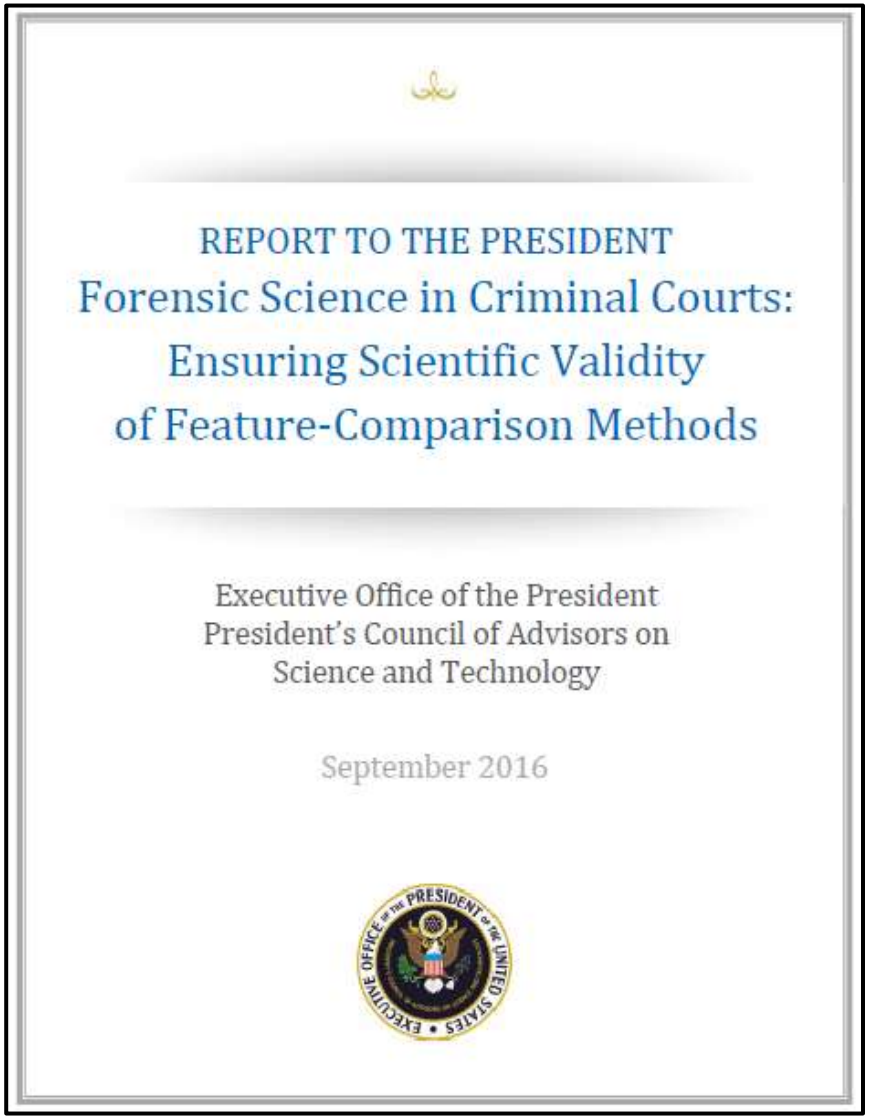
PCAST Report

President's **C**ouncil of **A**dvisors on **S**cience and **T**echnology

a Federal Advisory Committee to the White House's Office of Science and Technology Policy (OSTP)

PCAST Report

Released September 20, 2016


REPORT TO THE PRESIDENT

Forensic Science in Criminal Courts:
Ensuring Scientific Validity
of Feature-Comparison Methods

Executive Office of the President
President's Council of Advisors on
Science and Technology

September 2016

https://www.whitehouse.gov/administration/eop/ostp/pcast/docsreports

Provides comments on:

- 5.1 DNA (single-source and simple-mixtures)
- 5.2 Complex DNA Mixtures
- 5.3 Bitemark Analysis
- 5.4 Latent Fingerprint Analysis
- 5.5 Firearms Analysis
- 5.6 Footwear Analysis
- 5.7 Hair Analysis

Provides recommendations to **NIST** and OSTP (§6), FBI Laboratory (§7), Attorney General (§8), and the Judiciary (§9)

PCAST Report Comments on Forensic DNA

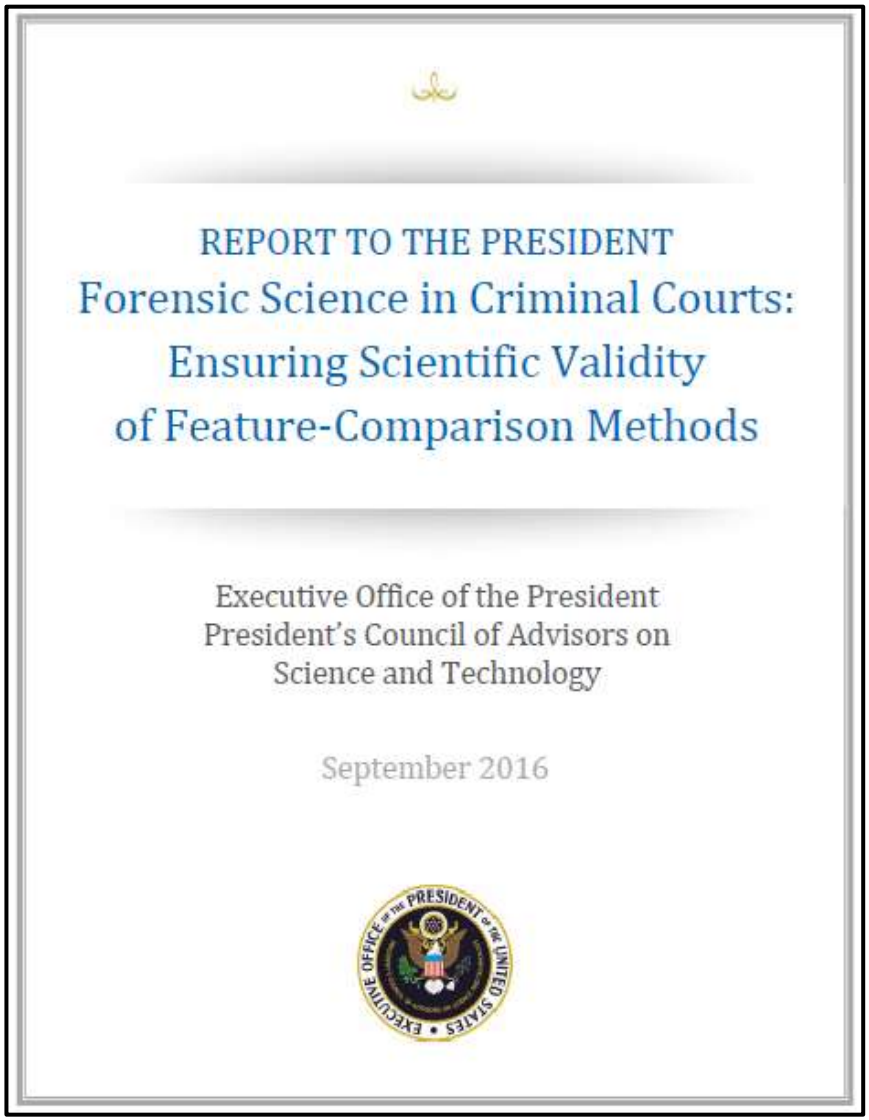
- Supports appropriate use of single-source and simple mixture DNA analysis
- **Expresses reservations with complex DNA mixtures** (≥3 contributors)

PCAST Co-Chairs

Eric Lander

John Holdren

Released September 20, 2016



REPORT TO THE PRESIDENT

Forensic Science in Criminal Courts:
Ensuring Scientific Validity
of Feature-Comparison Methods

Executive Office of the President
President's Council of Advisors on
Science and Technology

September 2016

Responses to the PCAST Report

Sept 2 (2 pages)
Nov 16 (9 pages)

Sept 20 (2 pages)

Sept 21 (3 pages)

Sept 30 (2 pages)

Oct 31 (2 pages)

Sept 20 (1 page)

Sept 21 (2 pages)

Oct 5 (1 page)

Sept 7 (1 pages)
Not dated (2 pages)

Articles published on Sept 20, 2016

The Washington Post

- **"A wake-up call on the junk science infesting our courtrooms"**
  - **Harry T. Edwards and Jennifer L. Mnookin**

- **"Calls for limits on 'flawed science' in court are well-founded: A guest post"**
  - **Tom Jackman (with Brandon Garrett)**

- **"White House science advisers urge Justice Dept., judges to raise forensic standards"**
  - **Spencer Hsu**

