

Topics and Techniques for Forensic DNA Analysis  
Continuing Education Seminar

# Literature Tracking

NYC OCME  
Dept of Forensic  
Biology

New York City, NY  
March 25, 2009



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Standards and Technology

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## Presentation Outline

- Why bother with the literature?
- What is the literature you should be concerned with reading?
- What are some strategies for reading the literature?
- What resources exist for finding papers?
- What resources exist for storing and retrieving information related to the literature?
- How do I go about writing an article?

## Are You an Expert?

- What kind of expert witness will you be?
- Do you know the field as well as you need to?
- **Reading the literature is critical to your ability to be an effective expert!**

## Why Discuss the Literature?

- NYC OCME is a progressive lab with an active research group (doing Y-STRs, mtDNA, LCN, pathology)
- I think it will be more useful to share literature strategies with you than labs that may not be as progressive
- How we manage information is critical to success in the information age we live in today

## Revised Quality Assurance Standard Requirement for Literature Review

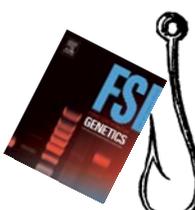
Quality Assurance Standards for Forensic DNA Testing Laboratories  
(effective July 1, 2009)

5.1.3.2. The laboratory shall have a program approved by the technical leader for the **annual review of scientific literature** that documents the analysts' ongoing reading of scientific literature. **The laboratory shall maintain or have physical or electronic access to a collection of current books, reviewed journals, or other literature applicable to DNA analysis.**

[http://www.fbi.gov/hq/lab/fsc/backissu/oct2008/standards/2008\\_10\\_standards01b.htm](http://www.fbi.gov/hq/lab/fsc/backissu/oct2008/standards/2008_10_standards01b.htm)

## I am trying to get you "hooked" on literature

- **I want to teach you to fish** rather than just giving you some fish...



Give a man a fish and you feed him for a day. Teach a man to fish and you feed him for a lifetime.  
Chinese Proverb

"Give a man a fish; you have fed him for today. Teach a man to use the Net and he won't bother you for weeks."  
—Author unknown

### Benefits of Literature Scans

- Become familiar with authors and institutions
- Will improve you as a writer and a presenter
- Will improve your lab's performance
- Over time you will be building your knowledge
- Remember: **You don't have to master every paper...**

How many have read any scientific article in the past month?

### The Value of a Journal Club

- Some potential approaches
  - Have specific people looking at individual journals
  - Bring relevant articles to attention of everyone
- **J Forensic Sci and FSI Genetics will cover ~90% of relevant articles in forensic DNA**
  - Scan journal, distill information, distribute to group
- rQAS requires literature to be available

### How not to do it based on my experience

- Passing around individual journals with a reader list attached
  - Very inefficient process because journals get stuck on someone's desk
  - It becomes challenging to find a specific issue before it is returned to a central repository
  - Some information may not be as relevant (for research) many months later

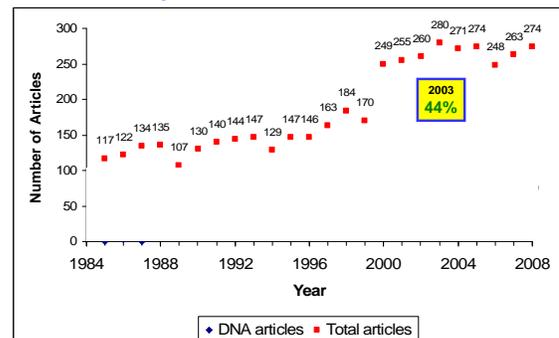
### Forensic Journals

- There are a finite number of journals with the vast majority of primary publications related to forensic DNA analysis

### Forensic Science Publications



### Journal of Forensic Sciences DNA publications vs total articles



From PubMed searches performed Feb 2009 using <http://www.ncbi.nlm.nih.gov/sites/entrez>

The First *Journal of Forensic Sciences* Articles on DNA (April 1986)

J Forensic Sci, Apr 1986, Vol 31, No. 2

**GUEST EDITORIAL**

*Evan Kanter,<sup>1</sup> B.S.; Michael Baird,<sup>1</sup> Ph.D.; George F. Robert Shaler,<sup>2</sup> Ph.D.; and Ivan Balazs,<sup>1</sup> Ph.D.*

