



Workshop #5



International Society for Forensic Genetics

Monday, August 28, 2017

Scientific Publication: Literature Searching, Reading, Writing, and Reviewing

John M. Butler, Ph.D.

NIST Fellow & Special Assistant to the Director for Forensic Science
U.S. National Institute of Standards and Technology

Associate Editor, *Forensic Science International: Genetics*



Description of Workshop

Science benefits from effective communication of ideas. Research results are shared with others through publications and presentations. Scientific publication involves efforts in reading, writing, and reviewing the literature. Editors of peer-reviewed journals rely on input from scientific colleagues to judge the merits of submitted manuscripts. Knowledgeable reviewers providing timely feedback are important for a successful peer-review process. Reviewing manuscripts is a chance to provide an important service and to influence the scientific community for good. This workshop will share insights based upon editorial experience with *Forensic Science International: Genetics* as well as extensive writing practice in preparing five textbooks and over 150 research articles and invited book chapters. Approaches to reading, writing, and reviewing relevant literature will be discussed with the goal of improving submissions to the scientific literature.

Workshop packet contents include:

- Slide handouts
- Presenter's article: J.M. Butler (2013) The triad of scientific publication: reading, writing, and reviewing. *FSI Genetics Suppl. Ser.* 4:e115-e116.
- Reference list

Points of view are the presenter and do not necessarily represent the official position or policies of the National Institute of Standards and Technology.

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For more information, see <http://strbase.nist.gov/training.htm>



Bridging East & West
ISFG 2017
20th Congress of the International Society
for Forensic Genetics
August 28 - September 2, 2017
Cebu, South Philippines (Cebu)




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28 August 2017





Value of Studying this Topic



Gerard Piel
(1915 – 2004)
Publisher of *Scientific American* magazine


“Without publication, science is dead.”



“A scientific experiment is not complete until the results have been published and understood.” - Robert A. Day


Some Topics We Hope to Address

- How to **find** the best articles to answer my questions or to strengthen my research efforts
- How to gain the most from articles that I **read**
- How to **store** articles that I collect so I can find them again
- How to **review** or become a better peer-reviewer
- How to **write** or to improve my writing
- How to **revise** manuscripts to address concerns raised during the review process



Workshop #5 Outline

Scientific Publication

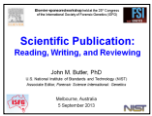

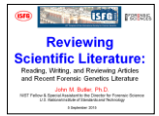


Time	Topics
14:30 – 15:00	Introduction & Expectations; Bibliometrics
15:00 – 15:30	Searching, Collecting, and Storing Articles
15:30 – 16:00	Reading and Reviewing Articles
16:00 – 16:30	BREAK
16:30 – 17:30	Writing, Authorship, and Creating Useful Figures and Tables
17:30 – 18:00	Submission & <i>FSI Genetics</i> experiences

ISFG Presentations on Scientific Publication

- 2013 (Melbourne)** – evening (**1 hour**) workshop sponsored by Elsevier
- 2015 (Krakow)** – **45 minute** talk on Saturday morning
- 2017 (Seoul)** – pre-conference (**3 hour**) workshop

Available on <http://strbase.nist.gov/NISTpub.htm#Presentations>

Article from my ISFG 2013 workshop

Forensic Science International: Genetics Supplement Series 4 (2013) e115–e116



Contents lists available at ScienceDirect

Forensic Science International: Genetics Supplement Series

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



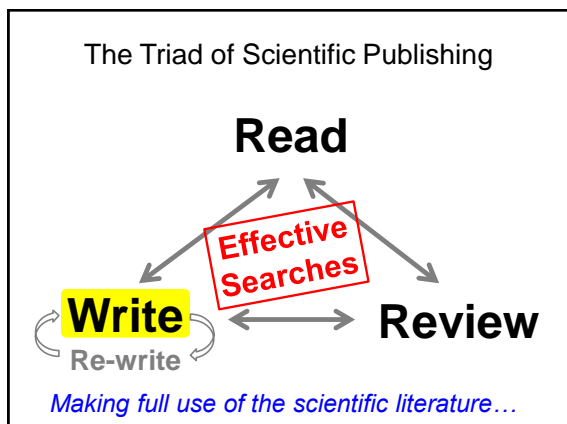
The triad of scientific publication: Reading, writing, and reviewing

John M. Butler^a

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

...“An important purpose of scientific publication is to document work performed to aid the advancement of science. In short, writing enables history.”

...“Reviewing manuscripts is a chance to influence the community for good and to provide service back to journals...”



A 2016 Workshop on Improving Forensic Science Literature Searches

Susan Makar, Amanda Matanowski, Matthew Wood, John Butler, Jeff Tittelbaum, Melissa Taylor

Topics Covered:

- Why Search & Read the Literature
- Free Information Resources
- Using Web of Science
- Case Examples
- ForSciPub Vision
- AAAS, NCFS, and OSAC Activities

Information Does Exist Beyond the First Page of Your Google® Search!
Tools and Strategies for Forensic Science Literature Searching and Use

Chair: John M. Butler
Co-Chair: Matthew R. Wood

http://strbase.nist.gov/training/AAFS2016_LiteratureWorkshop.htm

Topics in This ISFG 2017 Workshop

**The 3 R's of Scientific Publication:
Reading, (Re-)Writing, and Reviewing**

- **Reading**
 - Strategies & tools for reference collection
- **Writing**
 - Submission & peer-review process
- **Reviewing**
 - Experiences with *FSI Genetics*

Target Audience for This Presentation

- Young (or even more seasoned) scientists who want to learn how to write better or become a more effective reviewer
- Anyone who wants to better understand the review process

“Writing a manuscript is arguably the single most critical component to being a scientist – one for which, in many cases, formal training is minimal.”

– Dr. Nathan Blow, *BioTechniques* editor-in-chief (May 2013, p. 235)

My Qualifications on this Topic

Degrees in chemistry

- BYU (B.S., 1992), University of Virginia (Ph.D., 1995)
- Undergraduate classes on scientific writing and public speaking

Experience

- Research-focused career
 - Published >150 articles and invited book chapters
 - Given >300 presentations on scientific topics
- Love for teaching
 - More than 50 workshops on DNA topics
 - Written five books (so far) on forensic DNA typing
- Active reviewer and journal editor responsibilities
 - Associate editor of *Forensic Science International: Genetics* since 2007
 - Reviewed hundreds of articles for >20 different journals
- Avid lifelong reader of history and science
 - Read >2,000 books and thousands of articles

Named by ScienceWatch in July 2011, as the #1 world-wide high-impact author in legal medicine and forensic science over the previous decade

Quote on p. xiv, J.M. Butler (2015) *Advanced Topics in Forensic DNA Typing: Interpretation* (Elsevier; San Diego)

Doug Butler Thoughts on Learning

“You never really learn anything until you have to teach it to someone else.”

My father has written a dozen books covering his field of **horseshoeing** and started his own school after teaching at three different universities.

His latest book (2012) Making horseshoes Putting shoes on the horse

Acknowledgments for Those Assisting Me in Gaining My Experience in Scientific Writing



- My father inspired me to write through his example of authoring textbooks (my first book is dedicated to him)
- **My wife regularly corrects me and helps me ensure that my words can reach a non-scientist**
- Colleagues at NIST (particularly Kathy Sharpless & Dave Duewer) have provided input on my last three books & other research/review articles over the years
- Graduate school advisors (Bruce McCord, **Ralph Allen**, & Bruce Budowle) had an important influence on helping me writing my PhD dissertation and my first few research papers



Giving a copy of my 5th book on DNA to my professor, Ralph Allen, on his retirement (November 2015)

Introductions & Expectations

- **Your Name?**
- **Your Laboratory/Employer?**
 - Or are you a student?
- **What you hope to learn in this workshop?**

The Literature and Bibliometrics

Why Publish Scientific Articles?

- **To spread information and share new knowledge with others**
- To gain recognition, success and prestige for the authors and their institutions
- To win promotion to higher positions, job security, and tenure within academia
- To enhance chances of obtaining grants and research funding
- To gain priority for making a discovery

From Prof. Wayne Jones presentation at 19th IAFS meeting (Madeira, Portugal), 15 Sept 2011
"Publishing In Forensic Sciences: Where and How to Publish and the Meaning of Numbers"

Scientific Publication Advances Knowledge



"Science... has provided a **record of ideas** and has enabled man to manipulate and to make extracts from that record so that knowledge evolves and endures **throughout the life of a race** rather than that of an individual."
- Vannevar Bush

Slide from AAFS 2016 workshop (Information Does Exist Beyond the First Page of Your Google Search)
Melissa Taylor "ForSciPub: A Vision for the Future of Forensic Science Literature"
Available at http://strbase.nist.gov/training7_AAFS2016-W1-Taylor.pdf

Ranking of the Value and Relevance of Scientific Writing

Lesser
value

- Website blogs and opinion pieces
- Non-peer reviewed articles
 - Conference proceedings
 - Letters to the editor
 - Many review articles
- Peer-reviewed research articles – with data!
- **Highly cited scientific articles**
 - Shows support from other scientists over time
 - **Truly a measure of "scientific acceptance"**

Greater
value

National Commission on Forensic Science (NCFS) Activities Regarding Forensic Literature

<https://www.justice.gov/archives/ncfs>

- **NCFS Scientific Inquiry & Research Subcommittee discussed issues with the forensic science literature**

"A cursory review of the literature citations raised concerns within the NCFS that extend beyond these specific [SWG] bibliographies [provided to the SoFS]:

"1. In some cases, it was unclear which literature citations are crucial to support the foundation of a particular forensic science discipline.

"2. Some of the cited literature had not undergone a rigorous peer-review process."

Available at <https://www.justice.gov/ncfs/file/786591/download>

From Jan. 2015 NCFS work product: "Scientific Literature in Support of Forensic Science and Practice"



NATIONAL COMMISSION ON FORENSIC SCIENCE

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

Scientific Literature in Support of Forensic Science and Practice

Commission Action:

On January 30, 2015, the Commission voted unanimously to adopt this work product.