The Wall Street Journal – Sept 20, 2016

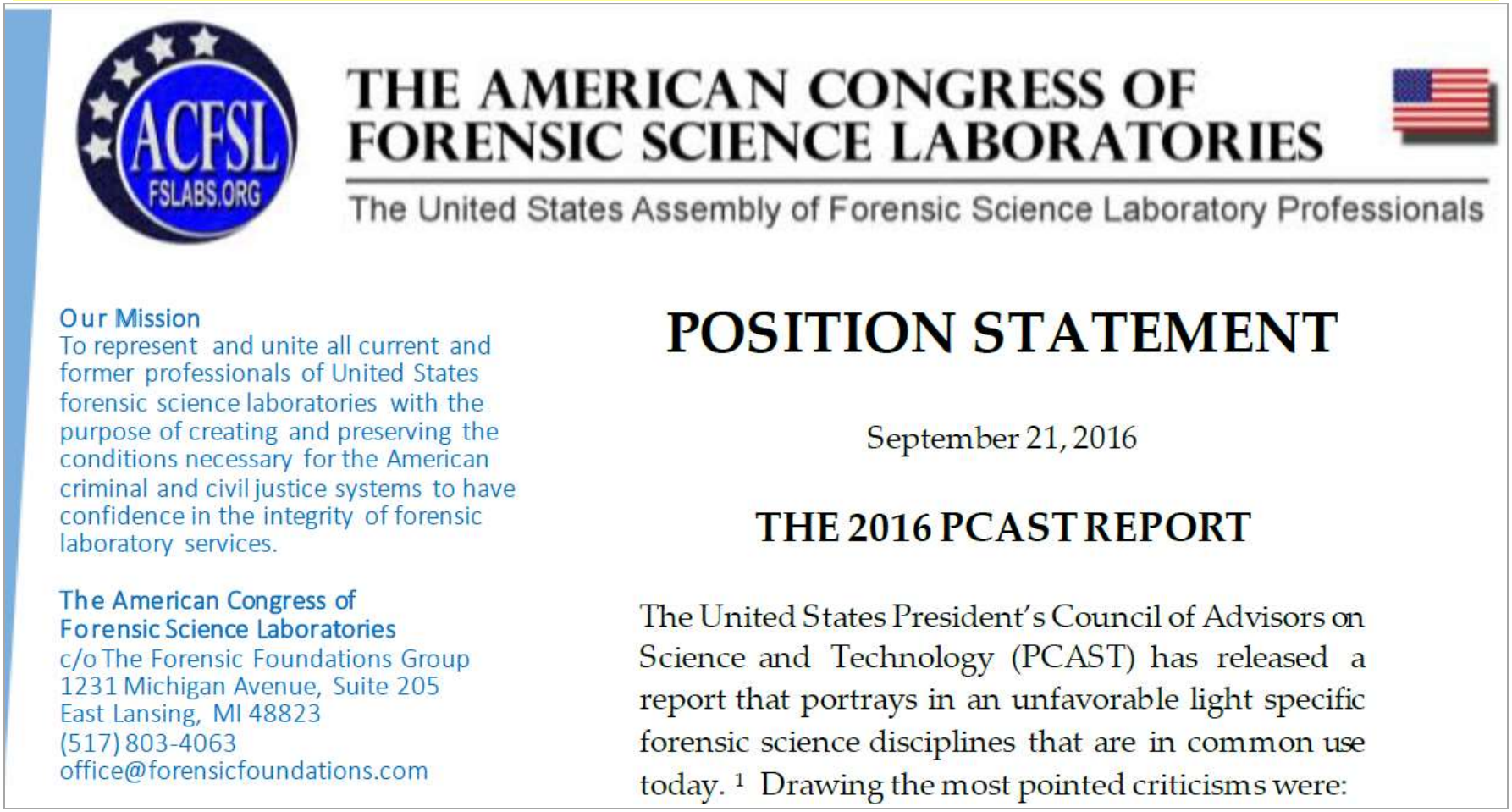
- **"White House Advisory Council Report Is Critical of Forensics Used in Criminal Trials"**
  - Gary Fields

- "In a statement, **Attorney General Loretta Lynch** said the Justice Department had taken unprecedented steps to strengthen forensic science, including investments in research, draft guidance to lab experts when they testify in court and 'reviews of forensic testimony in closed cases.'
- "We remain confident that, when used properly, forensic science evidence helps juries identify the guilty and clear the innocent, and the department believes that the current legal standards regarding the admissibility of forensic evidence are based on sound science and sound legal reasoning," Ms. Lynch said. "**While we appreciate their contribution to the field of scientific inquiry, the department will not be adopting the recommendations** related to the admissibility of forensic science evidence."

http://www.wsj.com/articles/white-house-advisory-council-releases-report-critical-of-forensics-used-in-criminal-trials-1474394743

ACFSL Position Statement

Attacks the authors and their connections to the Innocence Project



THE AMERICAN CONGRESS OF FORENSIC SCIENCE LABORATORIES

The United States Assembly of Forensic Science Laboratory Professionals

Our Mission

To represent and unite all current and former professionals of United States forensic science laboratories with the purpose of creating and preserving the conditions necessary for the American criminal and civil justice systems to have confidence in the integrity of forensic laboratory services.

The American Congress of Forensic Science Laboratories
c/o The Forensic Foundations Group
1231 Michigan Avenue, Suite 205
East Lansing, MI 48823
(517) 803-4063
office@forensicfoundations.com

POSITION STATEMENT

September 21, 2016

THE 2016 PCAST REPORT

The United States President's Council of Advisors on Science and Technology (PCAST) has released a report that portrays in an unfavorable light specific forensic science disciplines that are in common use today. [1] Drawing the most pointed criticisms were:

http://www.crime-scene-investigator.net/PDF/american-congress-of-forensic-science-laboratories-response-to-forensic-science-in-federal-criminal-courts-ensuring-scientific-validity-of-pattern-comparison-metho.pdf

Additional Responses to PCAST

- David Kaye blog (multiple dates starting Sept 1)
  - http://for-sci-law.blogspot.com/ (e.g., Oct 24 – "PCAST's sampling errors)
- Geoffrey Morrison *et al.* (Oct 5)
  - Letter to the Editor of *Forensic Sci. Int.*
  - 18 co-authors including Simone Gittelson (NIST SED)
- Mark Perlin letter (Sept 16)
  - https://www.cybgen.com/information/newsroom/2016/sep/files/letter.pdf
- John Buckleton blog (Sept 1) and letters/emails
  - https://johnbuckleton.wordpress.com/pcast/
- **Several OSAC subcommittees have drafted responses…**

From a Recent Article by a Law Professor

Jessica Gabel Cino, Associate Dean for Academic Affairs and Associate Professor of Law, Georgia State University and member of the American Academy of Forensic Science's Standards Boards for DNA and fingerprints

- "Pattern identification evidence shouldn't be excluded from cases wholesale, but forensic evidence needs to be placed into context. **When the human eye is the primary instrument of analysis**, the court, the attorneys and the jury should be fully aware that **certainty is unattainable, human error is possible, and subjectivity is inherent**."

- "**The PCAST report is yet another wake-up call** for the criminal justice system to correct the shortcomings of forensic science. We demand that guilt be proven beyond a reasonable doubt; we should also demand accurate and reliable forensics. **Without improvement, we can't trust forensic science to promote justice**."

THE CONVERSATION
Academic rigor, journalistic flair

December 6, 2016 article "Forensic evidence largely not supported by sound science – now what?"

https://theconversation.com/forensic-evidence-largely-not-supported-by-sound-science-now-what-67413

PCAST Report Requests for NIST

- Requests that NIST
  1. **perform foundational validity evaluations** and
  2. **issue an annual public report of findings**

- Recommends that Congress should increase NIST funds by **$4 million for evaluation work** and **$10 million for additional research**

- Asks NIST to work with the FBI Laboratory in conducting research and evaluations

Statement from the Acting NIST Director at the NCFS Meeting on April 10, 2017

- "This past September the President's Council of Advisors on Science and Technology (PCAST) recommended an expanded role for NIST in assessing the scientific foundations and maturity of various forensic disciplines. We do recognize the need for, and value of, such studies and are exploring ways to conduct some work in this area. Without the additional funding recommended by PCAST, NIST cannot make any large-scale commitments to extensive technical merit review.

- "That said, **we are planning an exploratory study to address concerns raised by PCAST regarding complex DNA mixtures.** This will likely involve assessing the scientific literature, developing a detailed plan for evaluating scientific validity that would include probabilistic genotyping, and designing one or more interlaboratory studies to measure forensic laboratory performance with DNA interpretation. These interlaboratory studies would build upon previous NIST DNA mixture studies conducted in 2005 and 2013. NIST has a history of involving external partners in its research and standards efforts, and we anticipate external and international collaboration in this effort."

National Commission on Forensic Science (NCFS)

a Federal Advisory Committee to the Department of Justice (DOJ)

Media Coverage of the NCFS Closure

April 10, 2017

The Washington Post
Democracy Dies in Darkness

Sessions orders Justice Dept. to end forensic science commission, suspend review policy

U.S. Attorney General Jeff Sessions during the daily briefing March 27. (Jim Watson/AFP/Getty Images)

By Spencer S. Hsu April 10

Attorney General Jeff Sessions will end a Justice Department partnership with independent scientists to raise forensic science standards and has suspended an expanded review of FBI testimony across several techniques that have come under question, saying a new strategy will be set by an in-house team of law enforcement advisers.

April 11, 2017

The New York Times

The Opinion Pages | OP-ED CONTRIBUTOR

Sessions Is Wrong to Take Science Out of Forensic Science

By ERIN E. MURPHY APRIL 11, 2017

Prosecutors applauded the April 10 announcement by Attorney General Jeff Sessions that the Department of Justice was disbanding the nonpartisan National Commission on Forensic Science and returning forensic science to law enforcement control. In the same statement, Mr. Sessions suspended the department's review of closed cases for inaccurate or unsupported statements by forensic analysts, which regularly occur in fields as diverse as firearm and handwriting identification, and hair, fiber, shoe, bite mark and tire tread matching, and even fingerprinting analysis.

If all you knew about forensic science was what you saw on television, you might shrug off this news, believing that only the most sophisticated and well-researched scientific evidence is used to solve and prove crimes. But reality is different.

Comments on Media Coverage

- There have been several dozen articles in the news media covering the NCFS closure since DOJ made its announcement on April 10, 2017
  - **There are multiple agendas pushing narratives – so don't believe everything you read!**
  - When NCFS was created, it was expected to last 4 to 6 years
- NCFS was designed as a Federal Advisory Committee with a limited lifetime (renewed every two years)
  - Public meetings and documents (videos are available from meetings; see website: https://www.justice.gov/ncfs)
  - The Commission accomplished a number of useful things – see the NCFS Summary Report…

NCFS Summary Report: *Reflecting Back-Looking Toward the Future*
NCFS Summary Report: *Appendix A - National Commission on Forensic Science Commissioners and Biographies*
NCFS Summary Report: *Appendix B - National Commission on Forensic Science Subcommittees*
NCFS Summary Report: *Appendix C - National Commission on Forensic Science Recommendations and Views*
NCFS Summary Report: *Appendix D - National Commission on Forensic Science Public Comments*

Read the Actual Press Release from the Department of Justice on April 10, 2017

https://www.justice.gov/opa/pr/attorney-general-jeff-sessions-announces-new-initiatives-advance-forensic-science-and-help

“We applaud the professionalism of the National Commission on Forensic Science and look forward to building on the contributions it has made in this crucial field.”

The following three actions were announced today:

1. In the coming weeks, the Department will appoint a Senior Forensic Advisor to interface with forensic science stakeholders and advise Department leadership;

2. The Department will conduct a needs assessment of forensic science laboratories that examines workload, backlog, personnel and equipment needs of public crime laboratories and the needs of academic and non-traditional forensic science practitioners, and issue a report to Congress; and

3. The Department will publish a notice in the Federal Register seeking public comment on how the Department should move forward to strengthen the foundations of forensic science and improve the operations and capacity of forensic laboratories. The notice will remain open until June 9, 2017.