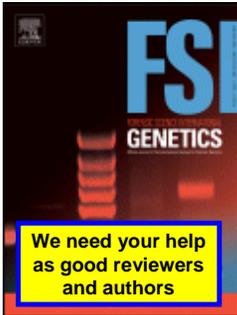
*Alan Giusti,<sup>1</sup> B.S.; Michael Baird,<sup>1</sup> Ph.D.; Sam Pasquale,<sup>2</sup> M.D.; Ivan Balazs,<sup>1</sup> Ph.D.; and Jeffrey Glassberg,<sup>1</sup> Ph.D.*

Forensic Analysis of DNA from Polymorphisms to the Analysis of DNA Recovered from Sperm

Application of Deoxyribonucleic Acid (DNA) Polymorphisms to the Analysis of DNA Recovered from Sperm

REFERENCE: Giusti, A., Baird, M., Pasquale, S., Balazs, I., and Glassberg, J., "Application of Deoxyribonucleic Acid (DNA) Polymorphisms to the Analysis of DNA Recovered from Sperm," *Journal of Forensic Sciences*, JFSCA, Vol. 31, No. 2, April 1986, pp. 409-417.

**Forensic Science International: Genetics**  
<http://www.fsigenetics.com/>



**Editor-in-Chief:**  
 Angel Carracedo (Spain)  
**Associate Editors:**  
 Peter M. Schneider (Germany)  
 John M. Butler (USA)

**FSI: Genetics is a new journal dedicated exclusively to the field of forensic genetics.** It has been launched in 2007 by Elsevier Publishers in affiliation with the International Society of Forensic Genetics. **All members of the ISFG receive a free subscription of this journal** (print and online version) as part of their membership benefits.

**We need your help as good reviewers and authors**



**Contents in 2007-2008**  
 (8 issues; 148 articles)

- STR population data (23)
- Mitochondrial DNA (23)
- Y-STRs (20)
- X-STRs (9)
- SNPs (9)
- Non-human DNA (6)
- Mixtures (6)
- Low-level DNA (5)
- Rapid screening/portable device (4)
- Degraded DNA/miniSTRs (3)
- Disaster victim identification (3)
- DNA extraction (3)
- DNA quantitation (3)
- ISFG DNA Commission (2)
- Introductory information (2)
- DNA databases (2)
- Expert systems (2)
- Paternity testing (2)
- Phenotype information (2)
- Review articles (2)
- Forensic pathology (2)
- Tri-allelic variants (2)
- Telogen hair analysis (2)
- Laser microdissection (2)
- Statistical issues (2)
- Troubleshooting (1)
- DNA sources (1)
- Post-conviction DNA testing (1)
- Potential disease linkage (1)
- Case studies (1)
- Serology (1)

**AAFS 2009 Topics Regarding Forensic DNA**  
 From abstracts of presentations at AAFS meeting in Denver, CO (Feb 2009)

- Improved DNA extraction
- Predicting hair color and ancestry with SNPs
- X-chromosome STRs
- **Familial searching**
- Y-STRs and mixtures
- **Low level DNA samples**
- miniSTRs
- DNA screening assays
- Optimizing database labs
- Microfluidic biochip systems
- Use with property crimes
- Recovery from handguns
- DNA from IEDs
- Expert systems
- Automation with robotics
- DNA quantitation – qPCR
- PCR directly from blood
- mtDNA
- RNA
- Non-human DNA (dogs & cows)
- **Mixture interpretation**

**Approaches to Maintaining an Awareness of the Literature**

- Foster environment where any employee can bring helpful information to their supervisor and team members
- Prepare reference lists on topics of interest to your lab (or team)
  - Examples:
    - **Listing of all articles on mixture interpretation**
    - Gathering 70 articles on low-copy number DNA (pdf files and reference list)

**Some recent relevant articles**

- Gill et al. 2009 – low level DNA thresholds
- Schneider et al. 2009 – mixture classification
- Vallone et al. 2008 - Rapid PCR

### How to Read a Scientific Article

- Skim the article first
  - Start with title and abstract (may consider authors as well)
  - Scan tables, figures and figure captions
- Examine results and conclusions
  - Do the data presented support the statements made?
- Do not worry about trying to comprehend the entire article at first
  - I very rarely read an article from start to finish in its entirety
- Highlight key points and make notes on the paper itself so you can go back to them later to refresh your memory