Type of Work Product:

Views Document issued by the Scientific Inquiry and Research Subcommittee

- "The NCFS believes that **a comprehensive evaluation of the scientific literature is critical** for the advancement of forensic science policy and practice in the United States."
[and worldwide as well...]

Available at <https://www.justice.gov/ncfs/file/786591/download>

From Jan. 2015 NCFS work product: "Scientific Literature in Support of Forensic Science and Practice"

It is the position of the NCFS that **foundational, scientific literature supportive of forensic practice should meet criteria** such as the following:

- **Peer-reviewed** in the form of original research, substantive reviews of the original research, clinical trial reports, or reports of consensus development conferences
- **Published in a journal or book** that has an **International Standard Number** (ISSN for journals; ISBN for books) and **recognized expert(s) as authors** (for books) or on its Editorial Board (for journals)
- **Published in a journal** that maintains a clear and publicly available statement of purpose **that encourages ethical conduct** such as **disclosure of potential conflicts of interest** integral to the peer review process
- **Published in a journal that utilizes rigorous peer review with independent external reviewers** to validate the accuracy in its publications and their overall consistency with scientific norms of practice
- **Published in a journal that is searchable using free, publicly available search engines** (e.g. PubMed, Google Scholar, National Criminal Justice Reference Service) that search major databases of scientific literature (e.g. Medline, National Criminal Justice Reference Service Abstracts Database, and Xplore)
- **Published in a journal that is indexed in databases that are available through academic libraries and other services** (e.g. JSTOR, Web of Science, Academic Search Complete, and SciFinder Scholar)

Available at <https://www.justice.gov/ncfs/file/786591/download>

From Jan. 2015 NCFS work product: "Scientific Literature in Support of Forensic Science and Practice"

Bibliometrics

efforts to measure scientific productivity
in an academic world of "Publish or Perish"

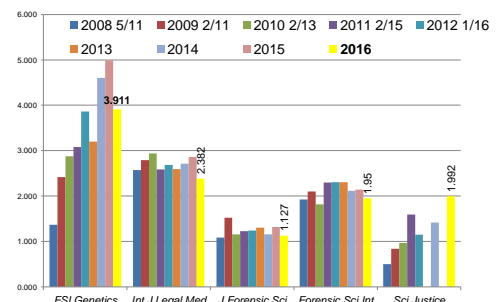
- **Impact factor (for journals)** http://en.wikipedia.org/wiki/Impact_factor
 - a **measure of the citations to science journals**
 - **can reflect relative importance of a journal to its field**
 - devised by Eugene Garfield, the founder of the Institute for Scientific Information
 - calculated yearly starting from 1975 for those journals that are indexed in the *Journal Citation Reports*
- **h-index (for authors)** <http://en.wikipedia.org/wiki/H-index>
 - described in 2005 by Jorge Hirsch (*Proc Natl Acad Sci* 102: 16569-16572)
 - an attempt to measure an author's productivity and impact
 - based on a list of an author's publications ranked in descending order by the number of times each publication is cited
 - value of h is equal to the number of papers (N) in the list that have N or more citations

Tools for Performing Bibliometrics

- **Science Citation Index** (prior to 2000)
 - CD-ROM from the Institute for Scientific Information
- **Web-based tools**
- **Web of Science** (since 2002; subscription fee)
 - Thomson Reuters → Clarivate Analytics (<https://www.webofknowledge.com/>)
 - 1.3 billion cited references back to 1900 from >18,000 journals
- **Scopus** (since 2004; subscription fee)
 - Elsevier (<https://www.scopus.com/>)
 - Most coverage only back to 1996 from ~23,000 journals & >150,000 books
- **Google Scholar** (since 2004; free)
 - Google (<https://scholar.google.com/>)
 - Size of available reference set is unpublished

For more information, see Hicks, D. et al. (2015) The Leiden Manifesto for research metrics. *Nature* 520: 429-431

Impact Factors for Forensic Genetics Journals



Impact Factor of a Journal

- Concept first described in 1955 and further developed over the years by Eugene Garfield
- Reflects the average number of citations to recent articles published in the journal



Citation Indexes for Science
A New Dimension in Documentation
through Association of Ideas
Eugene Garfield

Garfield, E. (1955) *Science* 122: 108-111

For example, an impact factor for 2016 (released in 2017)

The number of times that articles published in the journal in 2014 and 2015 were cited by articles in indexed journals during 2016

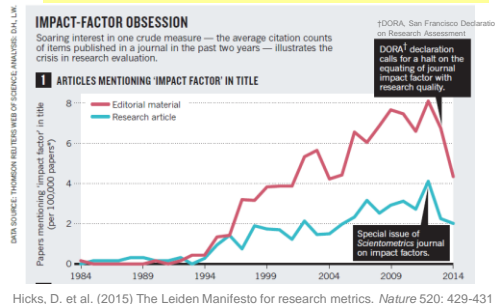
The total number of "citable items" published in that journal in 2014 and 2015

See Garfield, E. (2006). The history and meaning of the journal impact factor. *Journal of the American Medical Association* 295: 90-93

Reflects a 2-year window of use

Some Research Metrics Can Go Too Far

"Metrics have proliferated: usually well intentioned, not always well informed, often ill applied. We risk damaging the system with the very tools designed to improve it..."



COMMENT OBITUARY

Wouters, P. (2017) *Nature* 543: 492

Inventor of the impact factor passed away on 26 February 2017

Eugene Garfield (1925–2017)

Inventor of the Science Citation Index.



"I think you're making history, Gene!" So said Nobel laureate and molecular biologist Joshua Lederberg to his friend Eugene Garfield in 1962. They were building the Science Citation Index (SCI), now the Clarivate Analytics Web of Science, with long-sought grants from US funding agencies. Today, we cannot imagine research without indexes that reveal how articles are cited. Garfield enabled an entire field, scientometrics, the quantitative study of science and technology.

Garfield died on 26 February. We met in 1992, when I was writing a history of the index. That was a few months before he sold the Institute for Scientific Information (ISI), the company he had founded (initially named Documentation) in 1956 in Philadelphia, Pennsylvania, to Thomson Reuters. He stayed on as chairman emeritus, a bomb of energy, still coming up with ideas for applying citation indexes.

Garfield also launched *The Scientist* — a monthly magazine for life scientists — together with indexes in the social sciences and humanities, and services that

at conferences, making prototype indexes and sending proposal after proposal to the US Patent Office, the National Science Foundation and the National Institutes of Health. Funding finally became available after 1957, when the launch of the Soviet Union Sputnik satellite unleashed panic in the United States about the information crisis in science. Funders wanted ways to evaluate their effectiveness. Lederberg and Garfield joined forces to build an automated citation index across science.

Nonetheless, for many years, the SCI made a loss, supported by profits from *Current Contents* and other ISI services. Neither scientists nor librarians saw much use for these expensive books (a ten-year set could cost US\$25,000) with their long lists of code in small print. The exception was the community of historians and sociologists of science. For example, Derek de Solla Price, a science historian at Yale University in New Haven, Connecticut, and sociologist Robert Merton at Columbia University immediately saw the SCI as an instrument for analysing the dynamics and structure of science, and each developed theories about citations in research.

In 1951, he landed a job at the Welch Medical Library at Johns Hopkins University in Baltimore, Maryland, where almost all information services of the National Library of Medicine

<http://www.nature.com/nature/journal/v543/n7646/full/543492a.html>

Nobel Laureate Richard Roberts Calls for Eliminating the Journal Impact Factor

Roberts, R.J. (2017) An obituary for the impact factor. *Nature* 546: 600

- "I suggest that the time has come to formally declare this metric's [the impact factor's] demise."
- "The impact factor is often used, improperly, to provide a mathematical measure of a scientist's productivity, on the basis of where they published their results. It has proved popular with bureaucrats, and even with many researchers, because it seems to offer an easy way to determine the value of a scientist's output for someone who is either unable or too lazy to read that scientist's papers and judge their true worth."
- "It should never have been used and has done great damage to science. Let us bury it once and for all."

The h-index

(proposed in 2005 by Jorge Hirsch)

An index to quantify an individual's scientific research output

J. E. Hirsch*

Proc Natl Acad Sci USA (2005) 102: 16569-16572

Department of Physics, University of California at San Diego, La Jolla, CA 92093-0319

Communicated by Manuel Cardenas, Max Planck Institute for Solid State Research, Stuttgart, Germany, September 1, 2005 (received for review August 15, 2005)

I propose the index h , defined as the number of papers with citation number h , as a useful index to characterize the scientific output of a researcher.

citation / impact / unbiased

For the few scientists who earn a Nobel prize, the impact and relevance of their research is unquestionable. Among the rest of us, how does one quantify the cumulative impact and relevance of an individual's scientific research output? In a world of limited resources, such quantification (even if potentially distorted) is often needed for evaluation and comparison purposes (e.g., for university faculty recruitment and advancement, award of grants, etc.).

Published papers are rank ordered by decreasing citation number → the h -index is the number of the paper rank where the number of citations is greater than the paper rank number

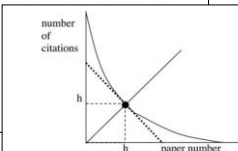


Fig. 1. Schematic curve of number of citations versus paper number, with papers numbered in order of decreasing citations. The intersection of the 45° line with the curve gives h . The total number of citations is the area under the curve. Assuming the second derivative is nonnegative everywhere, the minimum area is given by the distribution indicated by the dotted line, yielding a 2 in Eq. 1.