Contribute Your Thoughts
on Future Needs in Forensic Science

- Written public comment regarding the issue for comment should be submitted through *www.regulations.gov* **before June 9, 2017.**

- https://www.regulations.gov/document?D=DOJ-LA-2017-0006-0001

February 3-4, 2014 was the first meeting of the **National Commission on Forensic Science**

40 Commissioners

32 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 National Medal of Science recipient)
- Crime laboratory directors
- Judges, prosecutors, and defense attorneys
- Sheriff, detective, coroner, medical examiner, victims' advocate, and defendants' rights advocate

National Commission on Forensic Science (NCFS)

32 voting and 8 *ex-officio* members

Final meeting (13th): April 10-11, 2017

Policy-focused

NCFS Leadership

Until January 2017

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)

National Commission on Forensic Science

- Established in 2013 with an MOU between NIST and DOJ (MOU also enabled OSAC to start)
- NCFS is a Federal Advisory Committee to DOJ
- First meeting was held in February 2014
- In total, **13 meetings were held**
  - Meeting 11 was at NIST (September 12-13, 2016)
- Focus is on policy issues
- **43 documents** were approved
  - 20 recommendations and 23 views of the Commission
  - **A Summary Report was approved April 10, 2017**

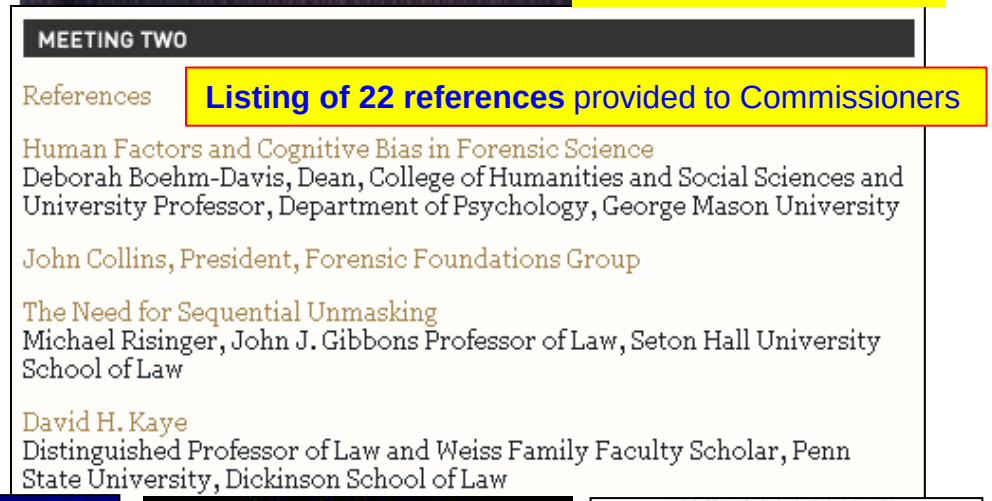
NCFS Meeting Materials Available

http://www.justice.gov/ncfs/meeting-materials.html

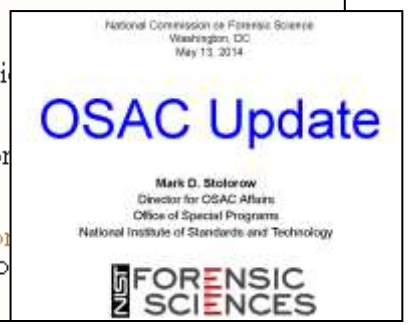
Meeting Summaries
pdf document

2nd National Commission on Forensic Science Webcast

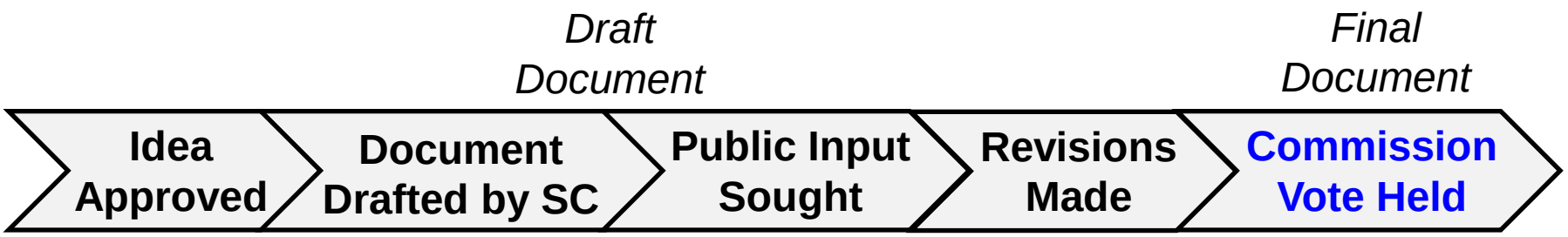
Webcast
(>9 hours of archived video)



Speaker Slides (pdf files)



General Process for NCFS Document Development



43 total documents approved

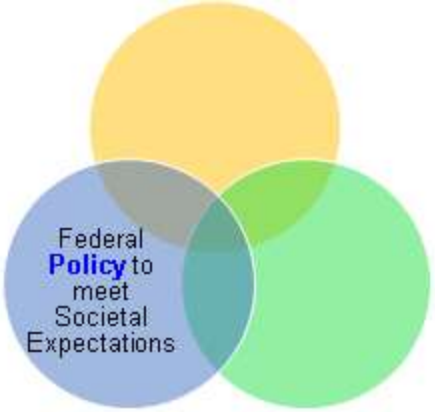
through meeting #13 (April 2017)

Types of NCFS Work Products

43 total documents approved
through meeting #13 (April 2017)

1) **Views** of the Commission
   - **23 approved** (through Meeting #13, April 2017)

2) **Recommendations** to the Attorney General
   - **20 approved** (through Meeting #13, April 2017)
     – Attorney General/DOJ decision to be made and issued within two NCFS meetings



Some Key NCFS Recommendations

Complete set of **43 work products available** at
https://www.justice.gov/ncfs/work-products-adopted-commission

Work Products are Developed in **Subcommittees**:

- **Accreditation and Proficiency Testing**
  - Universal Accreditation
- **Interim Solutions**
  - Transparency of Quality Management System Documents
  - National Code of Professional Responsibility
- **Scientific Inquiry and Research**
  - Technical Merit Evaluation of FS Methods & Practice
- **Medicolegal Death Investigation**
  - National Disaster Call Center
- **Reporting and Testimony**
  - Use of the Term “Reasonable Scientific Certainty”
- **Training on Science and Law**
  - Forensic Science Curriculum Development

Recommendations to the Attorney General Regarding **Use of the Term "Reasonable Scientific Certainty"** (NCFS Approved 3/22/16)

- **Recommendation #1**: The Attorney General should direct all attorneys appearing on behalf of the Department of Justice (a) to forego use of these phrases when presenting forensic discipline testimony unless directly required by judicial authority as a condition of admissibility for the witness' opinion or conclusion, and (b) to assert the legal position that such terminology is not required and is indeed misleading.
- **Recommendation #2**: **The Attorney General should direct all forensic science service providers and forensic science medical providers employed by Department of Justice** [FBI, DEA, and ATF Laboratories] **not to use such language in reports or couch their testimony in such terms unless directed to do so by judicial authority.**
- **Recommendation #3**: The Attorney General should, in collaboration with NIST, urge the OSACs to develop appropriate language that may be used by experts when reporting or testifying about results or findings based on observations of evidence and data derived from evidence.

https://www.justice.gov/ncfs/file/839726/download

Attorney General Decision on NCFS Recommendation

- Department forensic laboratories [FBI, DEA, ATF] will review their policies and procedures to **ensure that forensic examiners are not using the expressions "reasonable scientific certainty"** or "reasonable [forensic discipline] certainty" **in their reports or testimony. Department prosecutors will abstain from use of these expressions** when presenting forensic reports or questioning forensic experts in court unless required by a judge or applicable law.

Available at https://www.justice.gov/opa/file/891366/download

Attorney General Memo – September 6, 2016

Office of the Attorney General
Washington, D. C. 20530

September 6, 2016

MEMORANDUM FOR HEADS OF DEPARTMENT COMPONENTS

FROM: THE ATTORNEY GENERAL

SUBJECT: Recommendations of the National Commission on Forensic Science; Announcement for NCFS Meeting Eleven

As part of the Department's ongoing coordination with the National Commission on Forensic Science (NCFS), I am responding today to several NCFS recommendations to advance and strengthen forensic science. These recommendations involve promoting professional responsibility among forensic practitioners, instituting best practices in quality management of forensic laboratories, and advancing the relationship between academic forensic research and practical implemention.

Available at https://www.justice.gov/opa/file/891366/download

Technical Merit Recommendations

(Approved by NCFS Sept 12, 2016)