### Approaches for On-Going Information Searches on Topics of Interest

- Review entire journal listing of articles
  - Pick up journal or view table of contents on-line
- Directed searches on specific topics
  - PubMed
- Sign up for table of contents delivery via email
- **Examine publications cited in review article**

### Analytical Chemistry Application Review

June 15, 2005 issue of *Analytical Chemistry*

#### Forensic Science

T. A. Brottoll\*

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**250 articles referenced covering forensic DNA analysis during 2003-2004**

- Review Contents
- Forensic DNA Analysis
  - Collection, Characterization, Preservation, Extraction, and Quantitation of Biological Material
  - Short Tandem Repeats
  - Single-Nucleotide Polymorphisms
  - Y-STR Typing, Gender Identification, and X-Chromosome Analysis
  - Mitochondrial DNA Typing
  - Y-DNA Typing Systems and Microbial Forensics
  - DNA Databases
  - Interpretation and Statistical Weight of DNA Typing Results
  - General Reviews

### PubMed Searches



<http://www.ncbi.nlm.nih.gov/pubmed>

### PubMed Central



<http://www.pubmedcentral.nih.gov/>

### The Public Library of Science (PLoS) offers free on-line access to scientific articles

OPEN ACCESS Freely available online

#### An Ultra-High Discrimination Y Chromosome Short Tandem Repeat Multiplex DNA Typing System

Eric K. Hanson<sup>1,2</sup>, Jack Ballew<sup>1,2,3,4</sup>

<sup>1</sup> Graduate Program in Biomedical Science, University of Central Florida, Orlando, Florida, United States of America, <sup>2</sup> Department of Chemistry, University of Central Florida, Orlando, Florida, United States of America, <sup>3</sup> National Center for Forensic Science, Orlando, Florida, United States of America

In forensic casework, Y chromosome short tandem repeat markers (Y-STRs) are often used to identify a male donor DNA profile in the presence of excess quantities of female DNA, such as is found in many sexual assault investigations. Commercially available Y-STR multiplexes incorporating 12-17 loci are currently used in forensic casework (PowerPlex<sup>®</sup> Y and Applied Biosystems<sup>®</sup> AmpFISTR<sup>®</sup> Yfiler<sup>®</sup>). Despite the robustness of these commercial multiplex Y-STR systems and the ability to discriminate two male individuals in most cases, the coincidence match probabilities between unrelated males are modest compared with the standard set of autosomal STR markers. Hence there is still a need to develop new multiplex systems to supplement these for those cases where additional discriminatory power is desired or where there is a coincidental Y-STR match between potential male participants. Over 400 Y-STR loci have been identified on the Y chromosome. While these have the potential to increase the discrimination potential afforded by the commercially available kits, many have not been well characterized. In the present work, 31 loci were tested for their relative ability to increase the discrimination potential of the commonly used 'core' Y-STR loci. The result of this extensive evaluation was the development of an ultra high discrimination (UHD) multiplex DNA typing system that allows for the robust co-amplification of 14 non-core Y-STR loci. Population studies with a mixed African American and American Caucasian sample set (n=1372) indicated that the overall discriminatory potential of the UHD multiplex was superior to all commercial kits tested. The combined use of the UHD multiplex and the Applied Biosystems<sup>®</sup> AmpFISTR<sup>®</sup> Yfiler<sup>®</sup> kit resulted in 100% discrimination of all individuals within the sample set, which preages its potential to maximally augment currently available forensic casework markers; it could also find applications in human evolutionary genetics and genetic genealogy.

Citation: Hanson EK, Ballew J (2007) An Ultra-High Discrimination Y Chromosome Short Tandem Repeat Multiplex DNA Typing System. PLoS ONE 2(8): e1618. doi:10.1371/journal.pone.0020058

<http://www.plos.org/>



### WizFolio

**WizFolio Web 2.0** The Next Big Think

WizFolio is a web based productivity tool for managing all types of information. Researchers will improve their research efficiency using WizFolio to gather, organize and generate citations in their writings. You can also use WizFolio to manage and share web pages, pictures, videos, and all kinds of information. WizFolio is Web 2.0 at its best!

**Productivity Plug-Ins**

**WizAdd**

WizAdd grabs bibliographic data, videos, patents, and selected information from any webpage into your WizFolio account.

**WizCite**

WizCite inserts citations from WizFolio directly into Word 2003 and Word 2007. Change citation styles on-the-fly.