Times cited — ranked highest to lowest with publication year only first 75 articles shown

h -index = 53

"John M Butler" Google Scholar Search 16 Aug 2017

My book (2nd edition)					My first article					Most recent article shown				
rank	year	# cites	rank	year	# cites	rank	year	# cites	rank	year	# cites	rank	year	# cites
1	2005	902	16	1999	189	31	2005	95	46	1997	60	61	2012	44
2	2006	528	17	2002	186	32	2004	94	47	2006	59	62	2005	44
3	2006	477	18	2003	181	33	2011	93	48	2001	59	63	2013	41
4	2003	476	19	2000	162	34	2007	91	49	2005	57	64	2003	41
5	2001	454	20	2004	151	35	2003	90	50	2004	56	65	2004	40
6	2004	341	21	2008	148	36	2007	89	51	1999	56	66	2002	40
7	2005	298	22	2004	127	37	1998	82	52	2005	55	67	2001	40
8	2009	296	23	2014	120	38	2008	70	53	1996	55	68	2005	39
9	2002	239	24	2006	120	39	1995	70	54	2013	51	69	1998	38
10	1995	238	25	2013	114	40	1994	70	55	2011	51	70	2001	37
11	2011	234	26	2005	113	41	2012	69	56	2013	50	71	2009	36
12	1999	231	27	2003	109	42	2010	68	57	2008	50	72	2007	36
13	2004	216	28	2005	107	43	2005	68	58	2011	49	73	2013	34
14	2007	197	29	1998	101	44	2009	66	59	2008	48	74	2002	34
15	2010	193	30	1994	98	45	2014	60	60	2004	47	75	2015	32

h-index Comparisons for John M. Butler

Leiden Manifesto: "Reading and judging a researcher's work is much more appropriate than relying on one number." (Hicks et al. *Nature* 2015 520:429-431)

Web of Science
<https://apps.webofknowledge.com>

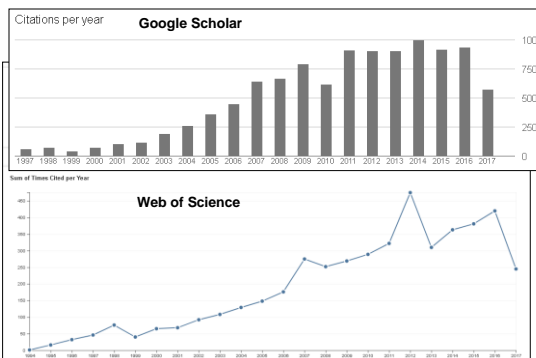
Google Scholar
<http://scholar.google.com>

Searches Conducted: August 16, 2017

Number of Articles Considered	117	173
Total Number of Citations	4,598	10,721
<i>h</i> -index #pubs with at least <i>h</i> citations	37	53
<i>i10</i> -index #pubs with ≥10 citations	79	107

Google Scholar found more articles and includes books, book chapters, and conference proceedings (e.g., my 2005 *Forensic DNA Typing* textbook is cited 902 times)

Citation Growth Curves over Time



van Noorden, R. et al. (2014) The top 100 papers. *Nature* 514: 550-553



THE TOP 100 PAPERS
Nature explores the most cited research of all time.

57,798,126 papers examined using Web of Science (1900-2014)

# citations	# articles	%
0	25,332,701	44 %
1 to 9	18,280,005	32 %
10 to 99	13,104,875	23 %
100 to 999	1,066,046	1.8 %
1000 to 9999	14,351	0.025 %
>10,000	148	
>100,000	3	

A 2014 Study on Citations

<http://nature.com/top100>

- "Older papers [have] more time to accrue citations"
- "Biologists tend to cite one another's work more frequently than, say, physicists."
 - The top article, a 1951 publication on protein measurement, had been cited **305,148 times**
 - Watson & Crick 1953 article on the structure of DNA had been cited **5,207 times**
 - Hirsch's 2005 proposal for the *h*-index to measure scientific productivity had been cited **1,797 times**
- 25,332,701 items had received zero citations** while 18,280,005 were cited 1-9 times → **more than three-fourths of published papers receive less than 10 citations**

Searching the Scientific Literature

What is the Scientific Literature?

John Maddox (the editor of *Nature* at the time) wrote in August 1986:

- "Professional people have won a poor reputation for their skill at communicating with each other. The complaint may unfortunately be justified."
- By what test are the scientific journals counted as literature?
 - "The bare minimum of an answer is that they are collectively referred to in this way by their contributors. Collectively, they also have the quality of permanence; they sit on library shelves for decades on end, and are referred to with reverence by those who contribute to later issues."

John Maddox (1986) What is the scientific literature? *Nature* 322: 681

Some Forensic Science Journals



Approaches to Retrieving Information

- **Passive reading**
 - You just happen to come across something interesting while browsing a journal that comes across your desk
- **Active searching** on a specific topic
 - Online tools (free resources and subscription databases)
 - Search strategies and key words used make a difference
- **Automated information push** from key words
 - Subscribing to a website RSS (rich site summary) feed informs you as the user to receive notification of any updates to the site based on key words provided



Selecting What to Read...

The amount of information available can feel overwhelming at times... It has been estimated that >23,000 journals exist and >50 million papers have been published since 1665 [A.E. Jinha (2009) *Learned Publishing* 23:258-263]

- Review entire journal listing of articles
 - Examine journal issue or view table of contents on-line
- Perform directed searches on specific topics
 - PubMed <http://www.ncbi.nlm.nih.gov/PubMed>
 - Web of Science <http://apps.webofknowledge.com>
- Sign up for table of contents delivery via email
- **Examine publications cited in review articles**

Web of Science Searches Can Help Track Where a Particular Author Publishes

Field: Source Titles	Record Count	% of 93	Bar Chart
FORENSIC SCIENCE INTERNATIONAL GENETICS	23	24.731 %	
JOURNAL OF FORENSIC SCIENCES	18	19.355 %	
ANALYTICAL CHEMISTRY	10	10.753 %	
FORENSIC SCIENCE INTERNATIONAL	8	8.602 %	
ELECTROPHORESIS	6	6.452 %	
INTERNATIONAL JOURNAL OF LEGAL MEDICINE	5	5.376 %	
BIOTECHNIQUES	3	3.226 %	
INTERNATIONAL CONGRESS SERIES	3	3.226 %	
JOURNAL OF MOLECULAR DIAGNOSTICS	3	3.226 %	
ANALYTICAL AND BIOANALYTICAL CHEMISTRY	2	2.151 %	
NUCLEIC ACIDS RESEARCH	2	2.151 %	

Web of Science search (16 August 2017)

Learn from What Others Pick as Valuable

- **Subscribe to an email list** provided by a librarian
 - Jeff Teitelbaum and his Washington State Patrol Forensic Laboratory Services Bureau email list



FLSBLibrary@wsp.wa.gov
Jeff.Teitelbaum@wsp.wa.gov

>2,500 emails sent in the past two years with interesting articles to consider reading covering all aspects of forensic science (both current and historical)

- **Review article highlights** on a journal website
 - E.g., <https://www.nature.com/research-highlights/>

nature.com

Research Highlights

Our pick of the latest scientific literature

Review Articles and Citations in Volume 18

Special Issue: New Trends in Forensic Genetics

Author(s)	Topic	Total Citations
J.M. Butler	Introduction and issue summary	14
J.M. Butler	U.S. initiatives to strengthen forensic science	141
T. Sijen	Molecular approaches for forensic cell type identification	153
M. Kayser	Forensic DNA phenotyping	100
C. Phillips	Bio-geographical ancestry	111
R. Cotton & M. Fisher	Sperm & seminal fluid properties	102
C. Børsting & N. Mørling	Next generation sequencing	94
E. Romsos & P. Vallone	Rapid PCR of STR markers	118
P. Gill et al.	Historical overview of STR genotyping and interpretation	177
K. Gettings et al.	STR allele sequence variation	110
R. Just et al.	Mitochondrial DNA heteroplasmy & NGS	88
T.M. Diegoli	STR markers on the X and Y chromosomes	248
R. Ogden & A. Linacre	Wildlife forensic science & genetic geographic origin assignment	63
M. Brion et al.	Molecular autopsy & NGS	72

1591 references cited in these 14 articles

Seek Contributions from Focused Meetings

From a UK Royal Society Meeting Held in London February 2015

PHILOSOPHICAL TRANSACTIONS B

rsta.royalsocietypublishing.org

The future of forensic DNA analysis

John M. Butler

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

Opinion piece



One this article: Butler JM. 2015 The future of forensic DNA analysis. *Phil. Trans. R. Soc. B* 370: 20140252.
<http://dx.doi.org/10.1098/rsta.2014.0252>

Accepted: 26 February 2015

One contribution of 15 to a discussion meeting issue 'The paradigm shift for UK forensic science'.

The author's thoughts and opinions on where the field of forensic DNA testing is headed for the next decade are provided in the context of where the field has come over the past 30 years. Similar to the Olympic motto of 'faster, higher, stronger', forensic DNA protocols can be expected to become more rapid and sensitive and provide stronger investigative potential. New short

Email author to request a copy
john.butler@nist.gov

will impact the future of forensic DNA are explored including the need for education and training to improve interpretation of complex DNA profiles.

<https://royalsociety.org/events/2015/02/forensic-science/>

A Valuable Article on Searching

Forensic Science Review (Jan 2015) 27: 41-52

An Improved Forensic Science Information Search

J. Teitelbaum
Forensic Science Library Services
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United States of America

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- Describes a number of free resources and how to optimize searches

- Uses examples from forensic toxicology to demonstrate different types of searches

- Email author for a copy:
Jeff.Teitelbaum@wsp.wa.gov

Jeff Teitelbaum currently runs the forensic library and research services for the state of Washington's Forensic Laboratory Services Bureau, the seven-lab crime lab system of the Washington State Patrol, where he supports the information needs of over 200 forensic scientists.

Some Free Resources for Searching



Slide from AAFS 2016 workshop (Information Does Exist Beyond the First Page of Your Google Search)
Jeff Teitelbaum "Free Forensic Science Information Resources for the Practitioner"
Available at http://strbase.nist.gov/training/5_Case%20Example_Teitelbaum.pdf



US National Library of Medicine
25 million citations from the biomedical literature



Slide from AAFS 2016 workshop (Information Does Exist Beyond the First Page of Your Google Search)
Jeff Teitelbaum "Free Forensic Science Information Resources for the Practitioner"
Available at http://strbase.nist.gov/training/3_Free%20Resources_Teitelbaum.pdf

Lessons Learned (from Jeff Teitelbaum)

- Publicly accessible databases and search engines can be incredibly useful
- **Never rely on only one resource.** Using multiple resources is essential to quality results
- Using search operators can dramatically improve your search results
- Spend time to learn about the advanced features and techniques for each resource
- **Work to find the specific terminology used in the scientific literature.** Using PubMed search box prompts can be useful.