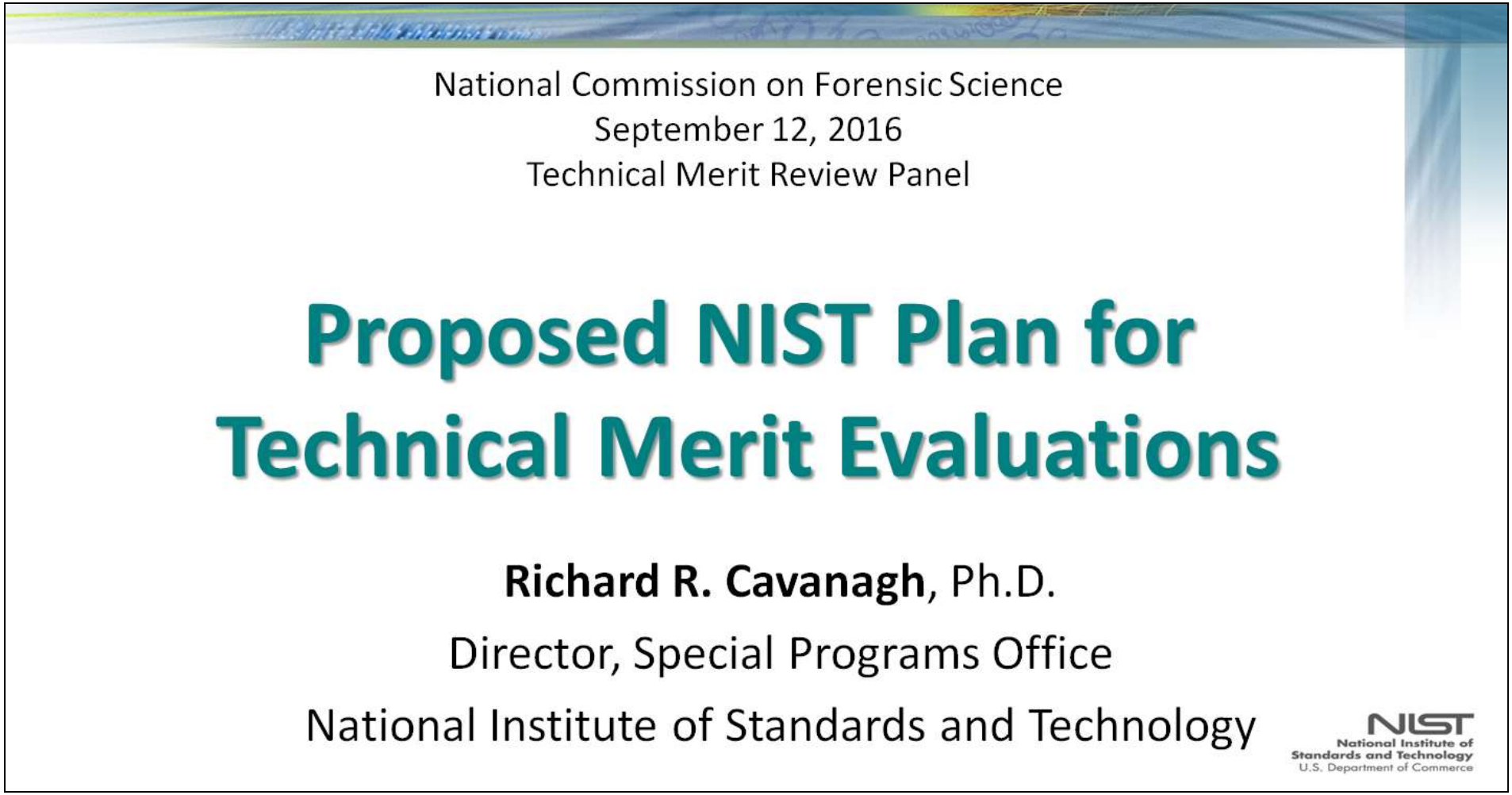
- **Recommendation #1: NIST should establish an in-house entity** with the capacity to conduct independent scientific evaluations of the technical merit of test methods and practices used in forensic science disciplines.

- **Recommendation #2:** The **results of the evaluations will be issued by NIST as publicly available resource documents**. NIST's evaluation may include but is not limited to: **a) research performed by other agencies and laboratories**, **b) its own intramural research program**, or **c) research studies documented in already published scientific literature**. NIST should initially begin its work by piloting three resource documents to establish their design and requirements. The release of these documents should be broadly disseminated in the scientific and criminal justice communities and accompanied by judicial trainings.

- **Recommendation #3:** The Organization of Scientific Area Committees for Forensic Science (OSAC) leadership, the Forensic Science Standards Board (FSSB), should **commit to placing consensus documentary standards on the OSAC Registry of Approved Standards for only those forensic science test methods and practices where technical merit has been established** by NIST, or in the interim, established by an independent scientific body. An example of an interim independent scientific body could be an OSAC created Technical Merit Resource Committee composed of measurement scientists and statisticians appointed by NIST and tasked with the evaluation of technical merit.

https://www.justice.gov/ncfs/page/file/905541/download

Proposed NIST Plan to Meet NCFS Request



Showed and discussed 13 slides as part of a panel to NCFS on technical merit

Thoughts Related to Technical Merit Evaluation Request by NCFS

Some of the Questions Associated with Technical Merit

- **What is the scientific maturity of the underlying measurement, data, comparison, analysis?**
  - What has been published?
  - What has been reproduced?
  - What has been/is the level of discourse on the topic in the research community?
- **Is the approach widely adopted by Forensics Professionals?**
  - Is this an emerging approach?
  - Is this an established approach?
- **Have efforts been directed at establishing the repeatability, reproducibility and accuracy of the method within an organization and across organizations?**
  - Is there a statistical basis for understanding expectations of the test method or practice?
  - Is the confidence level in the test method or practice well documented?

NIST Pilot Plans for Technical Merit Evaluation

•Initial NIST efforts would look at three examples selected from different areas, as we learn if the approach can be effective:

- DNA
- Firearms
- Bitemarks

- **Seek input from a variety of experts:**
  - NIST-hosted workshop to develop criteria for evaluation prior to embarking on study of a forensic method or practice
- **Conduct a literature review:**
  - NIST librarians assist in curation of appropriate references covering the method or practice in question
  - Reference list will be publicly available as part of the study findings
- **Evaluation of literature claims:**
  - Identification of appropriate laboratory studies to test those claims
- **Conduct interlaboratory study(ies)**
  - ***Where possible***, assess quality of work in operation – with de-identified participants
- **Publish findings and recommendations**
  - Possibilities include, *NIST Journal of Research, NIST Special Publication Series*, and other open access journals
- **Provide training for judges, lawyers, jurors, practitioners,…**
  - Develop training aids to convey the capabilities and limitations of studied forensic disciplines

Summary of Proposed NIST-Lab Technical Merit Efforts

- **Assessment focuses on scientific maturity of select aspects of three forensic science methods**
- **Assessment will look at and contribute to technical merit of current methods, including validation where feasible**
- **Assessment effort will not undertake original research**

1. **DNA**
   - » Long history at NIST
   - » Substantial resident expertise
   - » Strong tradition of working with other agencies
   - » New challenges with complex mixtures

2. **Firearms and Toolmarks**
   - » Strong effort in applying image analysis
   - » Strong effort in statistical analysis
   - » Well integrated with practitioners.
   - » Joint efforts currently underway with CSAFE

3. **Bitemarks**
   - » NIST has expertise in Nano Indentation
   - » NIST has expertise in characterization of Soft Materials
   - » NIST would need to reach out to others
     - American Dental Association Foundation (ADA research effort at NIST for 88 years)

Commission Activities

(operates on 2-year renewal terms)

- Announcement at AAFS 2013 meeting on February 21, 2013
- Commission charter originally filed on April 23, 2013; renewed on April 23, 2015
- Commission membership announced on January 10, 2014
- Meetings held thus far:

Term 1

- **Meeting 1 February 3 – 4, 2014**
- **Meeting 2 May 12 – 13, 2014**
- **Meeting 3 August 26 – 27, 2014**
- **Meeting 4 October 28 – 29, 2014**
- **Meeting 5 January 29 – 30, 2015**

Term 2

- **Meeting 6 April 30 – May 1, 2015**
- **Meeting 7 August 10 – 11, 2015**
- **Meeting 8 December 7 – 8, 2015**
- **Meeting 9 March 21 – 22, 2016**
- **Meeting 10 June 20 – 21, 2016**
- **Meeting 11 September 12 – 13, 2016**
- **Meeting 12 January 9 – 10, 2017**
- **Meeting 13 April 10 – 11, 2017**

NCFS Term 2 expired April 23, 2017

Wrap Up Comments from John Butler given on April 11, 2017 before the NCFS

Points of view are mine and do not necessarily represent the official position or policies of the US Department of Justice or the National Institute of Standards and Technology.

- Historical observations
- Personal reflections
- Lessons learned
- Acknowledgments

Lessons from History

https://www.nist.gov/featured-stories/who-was-detective-x

Wilmer Souder is seen using an early comparison microscope to compare the rifling marks left on two bullets, a technique for determining whether the bullets were fired from the same gun. This technique for comparing bullets is still used today in much the same way. *Credit: Photo by NBS/NIST; source: NARA*

- **Wilmer Souder** – National Bureau of Standards physicist who assisted in >800 cases for ~80 agencies from 1929 to 1953

- **1935 book "*Modern Criminal Investigation*"** (Harry Söderman & John O'Connell)
  - Chapter 29 "Police Laboratories" (p. 427) "**the personnel of the laboratory should be composed of detectives**" with a "scientific advisor" to work "hand-in-hand" with "the detective heading the police laboratory"; "**This [scientific advisor] must be carefully chosen. Much depends on him**."

National Council of Public History (April 20): I am participating with FBI, DEA, and ATF Historians

Ideals for Firearms Identification

Wilmer Souder, *Army and Navy Journal*, March 19, 1932

Are we learning from history or are we repeating it?

There should be adopted:

1. **Minimum standards of equipment** to be used.

   OSAC efforts to prepare and promulgate documentary standards (moving very slowly)

2. **Standards for records of evidence** to accompany and substantiate the expert's opinion; these to include photographs, metrological data and interpretations in permanent form.

   NCFS Views Document on Report and Case Record Contents (not approved 10 Apr 2017)

3. **Standards for qualification of experts** which will include **actual tests** made against secretly designated materials and reported in compliance with item 2.

   PCAST requests for data to support all conclusions made (largely being ignored)

4. **Methods for constant following up [with] experts testifying in court** to guarantee the highest efficiency.

   DOJ Forensic Science Discipline Review of FBI examiner testimony (just put on hold)

85 years later we are still addressing these same challenges!

Personal Reflections (1)

- My home was burglarized in June 2013 and **I have seen first-hand the challenges that exist in the criminal justice system beyond forensic science measurements**
  - e.g., sample collection problems by the detectives

- In April 2013, I moved within NIST to help with NCFS and other forensic activities
  - Leaving the laboratory environment has exposed me to a different "laboratory of learning"
  - I will likely be involved in helping with any future technical merit review & validation work conducted by NIST

Personal Reflections (2)

- I will go forward from my NCFS experience as an optimist with the belief that by small and simple things, great things can be brought to pass (but this may take longer than we would all like)

- With human nature **we are often quick to criticize**, but what will you and I do going forward to try and strengthen forensic science in the future?