<http://www.wizfolio.com>

### Reference Manager Software

**Demonstrate Reference Manager searches and generation of bibliography**

<http://www.refman.com/>

### Literature Management

- Used to spend 2+ hours per week in the library
- Now can access articles via NIST Virtual Library from my desk
- Consolidated Reference Manager database

### Our Project Team Library

**>8,000 references gathered and cataloged in Reference Manager**

- Started by Christian Ruitberg
- Maintained now by **Jan Redman**
- **Updated Monthly** and provided to NIST Human Identity Project Team

**NIST Human Identity Project Team**

John Butler

Margaret Kline

Pete Vallone

Jan Redman

Amy Decker

Becky Hill

**Comprehensive set of forensic DNA articles**

### Strategy for Information Flow

John Butler

**Locate, Print, and Classify Articles**

Jan Redman

**Catalogs and Files Articles**

**Distribution of Database Files to Team Members**

John Butler

Margaret Kline

Pete Vallone

Amy Decker

Becky Hill

**Updates supplied once a month on CD**

### Reference Manager Database

As of March 2009: 4785 references in AllRef and 3258 references in STR\_Ref

**Adding almost 1000 new articles each year**

Ref ID	Authors	Title
364	Gene First	NIST System Technical Manual
363	AngFST	
1354	Publicat	
1305	Genetic	
1115	Aasiphi,A	Allele fre
1937	Abdn,L	Analysis
1675	Acosta,M A	Genetic i
358	Adams,M	The hars
1933	Ago,K	Polymer
1836	Ago,K	Y-chrom
1736	Agrawal,S	DNA short tandem repeat profiling of three North Indian populations
1766	Agrawal,S	Allele frequencies of microsatellite repeat loci in Bhargava, Chaturvedi, and Dhamoon of North India
1766	Agrawal,S	Distribution of allele frequencies of six STR markers in north Indians

### Fruits of a Good Literature Collection

**Review Articles**

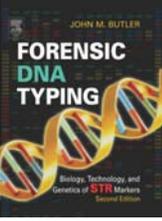
*John M. Butler, Ph.D.*  
**Genetics and Genomics of Core Short Tandem Repeat Loci Used in Human Identity Testing**  
*Anal. Chem.* 2007, 79, 4388-4394 *Analytical Chemistry (June 15, 2007 issue)*

**Forensic Science**  
**T. A. Beetsli\***  
 Department of Chemical and Physical Sciences, Cedar Crest College, 100 College Drive, Allentown, Pennsylvania 18104-6130

**J. M. Butler**  
 Biochemical Science Division, National Institute of Standards and Technology, Gaithersburg, Maryland 20899-0111

**J. R. Almaraz**  
 Department of Chemistry and Biochemistry and International Forensic Research Institute, Florida International University, University Park, Miami, Florida 33199

**Textbooks**



**2nd Edition 688 pp.**  
**Feb 2005**

### And a Useful Reference Website...



### STRBase: Developed as a Central Information Resource for Forensic DNA Typing



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

A comprehensive listing of STR articles is available based on my information collection

### Personal Journal Holdings

- American Journal of Human Genetics (2001-present)
- Genome Research (2001-2007)
- Forensic Science International (2001-2007)
  - NIST Library provides electronic access
- Forensic Science International: Genetics
  - complimentary subscription as the Associate Editor
- International Journal of Legal Medicine (2001-present)
- Journal of Forensic Sciences (data disk 1972-2005)
  - NIST Library provides electronic access
- Legal Medicine (2001-present)

Some funded from 2002-2007 by PECASE award money

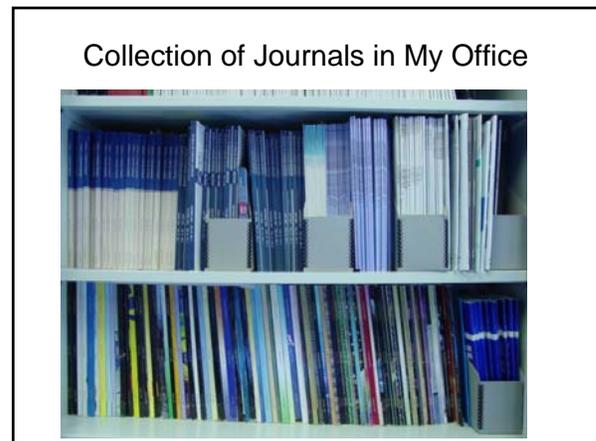
### Presidential Early Career Award for Scientists and Engineers (PECASE) July 12, 2002