Slide from AAFS 2016 workshop (Information Does Exist Beyond the First Page of Your Google Search)
Jeff Teitelbaum "Free Forensic Science Information Resources for the Practitioner"
Available at http://strbase.nist.gov/training/5_Case%20Example_Teitelbaum.pdf

Search Tools and Strategies

- Tools and search strategies for finding forensic publications
 - **Web of Science** – multidisciplinary sciences
 - **SciFinder** – chemistry and related areas
 - **Compendex** – engineering, computer science, etc.
 - **LexisNexis** – legal and news
- Impact assessment
- Data visualization tools

Note: The identification of any commercial product or trade name does not imply endorsement or recommendation by the National Institute of Standards and Technology.

Slide from AAFS 2016 workshop (Information Does Exist Beyond the First Page of Your Google Search)
Susan Makar and Amanda Malanowski "Tools for Searching and Analyzing the Forensic Science Literature"
Available at http://strbase.nist.gov/training/4_AAFS2016-W1-MakarMalanowski.pdf

Database Search Tips – Getting Started

- Write down the **key concepts** you want to focus on
- Limit to past **5 years**, **English** language articles, as an initial way to focus and narrow results
- As you search, **write down** synonyms, keywords, controlled vocabulary, classification codes
- Look at the number of search results – if too many, **try to narrow**
- Use **abstract and assigned keywords** to determine potential relevance

Slide from AAFS 2016 workshop (Information Does Exist Beyond the First Page of Your Google Search)
Susan Makar and Amanda Malanowski "Tools for Searching and Analyzing the Forensic Science Literature"
Available at http://strbase.nist.gov/training/4_AAFS2016-W1-MakarMalanowski.pdf

Web of Science

- An online subscription-based resource that indexes the science and technology literature, including citations and abstracts to peer-reviewed journal articles and some conference proceedings
- Fully covers over 8,300 journals across 150 scientific disciplines; 1900 to present
- Analyze the sci-tech literature using “Analyze Results” and “Create Citation Report” features

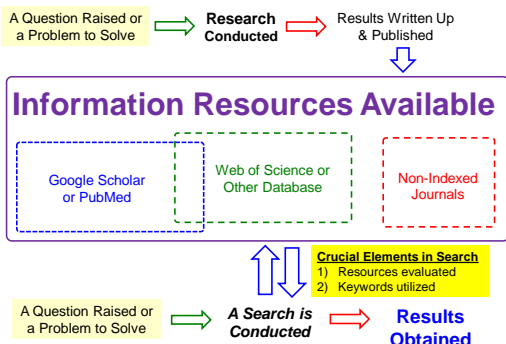
Slide from AAFS 2016 workshop (Information Does Exist Beyond the First Page of Your Google Search)
Susan Makar and Amanda Malanowski “Tools for Searching and Analyzing the Forensic Science Literature”
Available at http://strbase.nist.gov/training/4_AAFS2016-W1-MakarMalanowski.pdf

Web of Science

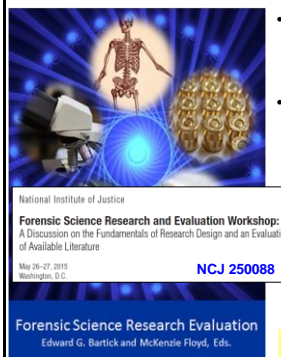
- When to use
 - Good starting point for any forensics topic because of its interdisciplinary coverage
 - Covers the peer-reviewed journal literature
 - Author searches to determine credibility/expertise
 - Historical coverage back to 1900
 - Early forensics research
 - Unusual topics that might not be covered in other subject-specific databases; examples include:
 - Wildlife forensics
 - Latent prints

Slide from AAFS 2016 workshop (Information Does Exist Beyond the First Page of Your Google Search)
Susan Makar and Amanda Malanowski “Tools for Searching and Analyzing the Forensic Science Literature”
Available at http://strbase.nist.gov/training/4_AAFS2016-W1-MakarMalanowski.pdf

“Ecosystem” of Scientific Knowledge



Recent NSF/NIJ-Funded Workshop



- Meeting was held at the AAAS headquarters (Washington, DC) on May 26-27, 2015
- Some relevant articles:
 - “Impact of forensic literature on the admissibility process” (Michael T. Ambrosino)
 - “Policy implications of inadequate literature” (Ronald N. Kostoff)
 - “A quality and gap analysis: an AAAS forensic science literature project” (Deborah Runkle)
 - “How do we trust the scientific literature?” (Simon A. Cole)

NSF-funded Workshop; available through NIJ
<https://www.ncjrs.gov/pdffiles1/nij/250088.pdf>

Storing & Retrieving the Literature

Curation of Collected Articles

- I collect digital copies of articles and have dedicated folders on my desktop computer
- I prefer to read an article from a printed copy so that I can make notes on it
- Do you have piles of paper in your office?
 - If so, how do you find information when you need it later?
- Do you have an organized filing system that enables efficient retrieval of articles and information you have collected in the past?
 - Upfront curation and classification will improve retrieval

Do You Use a "File Pile" Filing System?



Creating a Reference Collection



- My forensic DNA reference collection began while I was in graduate school
 - Continued over the years with the help of student interns like Christian Ruitberg shown here
- Mostly printed copies of articles are stored
 - has increasing become digital (this part is not as well organized)

Reference Management Systems

THOMSON REUTERS



ENDNOTE
The most powerful tool for managing your research.

Collect. Collaborate. Create. From Anywhere.

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

- Article information storage and search retrieval
- Reference formatting for different journals

Develop a system and strategy that works for you to store information

Reference Manager Database


As of Aug 2013: 5115 references in AllRef and 3683 references in STR_Ref

Reference Manager 11 [Reference List: str_ref_12 Database: Journal Reference ID 2625]

File Edit View References Tools Window Help

Ref Type: Journal
Ref ID: 2625
Title: Genetics and genomics of core short tandem repeat loci
Authors: Butler, J. M.
Pub Date: 2006
Web URLs: <http://dx.doi.org/10.1093/hmg/ddi329>
File Attachments:
Link to Full text:
Related Links:
Image(s):
Notes: DA: 20060108
IS: 1022-1188 (Print)
LA: eng
PT: Journal Article
PT - Review

8,798 references cataloged



Ref ID	Authors	Title
2153	Butler, J. M.	Forensic DNA typing by capillary electrophoresis using the ABI Prism 310 and 3100 genetic analyzers for STR analysis
2201	Butler, J. M.	Duplication of DYS19 flanking regions in other parts of the Y chromosome
2481	Butler, J. M.	Locus-specific brackets for reliable typing of Y-chromosome short tandem repeat markers
2477	Butler, J. M.	Chromosomal duplications along the Y-chromosome and their potential impact on Y-STR interpretation
2492	Butler, J. M.	U.S. population data for the multi-copy Y-STR locus DYS64
2550	Butler, J. M.	Allele frequencies for 27 Y-STR loci with U.S. Caucasian, African American, and Hispanic samples
2625	Butler, J. M.	Genetics and genomics of core short tandem repeat loci used in human identity testing
3015	Butler, J. M.	Short tandem repeat typing technologies used in human identity testing
3026	Butler, J. M.	STRs on 20Yb: insights on the future of forensic DNA testing

Benefits of Using a Reference Management Software Program

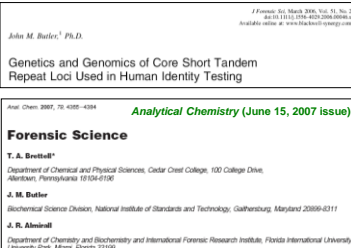
1. Enables connection to pdf files or indexing of paper records
2. Enables searching and storage of literature citations in a common format
3. Enables easy formatting of references for different journal styles

Strategies for Scientific Literature Collection and Curation

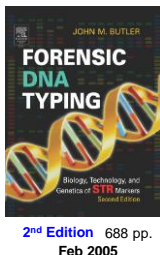
- **Use electronic papers only**
 - a standard file naming system will benefit retrieval
 - challenge of storing different files on different computers
- **Put everything into a single file (e.g., AllRef)**
 - use keywords or authors to find specific articles
- **Create separate files for individual projects**
 - classification problems can arise if an article could possible fit into multiple projects

Fruits of a Good Literature Collection

Review Articles

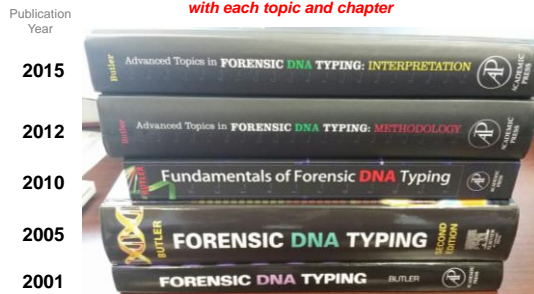


Textbooks

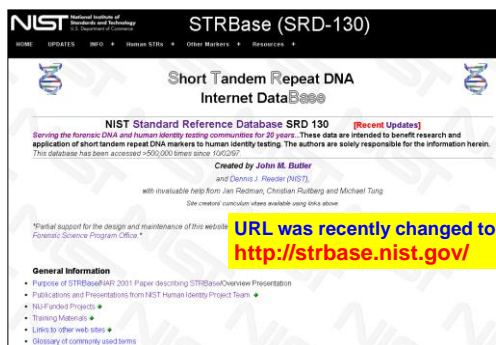


Butler Books on Forensic DNA Typing

Fairly comprehensive reference citations are provided with each topic and chapter



And a Useful Reference Website...



Reading Scientific Articles

Why Read the Literature?