- **I plan to continue writing articles, books, and conducting training** (when requested and available) of forensic practitioners, prosecutors, defense attorneys, and judges

- **Beyond the U.S.:** my experience in UK last week at the Royal Society
  - Diverse stakeholder perspectives are necessary to connect across disciplines and stakeholders – otherwise we live in silos and echo chambers

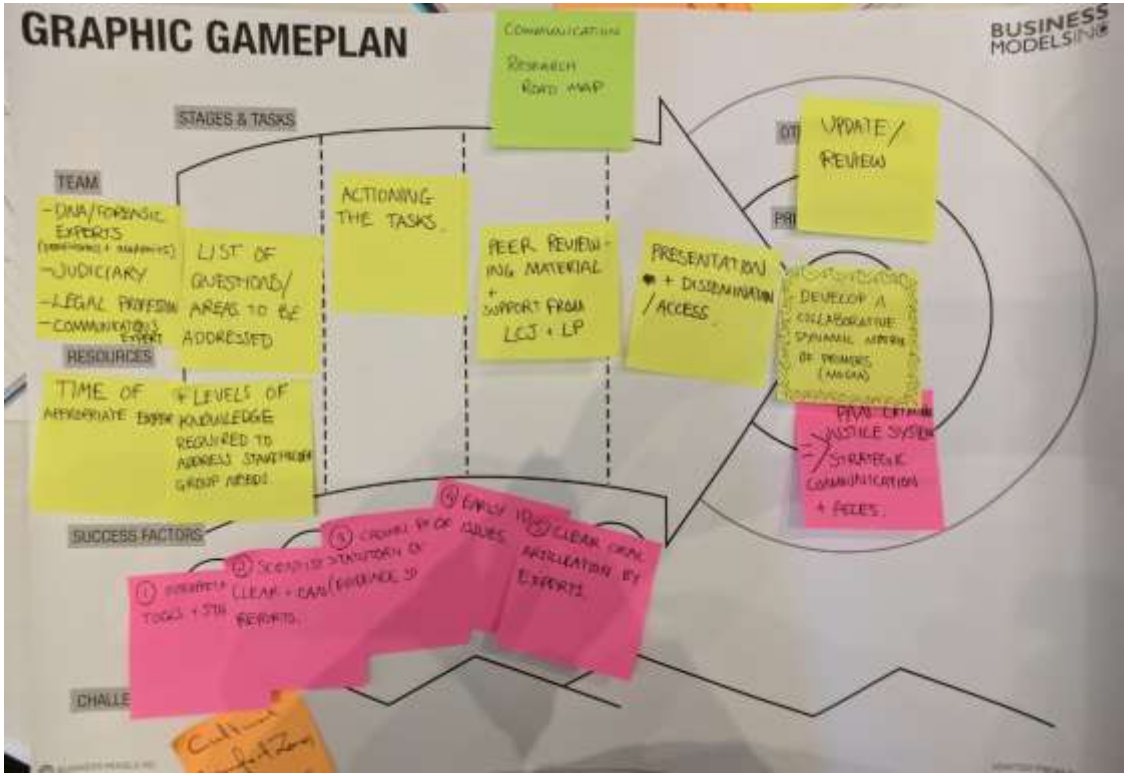
UK DNA Strategic Discussions

April 6-7, 2017 (London, UK)

- **Diverse perspectives are necessary to understand issues**
  - **Participants**: Judges (including head of the Judicial College), UK Regulator, laboratory director, forensic statistician, prosecutor, defense expert, academic researchers (multiple disciplines), documentary film maker, and a crime novelist (Val McDermid)
  - **Process**: business modeling process was used

- Training and communication are crucial to future improvements → action needs to be taken here

UK Strategic Planning on April 7, 2017 to Develop Stakeholder Primers



Goal to develop **a matrix of collaborative and dynamic training primers** (written and multi-media formats) to reach various stakeholders

An Illustrator was Present to Capture Our Discussions at this UK DNA Strategic Meeting

Commission → **a Unique Forum**

- NCFS has **enabled communication, collegiation, and collaboration** across various stakeholders to forensic science
- NCFS has benefited from the **openness and public input required** by Federal Advisory Committee Act (FACA) rules *(>600 public comments)*
- We live in an increasing polarized society (especially Washington, DC)
- There are unique challenges with forensic science operating in a legal adversarial environment
- I have personally enjoyed getting to know members of the Commission at our meetings and working collaboratively to understand one another and to reach consensus

The World Has Been Watching
What This Commission Is Doing

WORLD VIEW *A personal take on events*

Label the limits of forensic science

This week marks a chance to curb the misuse of crime-scene evidence in US courts and spare innocent people from going to jail, says **Robin Mejia**.

6 APRIL 2017 | VOL 544 | **NATURE** | page 7

"Even good lawyers aren't scientists, and right now prosecutors have an incentive to select forensic analysts who will assure juries that evidence is clear and convincing, not ones who will speak in appropriately cautious terms. Defense lawyers won't necessarily recognize that there's anything to refute in forensic evidence against their clients."

Commission → **a Unique Classroom**

- Example: Paul Speaker's talk this morning

- **Topics covered**: accreditation, human factors & cognitive bias, ethics, standards development, digital evidence, evidence retention & storage, training & continuing education, research, statistics, …

- **140 invited speakers** in 13 meetings

See meeting videos available at
https://www.nist.gov/topics/forensic-science/national-commission-forensic-science

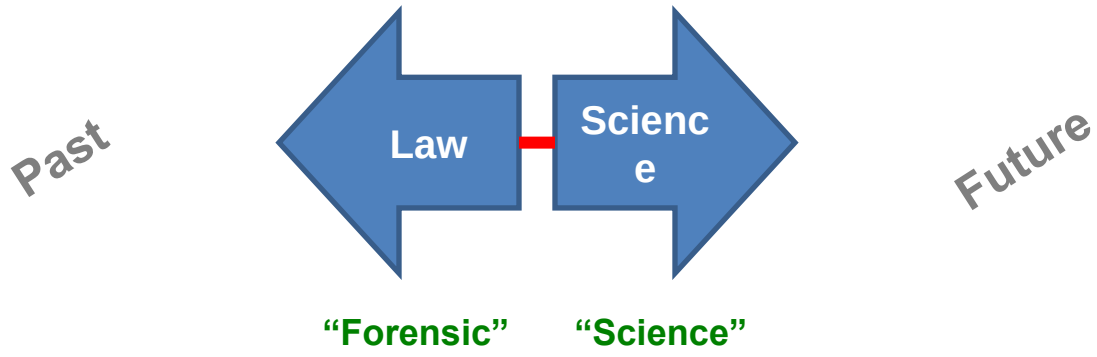
Important Observations

- The National Research Council 2009 (**"NAS Report"**) **called for changes** to strengthen forensic science (with 13 recommendations) but these are not really new issues
- **The criminal justice system**, where forensic science only plays a small part, **is not perfect**; there have been individuals wrongly convicted for a variety of reasons
- Despite a few well-publicized examples (e.g., Annie Dookhan), **forensic scientists** generally want to do a good job and **are trying to do their best**
- **Many forces are at play** to either change things or to maintain the status quo → ***which changes are needed?***

Culture Clash: Science and Law

Tension exists between science and the law:

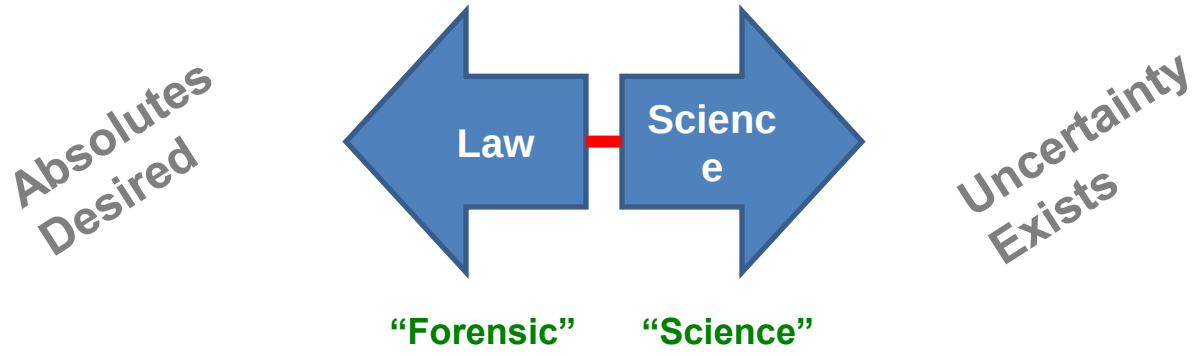
- The legal community **looks to the past** (precedence is desired)
- The scientific community **looks to the future** (evolving improvement is desired)



Culture Clash: Science and Law

Tension exists between science and the law:

- The legal community **wants finality and absolutes** (guilty or not-guilty court decisions)
- The scientific community **operates without certainty** (rarely with probabilities of 0 or 1)



Challenges to Communicating

- People like **narratives** better than **numbers**
  - **can we communicate science concepts correctly?**

- **We often talk past each other** (forensic practitioners & lawyers or practitioners & academic scientists) because we do not appreciate a subtle or significant difference in the meaning of a word or phrase – ***need for uniform terminology***

- "A reasonable degree of scientific certainty…"
  - I believe this is a legal crutch that has no scientific meaning and should not be used in court

Lessons Learned

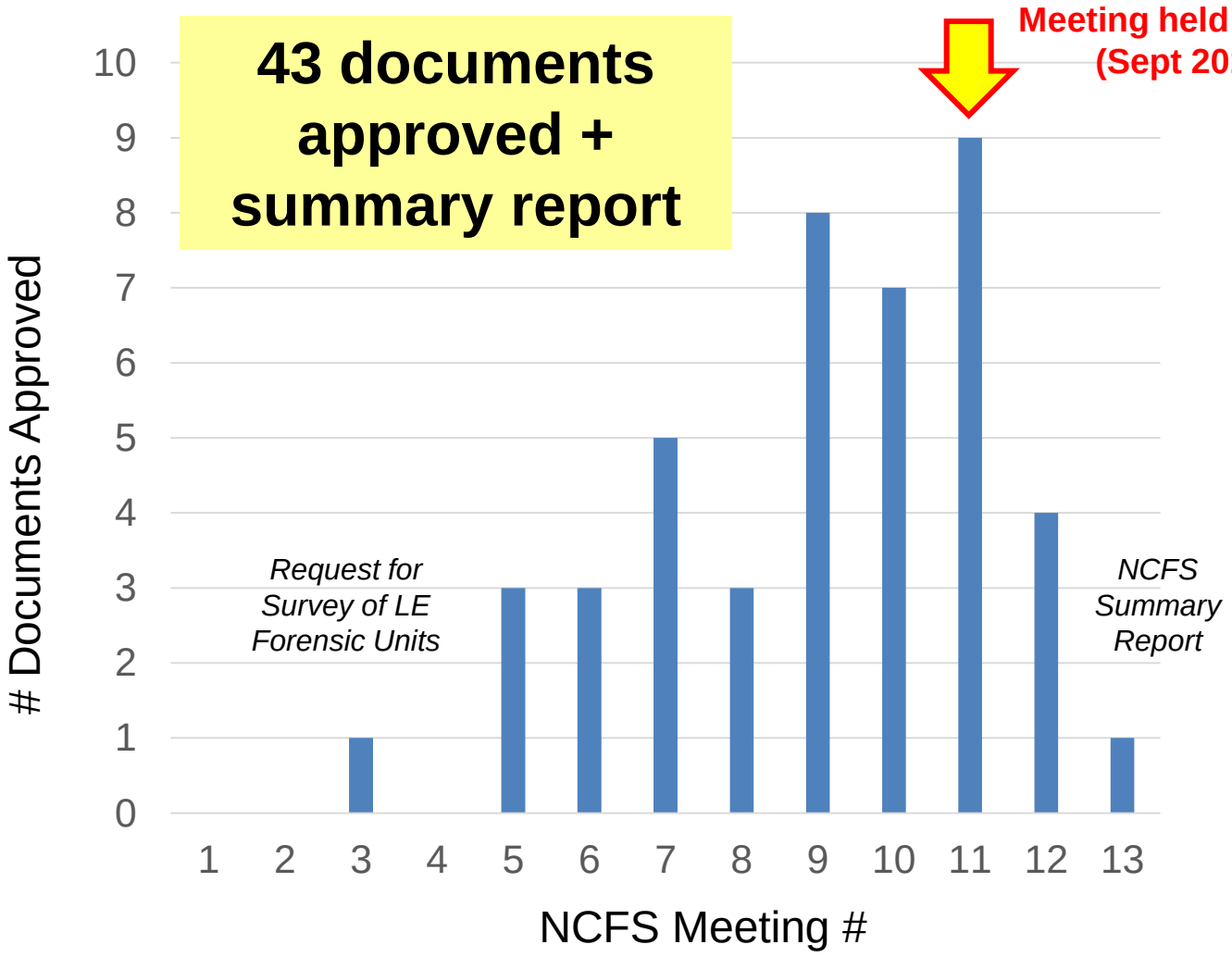
1. **Time and patience** are required for a newly organized group to align, pull together, and “gel”