**President Honors Scientists and Engineers in Awards Ceremony**  
 Room 450  
 Dwight D. Eisenhower Executive Office Building  
<http://www.whitehouse.gov/news/releases/2002/07/20020712-1.html>  
 10:10 A.M. EDT

THE PRESIDENT: Well, thank you all very much for coming today. It's a privilege to welcome our country's best minds to the White House. Today it is my honor, high honor to welcome the men and women receiving the 2001 Presidential Early Career Awards for Scientists and Engineers




With Arden Bement (former director of NIST, now director of NSF)



### DNA Books Collected

- **Have purchased 266 books** on topics related to forensic DNA analysis as of March 2009



Funded from 2002-2007 by PECASE award money

### Some Recent Books on Forensic DNA



### Collection of Notes from Meetings Attended



### Why you need to write up your work

- Peer-review usually generates quality information
- Talks are not held to the same standard as a written publication (that has been reviewed)
- A written publication is also accessible to those who did not attend a presentation and is archived for future scientists to read

### The Peer-Review Process Based on My Perspective as an Editor

- Authors write article according to journal guidelines (each journal has an "Instructions for Authors")
- Steps during review
  - Article submitted to journal by corresponding author
  - Assigned to an editor
  - Editor asks 2 or more scientists to review the article in a specific timeframe (usually 2-3 weeks)
  - Editor takes reviews into consideration and responds to author with **Accept, Revise, or Reject**; "Revise" is most common
  - Author revises article and resubmits it for another review

Unfortunately, busy scientists often do not complete their review in a timely fashion (requiring the editor to remind them)

### How to Write a Scientific Article

- **Outline the ideas first** with a purpose and plan
  - Decide on scope, design experiments, & collect data
- Write Materials and Methods section first
- Prepare all figures & tables
  - captions should be stand-alone
- Write Results and Discussion based on data shown in figures & tables
- Write Introduction to provide context to your work
- Prepare reference list according to journal format
- **Write abstract last**
  - Most critical piece since it will be the most read!



George Whitesides  
 on how to write a scientific article

*Adv. Mater.* (2004) 16(15): 1375-1377

**Whitesides' Group: Writing a Paper**\*\*

By George M. Whitesides\*

**1. What is a Scientific Paper?**

A paper is an organized description of hypotheses, data and conclusions, intended to instruct the reader. Papers are a central part of research. If your research does not generate papers, it might just as well not have been done. "Interesting and unpublished" is equivalent to "non-existent".

Realize that your objective in research is to formulate and test hypotheses to draw conclusions from these tests, and to teach these conclusions to others. Your objective is not to "collect data".

A paper is not just an archival device for storing a completed research program; it is also a structure for planning the paper in advance of the research program. You should write and rewrite these plans/outlines throughout the process.

**2.2. How Should You Construct an Outline?**

do not agree on the outline, any text is useless. Much of the time in writing a paper goes into the text; most of the thought goes into the organization of the data and into the analysis. It can be relatively efficient in time to go through several (even many) cycles of an outline before beginning to write text; writing many versions of the full text of a paper is slow.

All writing that I do—papers, reports, proposals (and, of course, slides for seminars)—I do from outlines. I urge you to learn how to use them as well.

**author of more than 950 scientific articles and 50 patents**

### "Source Attribution"

- Always cite your sources
  - Important to know where something came from because you might need to go back to it
  - Not all information is of equal value or importance

### Additional Thoughts

- Make time each week to continue your education
  - read an article once a week during lunch
  - read during your commute
- Take detailed notes with each meeting you attend and then share what you learned with others

### Bibliometrics

- **Impact factor (for journals)**
  - The impact factor is a measure of the citations to science journals and is usually thought to reflect the importance of a journal to its field. The Impact factor was devised by Eugene Garfield, the founder of the Institute for Scientific Information, now part of Thomson, a large worldwide US-based publisher. Impact factors are calculated each year by Thomson Scientific for those journals which it indexes, and the factors and indices are published in *Journal Citation Reports*.
- **h-index (for authors)**
  - The h-index is based on a list of publications ranked in descending order by the Times Cited. The value of h is equal to the number of papers (N) in the list that have N or more citations.
  - Hirsch, J.E. (2005) *Proc. Natl. Acad. Sci. USA* 102 (46): 16569-16572 November 15 2005