- Reading the relevant literature is crucial to developing expertise in a scientific field
- You must keep reading to be familiar with advances that are regularly being made
- **Your writing improves the more you read**
 - Being widely read in your field helps you prepare **relevant reference lists and insightful introductions** to your manuscripts
- Your ability to review other's work will improve...



Greg Matheson on Forensic Science Philosophy

The CAC News – 2nd Quarter 2012 – p. 6
"Generalist vs. Specialist: a Philosophical Approach"
<http://www.cacnews.org/news/2ndq12.pdf>

"If you want to be a technician, performing tests on requests, then just focus on the policies and procedures of your laboratory. **If you want to be a scientist and a professional**, learn the policies and procedures, but go much further and learn the philosophy of your profession. **Understand the importance of why things are done** the way they are done, the scientific method, the viewpoint of the critiques, the issues of bias and the importance of ethics."

<https://www.swgdam.org/public-comments> (public input being sought until 22 Sept 2017)

FBI DNA Quality Assurance Standards

16.1.2 (2017 draft) **Requirement for Literature Review**

STANDARD 16.1 The laboratory shall have and follow a program to ensure technical qualifications are maintained through **participation in continuing education**.

16.1.1 ...analyst(s)...shall stay abreast of topics relevant to the field of forensic DNA analysis **by attending seminars...in relevant subject areas for a minimum of eight (8) cumulative hours each calendar year**.

16.1.2 The laboratory shall have and follow a program approved by the technical leader for the annual review of scientific literature that documents the analysts' **ongoing reading of scientific literature**.

16.1.2.1 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.

Access to the Literature

- Most universities provide electronic and physical access to a wide variety of scientific journals
- Some forensic laboratories may be limited in what they have available
 - Share individual subscription copies with the laboratory
 - Use free Open Access articles (when available)
 - Email article authors to request an electronic copy of their publication

Benefits of Reading the Literature

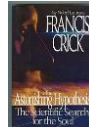
- You become familiar with authors and institutions
- You can improve as a writer and a presenter
- Your laboratory can improve its protocols
- Over time you will be building your knowledge
 - In graduate school, I read over 100 articles on PCR before I ever did a single experiment
 - I have gathered and cataloged ~10,000 articles over the last 25 years of work in the forensic DNA field
 - My books include reference lists that are as comprehensive as possible (because of this reference collection)
- Remember: **You don't have to master every paper...**

How many scientific articles have you read recently?



Francis Crick

The Astonishing Hypothesis (1994), page xiii



“There is no form of prose more difficult to understand and more tedious to read than the average scientific paper.”

The “IMRAD” Format to Scientific Articles

- **I**ntroduction – what question is being studied?
- **M**ethods (& Materials) – how study was performed?
- **R**esults – what were the findings in the study?
- **A**nd
- **D**iscussion – what do these findings mean?

- **The first scientific journals appeared in 1665** but early articles were descriptive in nature
- The IMRAD approach began to be used in the mid-20th century to focus articles and to make indexing and reviewing easier
- **IMRAD was formally defined in 1979** by the American National Standards Institute (ANSI Z39.16-1979) “American National Standard for the Preparation of Scientific Papers for Written or Oral Presentation”

From Day, R.A. (1998). *How to Write & Publish a Scientific Paper*, 5th edition. Oryx Press: Phoenix, Arizona.

Read Print or Electronic Format?

- **I prefer articles in print format to read them** because I like to mark meaningful passages and make notes in the margins for future use
- I do download and store articles electronically as pdf files (often for future printing purposes)
 - I typically name my files with the following format: **First Author's Last Name / Publication Date / Journal / Title or Brief Description** (e.g., “Butler 2006 J Forensic Sci – genetics and genomics of STR markers.pdf”)

How I 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
 - Most articles will be skimmed rather than read from start to finish
 - **Many articles are never read in detail**
- **Highlight key points and make notes on the paper** itself so you can go back to them later to refresh your memory

Journal Clubs

- A journal club is a group of individuals who meet regularly (in person, online, or both) **to critically evaluate recent articles** in the academic literature (*Wikipedia*)
- **Do you have one in your laboratory?**
- **How often do you meet? Is it effective?**
- We can learn from how the medical profession has conducted journal clubs as a method to learn from colleagues
 - Deenadayalan, Y., et al. (2008) How to run an effective journal club: a systematic review. *Journal of Evaluation in Clinical Practice* 14(5): 898-911

Selecting What to Read is Important

- Review entire journal listing of articles
 - Examine journal issue or view table of contents on-line
- Perform directed searches on specific topics
 - PubMed <http://www.ncbi.nlm.nih.gov/pubmed>
- Sign up for table of contents delivery via email
- **Examine publications cited in review articles**
 - You are trusting someone else (that you respect) to provide your reading list

Application Reviews on Forensic Science

appeared every other year in June 15 issue of *Analytical Chemistry* from 1983 to 2011

These reviews are **methods-focused with brief descriptions provided of hundreds of forensic science publications from the two previous years**. No attempt is made to prioritize the publications listed or to assess the quality of the work.

Application Reviews on Forensic Science published in the journal *Analytical Chemistry*

	Year Published	Years Covered	# Articles Reviewed	# DNA Articles Reviewed	% DNA
• 15 review articles by Tom Brettell, Rich Saferstein, and other co-authors	1983	1981 & 1982	490	0	0.0%
	1985	1983 & 1984	536	0	0.0%
	1987	1985 & 1986	496	6	1.2%
	1989	1987 & 1988	602	18	3.0%
	1991	1989 & 1990	691	48	6.9%
	1993	1991 & 1992	824	102	12.4%
	1995	1993 & 1994	843	146	17.3%
	1997	1995 & 1996	811	152	18.7%
	1999	1997 & 1998	782	138	17.6%
	2001	1999 & 2000	243	91	37.4%
• Provides a brief description of 9263 articles spanning 30 years of publications	2003	2001 & 2002	469	148	31.6%
	2005	2003 & 2004	789	250	31.7%
	2007	2005 & 2006	560	181	32.3%
	2009	2007 & 2008	552	163	29.5%
	2011	2009 & 2010	575	122	21.2%
	TOTAL		9263	1565	16.9%

Table 4 in J.M. Butler (2015) U.S. initiatives to strengthen forensic science & international standards in forensic DNA. *Forensic Sci. Int. Genet.* 18: 4-20

Interpol Literature Summaries

928 page pdf file available for download

17th Interpol International Forensic Science Managers Symposium, Lyon

8th - 10th October 2013

Review Papers

Edited by Prof. Niamh Nic Daoid
Centre for Forensic Science, University of Strathclyde,
Glasgow, UK

- Interpol holds a forensic science symposium **every three years** that involves a review of literature in multiple forensic disciplines
- With the last cycle of reviews in 2013, 18 topics are reviewed by **authors from countries around the world** that cover a total of 4968 reference citations
- A 928 page pdf file is available at <http://www.interpol.int/content/download/21910/%20206602/version/1/file/IFSMSReviewPapers2013.pdf>



18th INTERPOL International Forensic Science Managers Symposium
Lyon, France
11-13 October 2016
Review Papers

Now available on the INTERPOL website at
<https://www.interpol.int/content/download/33314/426506/version/1/file/INTERPOL%2018th%20IFSMS%20Review%20Papers.pdf>

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The opinions expressed are those solely of the authors and not necessarily those of their agencies, institutions, governments, or INTERPOL.

**3-year (2013-2016)
Review of Forensic
Science Literature**


- 769 pages in length
- 8.5 MB pdf file



Topic	Authors (affiliations)	# References
Firearms	Erwin J.A.T. Mattijsen (Netherlands Forensic Institute)	179
Forensic Geosciences	Lorna Dawson (James Hutton Institute, Aberdeen, UK)	245
Gun Shot Residue	Sébastien Charles, Bart Nys, Nadia Geuens (INCC-NICC Brussels, Belgium)	77
Marks	Martin Baker (Netherlands Forensic Institute)	104
Paint and Glass	Jose Almirall (Florida International University, USA)	102
Fibers and Textiles	Laurent Lepot, Kris De Wael, Kyra Lunstroff (INCC-NICC Brussels, Belgium)	92
Fire Investigation & Debris Analysis	Eric Stauffer (University of Lausanne, Switzerland)	194
Explosives	Douglas J. Klages and Greg Czarnopys (ATF Laboratory, USA)	646
Drugs	Robert F.X. Klein (Drug Enforcement Administration Laboratory, USA)	1434
Toxicology	Wing-man Lee, Kwok-leung Dao, Wing-sum Chan, Taisei Wong, Chi-wai Hung, Yau-Nga Wong, Luk-Hang Tong, Kin-mai Fung, Chung-wing Leung (Hong Kong Government Laboratory, China)	600
Audio	Catalin Grigoras, Andraş Dygajlo, Jeff M. Smith (University of Colorado-Denver, USA and École Polytechnique, Fribourg de Lausanne, Switzerland)	88
Video and Imaging	Arnout Ruitroff, Zeno Gerards, (Netherlands Forensic Institute)	108
Digital Evidence	Paul Reddy (Department of Forensic Science, District of Columbia, USA)	100
Fingermarks and Other Impressions	Andy Bécue and Christophe Champod (University of Lausanne, Switzerland)	536
DNA and Biological Evidence	François-Xavier Laurent and Laurent Pène (Institut National de Police Scientifique, Cedex, France)	75
Questioned Documents	William P. McAndrew (Gannon University, Erie, PA, USA) and Max M. Houck (Forensic & Intelligence Services LLC, USA)	255
Forensic Science Management		56

4891 references provided

Reviewing Scientific Articles



Why do Reviewers review?