2. **Respect and trust** involves listening to and seeking to understand the perspectives of others

3. **Receiving feedback can be uncomfortable** but in the end usually helps improve our efforts

4. **The community benefits when a dedicated group works together** and is open with its work products

Challenge of Ramping Up Activities and Impact of Ramping Down



NCFS Acknowledgments

- **Commissioners** (**49 in total across two terms**), meeting proxies, and subcommittee members (7 subcommittees + SPO; 15+17+1+7+10+4+6 = **60 additional SC members**)

- **Invited presenters** (8+7+10+6+8+15+4+8+7+12+10+17+28 = **140**)

- NIST leadership support
  - Pat Gallagher, **Willie May**, Kent Rochford, Rich Cavanagh

- DOJ leadership support
  - **Nelson Santos, my fellow Vice-Chair**
  - DAG James Cole, DAG Sally Yates
  - OLP: Kira Antell, Alex Krulic, Shimica Gaskins, Jonathan Wroblewski

- NCFS staff support
  - **DFO**: **Jonathan McGrath**, Andrew Bruck, Brette Steele, Armando Banilla (pre-NCFS initiation)
  - **Lindsay DePalma**, Danielle Weiss, Victor Weedn, Robin Jones
  - Contractor support with note taking at public meetings and subcommittee meetings and webcasts
  - Meeting logistics and planning people at OJP, NIST, and House of Sweden

Organization of Scientific Area Committees (OSAC)

Forensic discipline-specific “guidance groups” administered by NIST

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

https://www.nist.gov/topics/forensic-science/organization-scientific-area-committees-osac

Organization of OSAC Scientific Area Committees for FORENSIC SCIENCE

>600 people involved in 34 operational units
http://www.nist.gov/forensics/osac/index.cfm

- Provides technical leadership to help develop and promulgate **consensus-based documentary standards and guidelines** for forensic science
- Promotes standards and guidelines that are **fit-for-purpose** and **based on sound scientific principles**
- Promotes the use of OSAC documents by accreditation and certification bodies
- Establishes and maintains working relationships with similar organizations

OSAC held an in-person meeting April 18-21, 2017 in Leesburg, Virginia

OVERALL GOAL of OSAC REGISTRY:
Provide trusted discipline-specific standards (and guidelines)
that accrediting bodies can use to audit accredited laboratories

Provides initial starting material	***Creates high-quality guidance materials***	***Turns OSAC materials into standards***

① SWG documents
ASTM standards

OSAC Catalog
(718 documents initially compiled)

② Organization of OSAC Scientific Area Committees for Forensic Science

③ Standards Developing Organization
SDO

④ **OSAC Registry of Approved Standards**

⑤ **Accrediting Bodies audit Forensic Laboratories**
(providing "teeth" to standards)

See **http://www.nist.gov/forensics/osac/osac-newsletter-february-2016.cfm#bigpicture**

OSAC Monthly Newsletter

A communication vehicle to improve interaction with stakeholders

One of the ways to solicit public comment on standards and guidelines up for consideration on the OSAC Registries

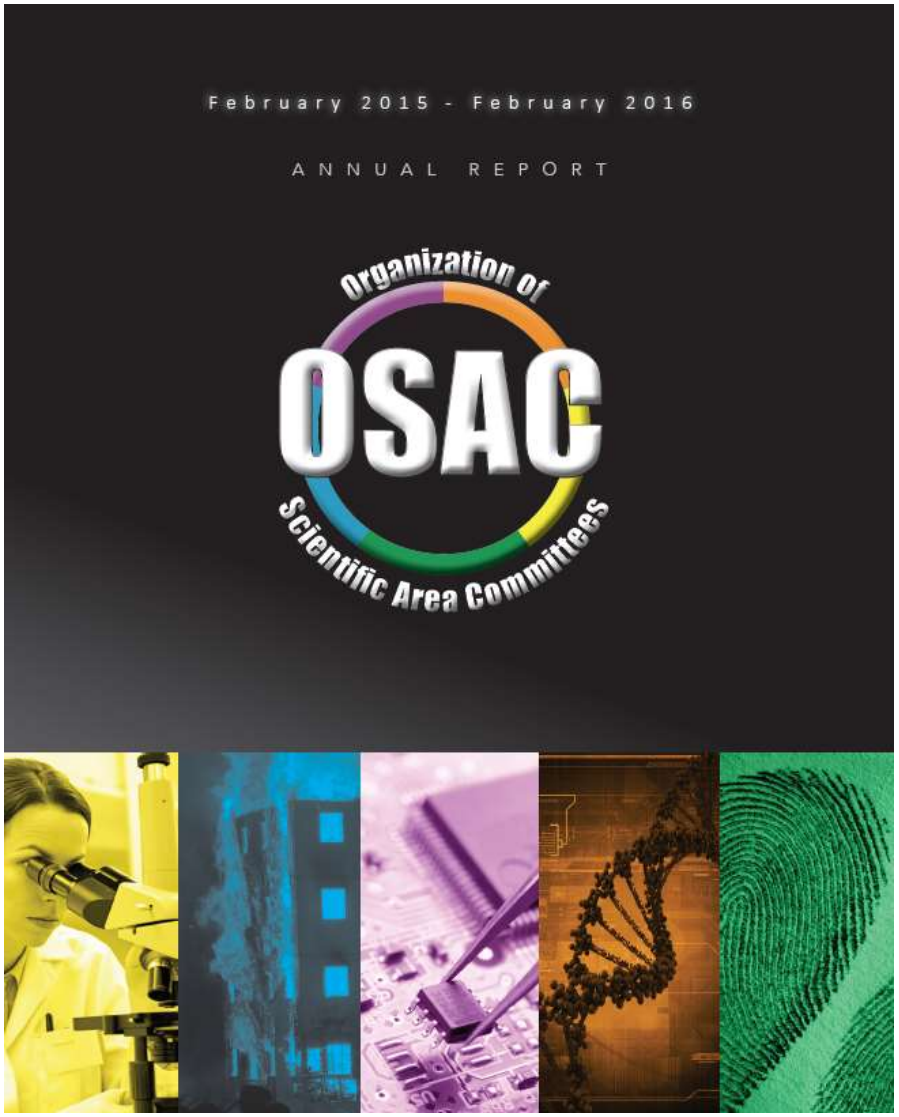
Issues (to-date)

- August 2015
- September 2015
- October 2015
- November 2015
- December 2015
- January 2016
- February 2016
- March 2016
- April 2016
- May 2016
- June 2016
- July 2016
- August 2016
- September 2016
- October 2016
- November 2016
- December 2016
- January 2017
- February 2017
- March 2017
- April 2017

Newsletters released around 15th of each month

https://www.nist.gov/topics/forensic-science/osac-newsletter

OSAC Annual Report



Released 19 September 2016

- **74 page report** summarizing activities from the first year of OSAC (Feb 2015 to Feb 2016)

- Available as a pdf file for download at https://www.nist.gov/sites/default/files/documents/2016/09/13/osac_annual_report_2015-2016.pdf

See also Public Status Meetings (Feb 2017): https://www.nist.gov/news-events/events/2017/02/osac-scientific-area-committees-public-status-reports-open-discussions

NIST Center of Excellence on Forensic Science

CSAFE will focus on the following objectives: **http://forensic.stat.iastate.edu/**

- **Develop and apply statistical methods** to pattern evidence, including latent prints, handwriting, tool marks, computer and information systems, social media, and GPS
- **Develop,** in collaboration with NIST scientists, **new methods for forensic evidence**
- **Develop new inference techniques that account for various sources of uncertainty**
- **Establish a sound base of interpretation for forensic evidence** in judicial settings
- **Educate and train forensic practitioners, judges and attorneys**, and the next generation of statisticians

First Forensic Science Error Management Meeting was Held in July 2015

Proceedings published from the first Error Management meeting *(download using link below)*

- **432 registered participants from 11 countries**
- Over the 3.5-day meeting and across 8 technical tracks and 42 sessions, **there were 2 keynote and 10 plenary speakers, 106 oral presentations, 9 panel discussions, and 18 poster presentations.**
- In their keynote address, Brandon Mayfield, a victim of a forensic science error, and Steven Wax, Mr. Mayfield's attorney, providing a gripping tale of the impact that an error in a fingerprint "match" caused Mr. Mayfield and his family (see video at https://www.nist.gov/associate-director-laboratory-programs/recorded-sessions)

http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1206.pdf

July 24-28, 2017

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

FORENSIC SCIENCE ERROR MANAGEMENT

INTERNATIONAL FORENSICS SYMPOSIUM

July 24-28, 2017 @NIST, Gaithersburg, MD

Crime Scene - Death Investigation
Human Factors - Legal Factors
Quality Assurance - Laboratory Management
Criminalistics - Digital Evidence

https://www.nist.gov/news-events/events/2017/07/2017-international-forensic-science-error-management-symposium

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

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

NIST FORENSIC SCIENCES

www.nist.gov/forensics

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Activity level propositions

Shedder status and background DNA

The implications of shedder status and background DNA on direct and secondary transfer in an attack scenario

Ane Elida Fonneløp[a,c,*], Merete Ramse[a], Thore Egeland[a,b], Peter Gill[a,c]

Forensic Science International: Genetics 29 (2017) 48–60

Contents lists available at ScienceDirect

Forensic Science International: Genetics

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

Research paper

The implications of shedder status and background DNA on direct and secondary transfer in an attack scenario

Ane Elida Fonneløp[a,c,*], Merete Ramse[a], Thore Egeland[a,b], Peter Gill[a,c]

[a] Oslo University Hospital, Norway
[b] IKBM, Norwegian University of Life Sciences, Ås, Norway
[c] University of Oslo, Oslo, Norway

Measurement of shedder status

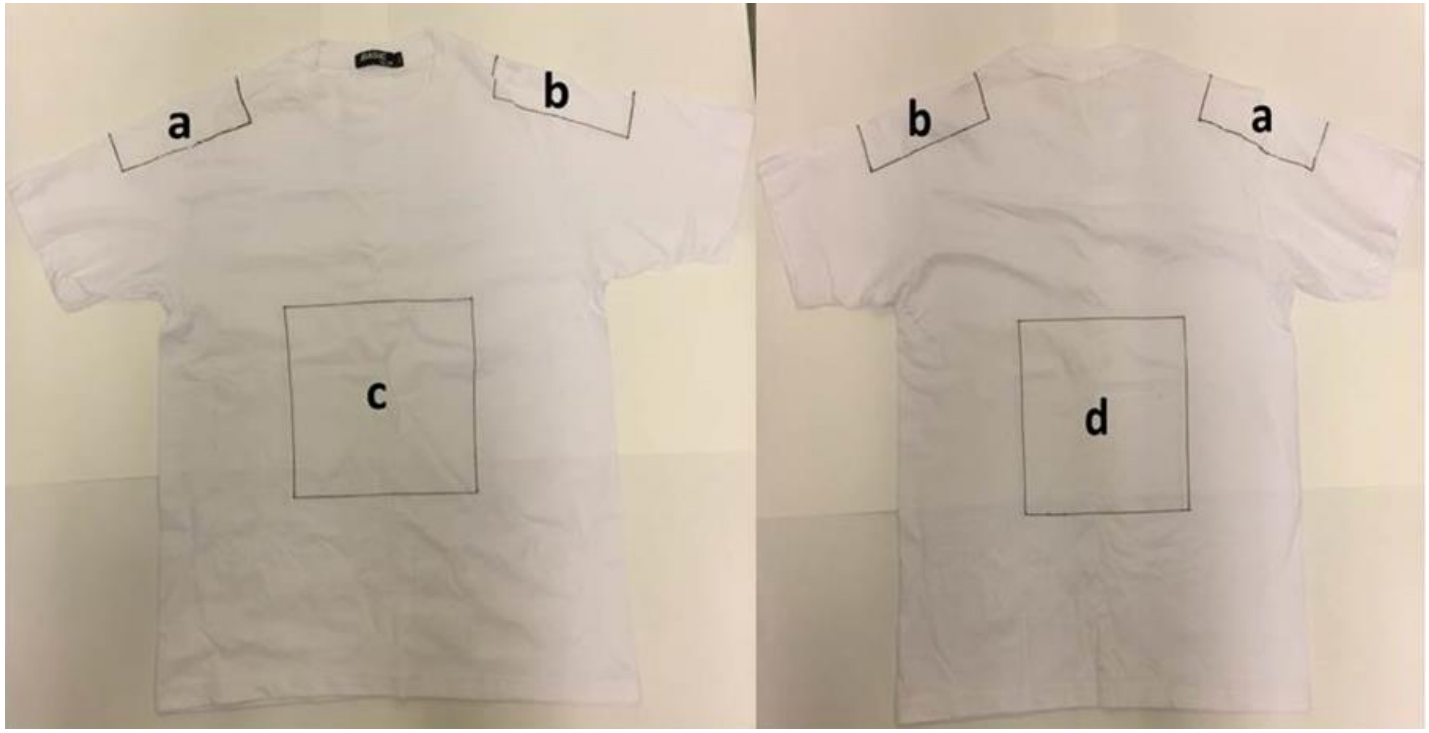
- How to measure the shedder status of an individual?
- Traditionally this has been assessed by determining the amount of DNA shed by an individual related to ‘time since hand-washing’ eg Lowe et al( )
- But this is a bit unrealistic because in casework, we do not know this parameter and perhaps it is unlikely that a criminal washes hands just prior to a crime
- It is generally accepted that there are differences in shedder status

Shedder test (method)

- 20 participants were asked to hold a conical tube for 10s to deposit their DNA
- Sampling repeated 3 different occassions.
- Sampling was taken at random – participants were not told when – no handwashing regime
- This sampling regime reflects a more natural state.

T-shirt preparation

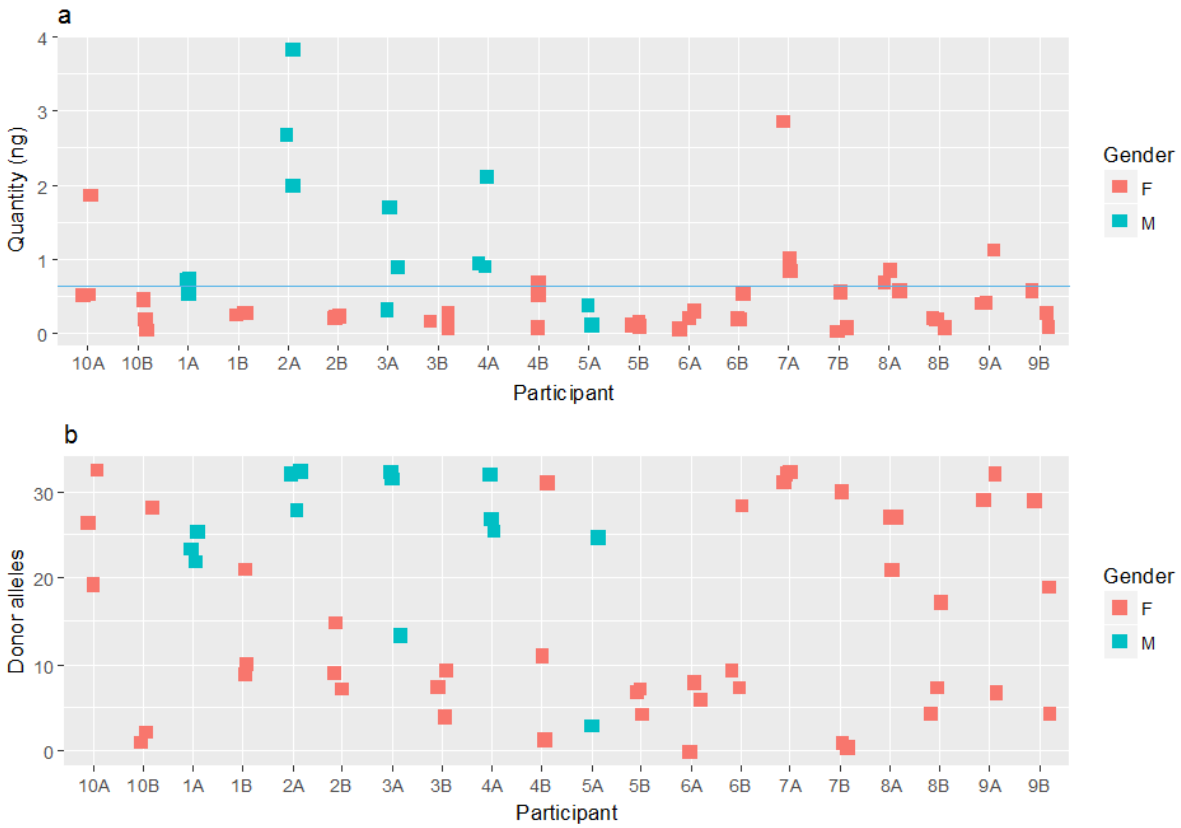
- 35 T-shirts, washed , UV irradiated
- Sampling areas shown



Definitions

- *Background DNA*: we define background DNA as DNA that is not crime related; present at a crime scene before the crime takes place. Background can originate from known and unknown individuals and can be propagated either by direct or by secondary transfer.
- *Direct transfer* is where DNA is transferred directly from a person to an object or to another person. With a crime event, the prosecution will typically assert that a DNA profile is a result of direct transfer from a defendant, since this usually infers an 'activity'.
- *Secondary transfer* is where an intermediary has transferred DNA, either from an object, or from another person. In the context of evaluating a crime-event, the defense may assert that the defendant's DNA was transferred by secondary transfer.

Results – shedder status



mean

high shedders were defined as follows: In at least two of the three samples the DNA quantity had to be above the average concentration in deposits made by all participants (fig 2a), at least 2 profiles had to be high quality (12 or more full loci).

Background

- When people share the same ‘living space’ they transfer DNA between them

Table 2 The detection (frequency) of secondary transfer from co-workers and unknown contributors to high and low shedders T-shirts.

	Low shedders	High shedders	Total
Samples collected	100	48	148
Interpretable secondary transfer from colleagues (frequency)	6 (0.06)	1 (0.02)	7
interpretable secondary transfer from unknowns (frequency)	7 (0.07)	0	7

Transfer during simulated attack

- Samples taken from victim and attacker to determine cross-transfer.

Case circumstances

- A woman working in a store goes out to make a bank deposit. On her way to the bank she is attacked from behind by a masked man, beaten to the ground and robbed. A DNA-sample was collected from an area of the woman's T-shirt where she recalled being held, and the resulting DNA-profile was a two-person mixture of her and an unknown male. The sample was compared against the national DNA database and a match was found with one of her co-workers. His DNA profile had been loaded to the DNA database for a former conviction of drink-driving 5 years ago. The co-worker, who was not at work that day, denies being involved in the attack and claims that his DNA must have been transmitted to the woman by secondary transfer from the environment in the store.

Propositions

- (Hp) is “the defendant is the offender” and the defense hypothesis (Hd) is “the defendant is not the offender”.