GIVE	TAKE
Academic 'duty'	Updated with latest developments
	Helps with own research or new ideas
	Career development
	Awareness of new research before their peers
	General interest in the area
	Builds association with journals and Editors

<http://www.elsevier.com/reviewers/home#why-review>

The Peer-Review Process

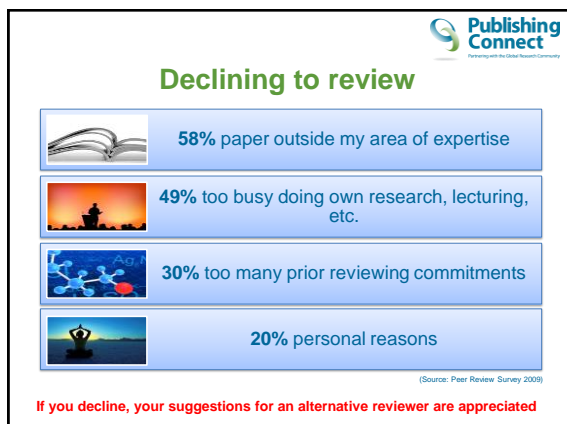
Based on My Perspective as an Editor

- 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 reviews in a timely fashion (requiring the editor to remind them)

If Asked to Review...

- Respond quickly with a "yes" or "no" and **be honest** if you cannot complete the review in the requested time period (usually 2 to 3 weeks)
- If the topic is outside your expertise or you think there may be a potential conflict of interest, then you should decline to perform a review on the requested submission
- Helpful to know that you (as a potential reviewer) are out of the office so an editor can avoid inviting you during this time period
 - For some journals, it is possible to alert editors by putting a note in your reviewer on-line profile



Qualities of a Good Reviewer

...“Good reviewers provide **objective feedback** to editors and **constructive comments** to authors.”

Forensic Science International: Genetics Supplement Series 4 (2012) e115–e116

Contents lists available at ScienceDirect

 Forensic Science International: Genetics Supplement Series

Journal homepage: www.elsevier.com/locate/FSIGSS

The triad of scientific publication: Reading, writing, and reviewing

John M. Butler^{*}

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

Qualities of a Good Reviewer

- Objective
- Thorough and constructive feedback to editor and authors
 - Clear recommendation to the editor
 - Collegial comments to the authors
 - The more detail, the better to improve the article during a revision process
- **Review completed in the requested timeframe**
- Keep contents confidential following review
 - Destroy copy of manuscript
- **If you were the author of the article, how would you like a reviewer to treat you?**

Your review should be more descriptive than this example...

“This paper contains much that is new and much that is true. Unfortunately, **that which is true is not new and **that which is new is not true.**”**

– Attributed as a referee's report in H. Eves, *Return to Mathematical Circles* (1988). Also attributed to a 19-th century scientist commenting on one of his competitor's papers, cited in I. M. Klotz, 'How to become famous by being wrong in science', *International Journal of Quantitative Chemistry*, **24**, 881-890, which is quoted in Frederick Grinnell, *Everyday Practice of Science* (2008), 86.

Some Logistics of Reviewing

- I like to **print out the article** so that I can mark corrections and comments on it
- I first **skim** the article to get an idea of the topic and scope involved
- I review the **title, abstract, and conclusions** first
- I check the **reference list** for consistency and format
- I examine the **Materials and Methods** to see if sufficient detail is present
- I **read text and examine figures and tables** carefully and mark comments on the article
- I **type up my comments** and provide them to the editor with a recommendation for acceptance, revision or rejection

Writing Your Review

- Provide a **brief summary of the article's purpose**
- Provide a **recommendation to the editor** (acceptance, revision, or rejection)
- Provide support for your recommendation through **specific comments** addressed to the authors
- Include **major concerns first** then cover minor issues
- Some changes may be essential and others just suggestions to improve the manuscript (make concerns clear to authors)
 - A reviewer should not copy-edit the manuscript if English grammar needs significant work (just state concern with the readability of the text and perhaps recommend rejection)

Requesting Additional Experiments

- Remember that this article is not your work...
- Ask and address the question: **“Did the authors adequately set up their study and would their study require any extra work to support their conclusions?”**

Questions about Tables and Figures

- Appropriate
 - Are they necessary? Do they add value to the article? Are there too many or too few?
- Understandable
 - Are they easy to understand?
 - Does a figure need color to make it clear?
 - Are captions complete?
 - Are sizes of figures appropriate for what is being shared?
 - Are the quality and readability of the image sufficient?
 - Are figures consistent across the manuscript in terms of font size and style, legends, and axes?

Additional Areas to Examine

- Conclusions
 - Sometimes authors include unjustified claims or make generalizations that are not supported by their results (i.e., they over extrapolate their conclusions)
- References
 - Are they appropriate, up-to-date, too many self-citations, or too few citations?

In my opinion, reviewers should not ask for authors (as part of the review) to cite the reviewer's work!

Do's and Don'ts of the Review Process

Do

- 1) Provide clear comments to authors
- 2) Be consistent with comments to authors and editor
- 3) Provide specific references to text to support your critiques
- 4) Reread your review to ensure you are not too harsh
- 5) Treat authors of a manuscript as your equal independent of quality

Do Not

- 1) State in your comments to the authors your recommendation to the editor
- 2) Praise manuscript in authors comments and disparage it in confidential comments to editor
- 3) Make vague text references or opinions not supported by data
- 4) Send off your review without looking over it at least once
- 5) Talk down to authors (remember that science is a collaborative process)

Lovejoy, T.I., Revenson, T.A., France, C.R. (2011). Reviewing manuscripts for peer-reviewed journals: a primer for novice and seasoned reviewers. *Annals of Behavioral Medicine*, 42, 1-13.

Writing Scientific Articles

Think of a paper that you enjoyed reading
What are the qualities that made it worth reading?

To Be Completed during the Workshop

Who is Your Audience?

When You Write a Scientific Paper

- Other scientists
 - Your colleagues (those in the same field – e.g., forensic genetics)
 - Scientists reading outside their discipline (e.g., molecular biologists)
 - Students who are just getting started in the field
 - Non-native English speaking scientists
- In some cases, members of the general public such as journalists or lawyers

Why You Need to Write Up Your Work

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

David McCullough



“Writing is thinking. **To write well is to think clearly.**
That's why it's so hard.”

–David McCullough, Pulitzer Prize winner

(<http://www.neh.gov/about/awards/jefferson-lecture/david-mccullough-interview>)

Training in Scientific Writing is Needed

“To expect scientists to produce readable work without any training, and without any reward for success or retribution for failure, is like expecting us to play violins without teachers or to observe speed limits without policemen. Some may do it, but most won't or can't.”

– **Martin W. Gregory** (1992) “The infectiousness of pompous prose”, *Nature* 360: 11-12

Some Helpful Resources

- Whitesides, G.M. (2004). Whitesides' group: writing a paper. *Advanced Materials*, 16, 1375-1377. Available at <http://gmwgroup.harvard.edu/pubs/pdf/895.pdf>.
- Day, R.A. (1998). *How to Write & Publish a Scientific Paper*, 5th edition. Oryx Press: Phoenix, Arizona. [8th edition was published in 2016]
- *BioTechniques* July & August 2013 special series on manuscript tips: <http://www.biotechniques.com/news/> [search “manuscript tips”]
- Gopen, G.D., & Swan, J.A. (1990). The science of scientific writing. *American Scientist*, 78, 550-558.



George Whitesides on How to Write a Scientific Article

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

ADVANCED MATERIALS

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. “Interpreting 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 com-

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.

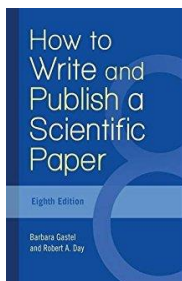
All writing that I do—papers, reports, proposals (and, of course, slides for seminars)—I do from outlines. I urge you to learn how to use them as well.

2.2. How Should You Construct an Outline?

author of more than 1290 scientific articles and 147 patents with an *h*-index of probably >200 (as of Aug 2017)

ESSAY

Robert A. Day's "How to Write & Publish a Scientific Paper" is a Classic



- 1st edition (1979)
- 2nd edition (1983)
- 3rd edition (1988)
- 4th edition (1994)
- 5th edition (1998)
- 6th edition (2006)
- 7th edition (2011)
- 8th edition (2016)

Co-authored
now with
Barbara Gastel
(Texas A&M)

Robert A. Day is Professor Emeritus of English at the University of Delaware

How to Write & Publish a Scientific Paper (5th edition) Table of Contents

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| 12. How to Cite the References | 24. How to Order and Use Reprints | |
- also 7 Appendices, a Glossary, and Reference List

BioTechniques Special Series: Manuscript Tips

from Nathan Blow, editor-in-chief, July & August 2013

<http://www.biotechniques.com/news/>

- 1) Abstracts – Part 1 07/16/2013
- 2) Abstracts – Part 2 07/18/2013
- 3) Introducing the Introduction 07/23/2013
- 4) Materials and Methods 07/29/2013
- 5) Top 10 Submission Tips 08/02/2013
- 6) Discussing the Discussion 08/06/2013
- 7) Figure It Out 08/20/2013

See also Blow, N.S. (2013). The write way. *BioTechniques*, 54, 235.

Important Steps to Address in Writing a Scientific Article

- Select a journal based on desired audience
- Decide on the scope of information
 - How much data will be covered? Should the material be subdivided into more than one article?
- Decide on article category
 - Research article, technical report, case report, etc.
- Pay attention to the reference format

As an editor, one of the first things I examine is the reference list...
If the authors are not consistent with their reference format or sloppy with details (e.g., missing volume or page numbers), then I may have concern with the quality of the work because **DETAILS MATTER IN SCIENCE!**

The "IMRAD" Structure for Scientific Papers

- **I**ntroduction – what question is being studied?
- **M**ethods (& Materials) – how study was performed?
- **R**esults – what were the findings in the study?
- **A**nd
- **D**iscussion – what do these findings mean?

"The scientific paper is the sum of its component parts." (Robert A. Day)

The title, authors, abstract, and keywords are critical to indexing and subsequent searches by potential readers

From Day, R.A. (1998). *How to Write & Publish a Scientific Paper*, 5th edition. Oryx Press: Phoenix, Arizona.

Some Decisions to Be Made

- How to subdivide information into digestible sections?
- What information is needed in Materials and Methods to permit someone to follow and repeat your experiments?
- What should be covered in a figure or table?
- What should be supplemental material versus material in the paper itself?

Thoughts on How to Write a Scientific Paper

- **Outline the ideas first** with a purpose and plan
 - Decide on scope & audience and select target journal
- 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 and then finalize title**
 - Most critical pieces since they will be the most read!

My Experience with Writing

- **Focus**
 - **Environment** – I need a **quiet place** with no interruptions in order to get into the flow of writing
 - **Time** – I need **long blocks of time** (around 6 hours has been optimal for me, which typically means late at night)
- **Perspective**
 - **Think from the readers' perspective** (this will require learning to step outside of yourself and see what you have written with fresh eyes)
 - Work on **content flow and clarity** (this will require multiple re-writes to your manuscript)
 - **Know your audience** (you should select a journal from which you have read articles previously)

References to be Cited are Gathered

- When I begin writing a new article, I like to **gather printed copies of relevant articles** from my files (or newly printed copies from electronic files) on the topic
- This pile of papers is then reviewed in preparing the introduction as well as the reference list

Thoughts on Creating Appropriate Titles

- Consider that **your title will be read more than anything else in your paper** – perhaps by thousands of people
 - The entire paper may not be read by anyone (except hopefully at least your coauthors!)
- Robert Day defines a good title as containing “**the fewest possible words that adequately describe the contents of the paper**”
 - “The meaning and order of the words in the title are of importance to the potential reader who sees the title in the journal table of contents.”
 - “**In designing the title, the author should ask: ‘How would I look for this kind of information in an index?’**”
 - “Avoid abbreviations in the title”

Day, R.A. (1998). *How to Write & Publish a Scientific Paper*, 5th edition. Oryx Press: Phoenix, Arizona; see Chapter 4 “How to Prepare the Title”

Some Example Titles

consider which ones look most interesting for you to read

1. Revised guidelines for the publication of genetic population data
2. An artificial neural network system to identify alleles in reference electropherograms
3. Sequence-based diversity of 23 autosomal STR loci in Koreans investigated using an in-house massively parallel sequencing panel
4. Mitogenomic diversity in Russians and Poles
5. mtDNA sequence diversity of Hazara ethnic group from Pakistan
6. Evaluation of the InnoTyper® 21 genotyping kit in multi-ethnic populations
7. A selection guide for the new generation 6-dye DNA profiling systems
8. Characterisation of artefacts and drop-in events using STR-validator and single-cell analysis
9. A phylogenetic approach for haplotype analysis of sequence data from complex mitochondrial mixtures
10. Application of DIP-STRs to sexual/physical assault investigations: Eight case reports

From the Sept 2017 (volume 30) issue of *Forensic Science International: Genetics*

Authorship

- **Authorship brings both credit and responsibility**
 - **Can each author explain and defend the data and conclusions made in the article?**
- Co-authors should read and agree with the final version of the article **PRIOR** to submission!
- The acknowledgments section exists to express appreciation for those who have contributed but not enough for authorship
 - not necessarily appropriate to include everyone in your lab
 - simple sample contribution should not guarantee authorship

For a discussion on authorship vs. contributorship, see <http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html>

- **Many journals now require the role of each listed author to be described**

A Coauthor or Simply Listed in the Acknowledgments? → It May Be Your Decision

European Journal of Human Genetics (2007) 15, 288–293
© 2007 Nature Publishing Group. All rights reserved 1074-8161/07 \$30.00
www.nature.com/nhg

ARTICLE

Africans in Yorkshire? The deepest-rooting clade of the Y phylogeny within an English genealogy

Turi E King¹, Emma J Parkin¹, Geoff Swinfield², Fulvio Cruciani³, Rosaria Scozzari¹, Alexandra Rosa⁴, Si-Keun Lim⁵, Yali Xue⁶, Chris Tyler-Smith⁷ and Mark A Jobling¹

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My laboratory at NIST assisted by supplying a single DNA sample and data, which to me did not rise to the level of coauthorship...

The Order of Authors

- First author (or joint first authors)
 - Primary drafter of the manuscript
- Anchor author
 - Last author listed, usually the principal investigator
- Corresponding author
 - Handles submission and correspondence with the editor
 - Often the first author (who drafts the manuscript) or anchor author (who typically oversees the project)
- Authorship should ideally be decided by those contributing to the research before the project is completed and the manuscript is written
- Recommend consistently using full names (e.g., "John M. Butler" rather than "J.M. Butler") as this helps indexing and searching

Writing the Abstract

- Sketch out text at the beginning stages but **finish the abstract last after the article is written**
- **This should be your best work** as it will be the most read portion of your paper (next to the title)
- Provide sufficient detail to encourage the reader to decide to read the entire paper but ensure that you are accurate in summarizing your work so as to not falsely advertise information that is not in the paper

Selecting Appropriate Keywords

- Selecting appropriate keywords aids indexing services so that other researchers can find your paper when they perform searches
 - Robert Day commented: **"The words in [a scientific] paper should be weighed as carefully as the reagents in the laboratory."**
- Your keywords and subject classification during submission can help editors find appropriate peer reviewers

Day, R.A. (1998). *How to Write & Publish a Scientific Paper*, 5th edition. Oryx Press: Phoenix, Arizona; see Chapter 35 "A Personalized Summary"

Preparing the Introduction to a Paper

- The purpose of the introduction is **to describe the problem you are studying and some of its history – not to just cite previous papers from your group** (to try and improve someone's *h*-index)
- **You need to understand the history of the problem, but you do not need to share everything you know!**

"All problems have histories and the wisest route to a successful solution to nearly any problem begins with understanding its history."
– David McCullough (2017) *The American Spirit*, Simon & Schuster: New York, p. 20

Materials and Methods

- **Often the first portion of the paper written**
- Describe experimental details with enough information so that someone else could replicate your measurements if desired
 - List the city and country the first time a manufacturer's product is named
 - List software programs used and statistical tests employed for calculations
 - List any variations from manufacturer's protocol
 - Cite institutional review board approval (if applicable)

Results and Discussion

- Decide on how to tell the story of your project
- Prepare figures and tables first
- **Describe findings step-by-step in walking the reader through your data**
- Interpret your results in the discussion section in the context of other work, which may have been mentioned in the introduction
 - Sometimes a separate “Conclusions” section can be included at the end of your article

Reference List

- Should be appropriate, relevant, and without any mistakes
 - In my opinion, your scientific abilities and reputation are connected to quality citations to appropriate references
- As an editor, I use the reference list as a gauge for the attention to detail that authors exhibit
 - If references are incomplete, have mistakes, or are in different formats, then I can lose confidence in quality of the work coming from the authors
- **Extensive self-citation suggests both a lack of humility and perhaps failure to appreciate the work of others in the field**
 - Are you really familiar with the literature if you can only cite your own work?

Acknowledgments

- Credit funding sources (\$)
- Express appropriate appreciation for input of other individuals who are not coauthors but who assisted in some way
 - you can be specific with describing their contributions
- If the anonymous reviewers (and possibly editor) provided useful feedback in their initial reviews, then they may be recognized in the revised manuscript

Suggestions for Writing and Re-Writing

- Write, then read, then re-write, then read, then re-write (continue this process as needed)
 - **Dozens of drafts may be required to polishing a text into the desired document**
- **Read the text out loud as you are editing...**
 - Write as if you were presenting to a friend
- Write in short sentences where possible
 - Omit unnecessary words
 - Don't use words your audience will likely not understand. Your goal is to clearly explain your work, not sound smart.

See Martin W. Gregory (1992) “The infectiousness of pompous prose”, *Nature* 360: 11-12

The Science of Scientific Writing

George Gopen & Judith Swan (1990)

Some Recommendations to Improve Accessibility:

- 1) Put grammatical subjects close to their verbs
- 2) Put information intended to be emphasized towards the end of a sentence (the **stress position**)
- 3) Place the person or thing whose “story” a sentence is telling at the beginning of the sentence (the **topic position**)
- 4) Provide context for the reader before sharing anything new

To provide good flow, place old information in topic positions, and place new, emphasis-worthy information in stress positions.

Gopen, G.D., & Swan, J.A. (1990). The science of scientific writing. *American Scientist*, 78, 550-558

An Example of These Gopen & Swan (1990) Recommendations

Authority established

subject — 1 — verb

“The Forensic Science Service recently noted that

sporadic contamination of consumables used in DNA

testing, such as the small tubes in which the PCR

amplification is performed, can introduce extraneous

DNA profiles (Howitt *et al.* 2003).”

Source provided

2

3 topic position

4 context provided

stress position

Passage from J.M. Butler (2005) *Forensic DNA Typing*, 2nd edition, p. 153

English Language Assistance

- If English is not your primary language, it may be helpful to obtain language editing help
- **Reviewers and editors may reject your article outright if it contains poor English**
 - This is a common challenge for many articles submitted from Asia
- On-line resources exist to improve your English writing skills (e.g., <https://cgi.duke.edu/web/sciwriting/>)
- Fees to perform English editing can be hundreds of dollars per manuscript

Use of Numbers

- Do not start a sentence with a number
 - e.g., “32 people were studied...” should instead be “Thirty-two people were studied...”
- Spell out single-digit numbers
 - One, two, three, four, five, six, seven, eight, nine, 10, 11, 12, 13, 14, 15, ...
- In a sentence containing more than one number, all can be listed numerically
 - e.g., “...we observed 5 blue, 6 green, and 14 yellow items...”