Bayes net

Shedder status	High (S)	p=0.25
	Low ($\bar{S}$)	1-p=0.75

Table 4 Conditional probability (p) for cells in node "The offender transferred DNA during attack"

	Shedder status	High (S)	Low ($\bar{S}$)
Direct Transfer	Yes (T)	(T|S) q=0.95	(T | $\bar{S}$) r=0.58
	No ($\bar{T}$)	($\bar{T}$|S) 1-q=0.05	($\bar{T}$| $\bar{S}$) 1-r=0.42

Table 5 Conditional probability (p) for cells in node "Secondary transfer from defendant"

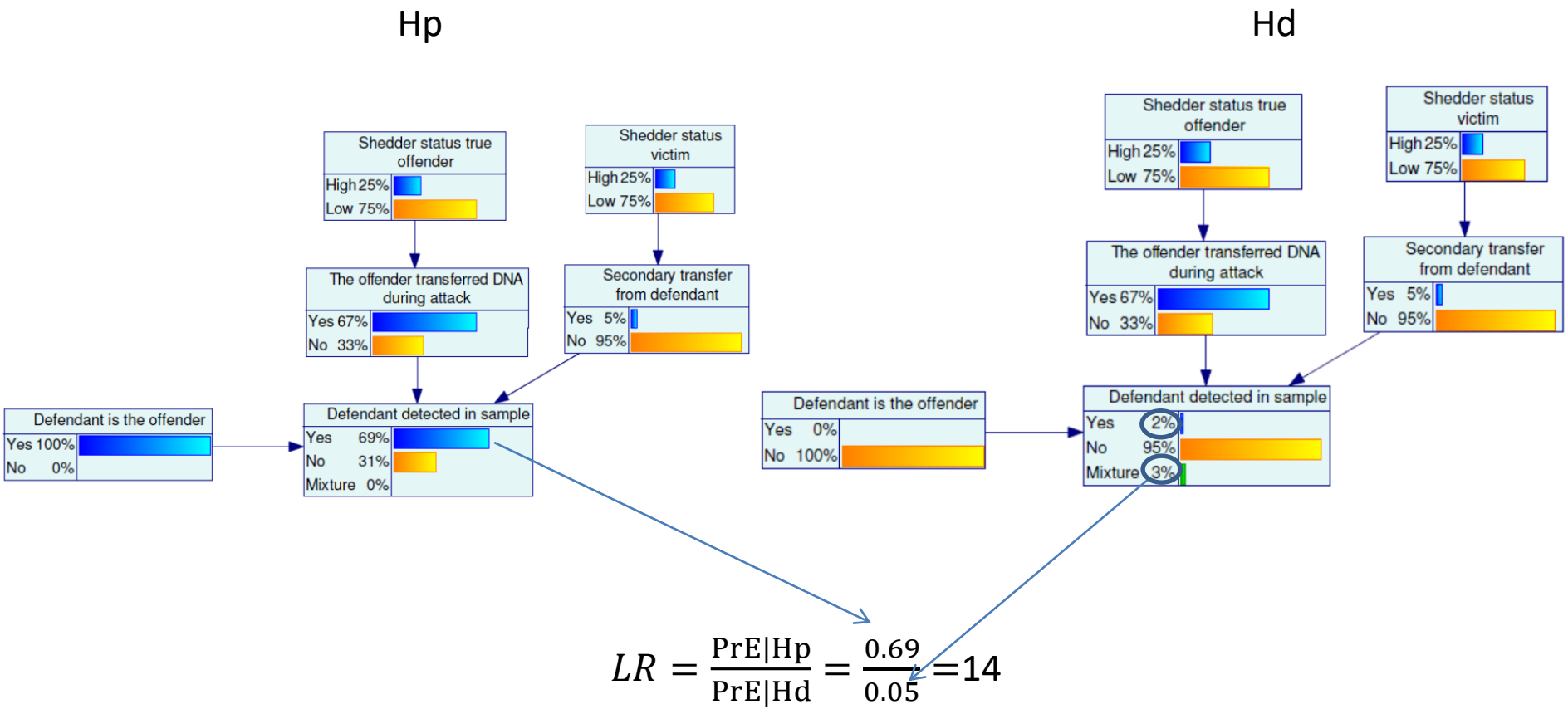
	Shedder status	High (S)	Low ($\bar{S}$)
Secondary transfer	Yes (Q)	(Q| S) s=0.02	(Q| $\bar{S}$) t=0.06
	No ($\bar{Q}$)	($\bar{Q}$| S) 1-s=0.98	($\bar{Q}$| $\bar{S}$) 1-t=0.94

Probability table for node “defendant detected in sample”

	Defendant is offender	**Yes (E)**				**No ($\bar{E}$)**			
	Direct Transfer	Yes (T)		No ($\bar{T}$)		Yes (T)		No ($\bar{T}$)	
	Secondary transfer	Yes (Q)	No ($\bar{Q}$)	Yes (Q)	No ($\bar{Q}$)	Yes (Q)	No ($\bar{Q}$)	Yes (Q)	No ($\bar{Q}$)
Detected	Yes	1	1	1	0	0	0	1	0
	No	0	0	0	1	0	1	0	1
	Mixture	0	0	0	0	1	0	0	0

Bayes Net

Probabilities under Hp, in the case where there is no information about shedder status.



$$LR = \frac{\mathrm{PrE|Hp}}{\mathrm{PrE|Hd}} = \frac{0.69}{0.05} = 14$$

Evaluation of evidence under Hp "The defendant is the offender" (implying direct transfer during the attack), versus Hd "the defendant is not the offender" (implying secondary transfer of DNA), in relation to different scenarios with high and low shedder offender and victim.

Shedder status	Hp	Hd	LR
No prior information	0.69	0.05	14
Offender low / victim low	0.61	0.06	10
Offender high / victim low	0.95	0.06	16
Offender low / victim high	0.59	0.02	30
Offender high / victim high	0.95	0.02	48
Offender NA / victim high	0.68	0.02	34
Offender NA / victim low	0.69	0.06	12
Offender high/victim NA	0.95	0.05	19
Offender low/ victim NA	0.60	0.05	12

Conclusions

- The probability that an attacker will transfer DNA to the victim will depend upon his “shedder status”.
- A high shedder attacker has 95% probability of transferring DNA compared to 58% from a low shedder attacker.
- The shedder status of the offender has a lesser effect.
- DNA matching the attacker from a “high shedder” victim is less likely to be caused by secondary transfer - because it tends to be at low level and therefore masked by the pre-existing background DNA of the high shedder victim.
- This masking effect is reduced with low shedder victims; hence secondary transfer is more likely to be observed.
- shedder status of the victim is actually more important than knowledge of the shedder status of the attacker

Conclusions

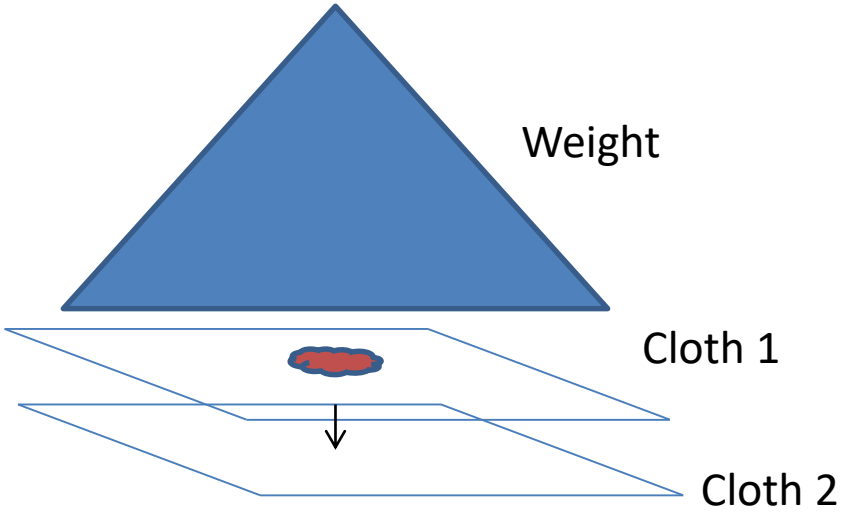
- Note that the LRs are dependant upon the various assumptions of the model which will vary at different crime scenes
- However – throughout, the LRs are always low – in the region of LR=10-48.
- This illustrates that the strength of the evidence of the DNA profile has nothing to do with the strength of evidence at activity level.

Main issues

- Reproducibility between laboratories
- What experimental designs to utilise?
- At least these experiments give an idea of the limitations of reporting by practical demonstration even if they cannot be used directly

Collaborative experiment

- Differences between laboratories?
- Differences between methods?



Analysis of SNP mixtures using Open source software EuroForMix

Øyvind Bleka[1], Peter Gill[1,2], Mayra Eduardoff[3], Carla Santos[4], Chris Phillips[4], Walther Parson[3,5]

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Abstract: A series of two- and three-person mixtures of varying dilutions were prepared and analysed with Life Technologies' HID-Ion AmpliSeq™ Identity Panel v2.2 using the Ion PGM™ massively parallel sequencing system. From this panel, we used 134 autosomal SNPs. Using the reference samples of three donors, we evaluated the strength of evidence of 134 autosomal markers with likelihood ratio (LR) calculations using the open-source quantitative EuroForMix program and compared the results with a previous study using the open-source qualitative LRmix program. Both models were originally designed for multi-allelic STRs. We show how they can be extended to bi-allelic SNPs.

Netherlands Forensic Institute
Ministry of Justice

EDNAP mini-Exercise proposal mtDNA quant

25 April 2017, Vilnius

Benefits of a good mtDNA quantification

- Establish if sufficient mtDNA is present in the sample

  Note: the quant will appear in pg/ul but this has not yet a relation to number of mtDNA copies

- Optimize the input for your favourite typing method
  - Sanger (mini-mito)
  - MPS (equalize input for multiple samples in one run)

  Note: mtDNA copy number varies for cell types, individuals

Strategy

Real time triplex PCR assay

- 40 cycles
- total & male based on Nicklas and Buel 2006
- Mt (loosely) based on Rygiel 2015
- Buffer system: TaqPath Multiplex Master Mix

DNA	Probe	Bp	Dye	Sensitivity
Total DNA	Alu Ya5	127 bp	VIC	0,5 pg/µl
Y DNA	DYZ5	137 bp	FAM	4 pg/µl
mtDNA	CR 16533-180	217 bp	JUN	? 0,1 pg/µl

Current status @NFI

Primers and probes	✓
PCR protocol	✓
Optimizing primer concentrations	in progress

Are you interested?

NFI provides:

- Primers and probes
- Challenging samples
- Protocols

Labs provide

- Your own favourite sample
- Your own total/Y/mtDNA quantification method

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