Additional Thoughts

- Writing involves a lot of re-writing (edit, edit, edit)
- Re-read your manuscript one final time before submission (perhaps after waiting a day or two to approach it with a fresh perspective)
- **Ask others for their input (and be willing to listen and learn from their suggestions)**
 - At NIST, we have an internal review process for all manuscripts before they are submitted to a journal

Errata and Letters to the Editor

- **Mistakes happen and should be corrected to fix the scientific record**
- If you discover the mistake
 - a Letter to the Editor can be written and submitted to note the correction needed (called an “erratum”; “errata” is plural form)
- If someone else discovers your mistake or raises a concern (regarding an issue that is real or perceived), then the critic(s) may write a Letter to the Editor exposing the issue
 - Original authors being criticized are typically given an opportunity to respond
 - Be kind in responding to critics and treat them with respect even if you disagree with their position

Creating Figures and Tables

How Data Are Presented Makes a Difference

(A) t (time) = 15', T (temperature) = 32°; t = 0', T = 25°;
 t = 6', T = 29°; t = 3', T = 27°; t = 12', T = 32°; t = 9', T = 31°

(B)

Time (min)	Temperature (°C)
0	25
3	27
6	29
9	31
12	32
15	32

(C)

Temperature (°C)	Time (min)
25	0
27	3
29	6
31	9
32	12
32	15

Gopen, G.D., & Swan, J.A. (1990). The science of scientific writing. *American Scientist*, 78, 550-558

Why Readers Prefer a Specific Order

Contextual
information
appearing in
regular steps

The "new"
(measured)
information

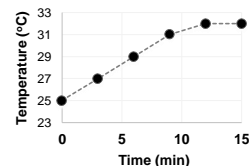
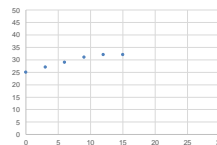
- In English, we read left to right
- Thus, we prefer **contextual information on the left** (in this example, time)
- And our brains prefer **the new information**, what we are trying to "discover" from the measurements made, **on the right** (in this example, temperature)

Time (min)	Temperature (°C)
0	25
3	27
6	29
9	31
12	32
15	32

Gopen, G.D., & Swan, J.A. (1990). The science of scientific writing. *American Scientist*, 78, 550-558

The Same Data – but in a Figure Format

t (time) = 15', T (temperature) = 32°; t = 0', T = 25°;
t = 6', T = 29°; t = 3', T = 27°; t = 12', T = 32°; t = 9', T = 31°



No axis labels or units (min, °C)
Small axis values
Not scaled to emphasize data
Data points are small
Grid lines can be distracting

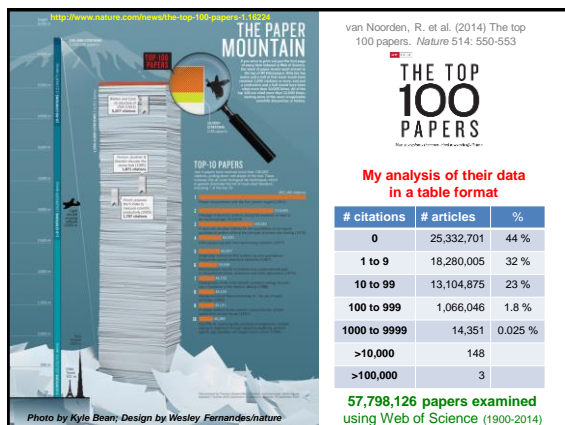


Table and Figure Captions

- Captions should be **descriptive enough** so that the table or figure **can be understandable independent of the text**
- I try to think through each element of the table or figure as if I was a reader encountering the information for the first time
 - Remember that writing involves telling a story about your findings so think carefully about how data are conveyed and described

Submission & Peer-Review Process



2015 Numbers from Elsevier

- **Authors:** 1.8 million unique authors worldwide submitted 1.3 million manuscripts to Elsevier journals. (For context, we estimate the total number of active researchers globally at some 7.8 million in 2015.¹)
- **Reviews:** 700,000 peer reviewers conducted 1.8 million article reviews, under the guidance of approximately 17,000 "high level handling editors." An additional 63,000 editors are affiliated with our journals, totaling 80,000 Elsevier editors. Approximately 7,000 of those editors were appointed in 2015.
- **Articles:** Approximately 400,000 of those manuscripts were eventually published in approximately 2,500 active Journals — 73 of which were launched in 2015. 400,000 is about 16%² of the total number of scholarly articles published worldwide in 2015.
- **Archive:** The 400,000 new articles brought the total number of documents available on ScienceDirect to more than 13 million. (It is over 14 million today.)
- **Access:** These articles were accessed by around 12 million people per month, with close to 900 million full-text article downloads for the year.
- **Citations:** Elsevier articles published in the 5 years ending 2014 were cited 11.5 million times in the same period³ meaning Elsevier punches above its weight with more than 25% citation share.

<https://www.elsevier.com/connect/elsevier-publishing-a-look-at-the-numbers-and-more>

Importance of Selecting an Appropriate Journal

- Depends on your intended audience
- Speed to publication
- Impact factor of the journal
- Remember that **peer-review is not perfect**
 - If a poor quality article (or one you have a specific concern with) makes it through the process, then a letter to the editor may be an appropriate avenue to pursue further clarification or correction
- **An editor can reject an article if it is not considered appropriate for the journal's intended audience**

<http://www.ees.elsevier.com/fsigen/>

Forensic Science International: Genetics

Welcome to the online submission and editorial system for *Forensic Science International: Genetics*.

FSI: Genetics will be specifically devoted to Forensic Genetics. This branch of Forensic Science can be defined as the application of Genetics (in the sense of a science with the purpose of studying inherited characteristics for the analysis of inter- and intraspecific variations in populations) for the resolution of legal conflicts. This includes paternity testing, criminal casework, and identification of human remains. Although protein and enzyme polymorphisms were firstly used to fulfill the aims of the field they have been substituted nowadays by DNA polymorphisms analyzed by a variety of molecular biological typing technologies. The amount of work in this field has increased enormously with no signs of slowing down with many new applications such as the application to non-human DNA material (crime scene, illegal trade in endangered species evidences, and bioterrorism) and the building and appropriate management of DNA databases.

The scope of the journal includes:

- Forensic applications of human polymorphism: testing of paternity and other family relationships, immigration cases, typing of biological stains and tissues from

Author Information

- [Log In](#)
- [Journal Homepage](#)
- [Authors' Home](#)
- [Guide for Authors](#)
- [Tutorial for Authors](#)
- [Artwork Guidelines](#)
- [Copyright Information](#)
- [EES Retention Policy](#)
- [Funding Bodies](#)
- [Compliance](#)
- [Language Services](#)
- [Authors' Update](#)

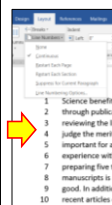
Reviewer Information

- [Log In](#)
- [Reviewer Guidelines](#)
- [Tutorial for Reviewers](#)
- [Reviewers' Home](#)
- [Reviewers' Update](#)

Manuscript Submission

- Cover letter
 - Although not always required, it helps to **introduce your article with a brief letter to the editor** briefly reviewing your work and its importance
- Suggested reviewers
 - You are welcome to **identify potential reviewers** and reviewers who may have a conflict of interest (suggest who should not review your work)
- **Do NOT co-submit** your article to another journal!
 - We have caught several authors who have done this in the past few years and have banned them from submission to both journals for a period of time

Other Items with Submissions



- Review the Journal's Guide for Authors
 - <https://www.elsevier.com/journals/forensic-science-international-genetics/1872-4973/guide-for-authors>
- **Include line numbers** next to the text for submitted manuscripts so that these numbers can be used for peer-review purposes
- Please **work on the English grammar** and spelling **BEFORE** submitting the manuscript (peer-reviewers should not be your language police)

A Recent Example...

- **Editor:** *"Please work with a native English speaker if possible to help polish the language as noted by Reviewer #1 below. Once the grammar is improved further, the article appears ready for publication."*
- **Response:** *"We have revised the language as noted by Reviewer #1 and **polished the grammar as possible as we can.**"*

BioTechniques' Top 10 Submission Tips

from Nathan S. Blow, PhD, editor-in-chief, August 2014

1. Know the journal
2. Know the submission and formatting guidelines
3. Write with an active voice
4. Avoid "wordiness"
5. Practice quality control
6. Create a true cover letter
7. Know your references
8. Format figures and captions correctly
9. Ask the editor
10. Rebut decisions effectively (and respectfully)

<http://www.biotechniques.com/news/Special-Series-Manuscript-Tips-Top-10-Submission-Tips/biotechniques-345608.html>

Editor Options with *FSI Genetics* Articles

No Decision

Reject pre review and suggest transfer
Reject post review and suggest transfer
Reject due to Poor Language
Minor Revision & Submit Interactive Plots
Accept
Revise not Ready for Peer Review
Provisionally Accept
Revise
Reject

the manuscript
can be transferred
to **another**
Elsevier journal
for consideration

- Forensic Science International
- Science & Justice
- Legal Medicine

	Original Submission	Revision 1
Review #1	Minor Revision	Minor Revision
Review #2	Major Revision	Accept
Editor	Revise	Revise

Some Reasons Why Articles Are Rejected

- Material covered in the article is deemed **inappropriate for the journal** or **insufficiently novel** by the reviewers and/or the editor
- **Poor English language and grammar** make it challenging for the article to be understood
- One or more of the reviewers feel that **conclusions cannot be supported** by the results
- **Poor experimental design** such that results obtained are not meaningful
- **Rude responses** to reviewers and/or editors **that fail to address concerns** raised during revision

Responding to Reviews with Revisions

- Address reviewer and editor concerns point-by-point in a direct and pleasant manner
 - Your purpose is to convince the editor (and often the original reviewers) that you have carefully considered the initial concerns raised
- Provide respectful rebuttals
 - Criticism is hard to take but is necessary to improve your work

Potential Reasons for Delays

- Handling editor may be busy or on travel and slow in assigning potential reviewers
- Potential reviewers decide not to accept and editor has to find other reviewers
- Reviewers are busy and delay turning in their reviews (and editor may have to wait for a second or third review before making a decision)
- Once all reviews are into the editorial system, handling editor is notified but may be busy or on travel and slow in making a decision

Example Timeline for Process of Review

extracted from *FSI Genetics*
correspondence history

Step	Date	# Days	Activity
1	11 May	0	Authors submit their manuscript
2	12 May	1	Submission verified by journal
3	3 June	23	Handling Editor assigned
4	6 July	56	Reviewed invited
5	8 July	58	Reviewer #1 accepts invitation
6	6 Aug	87	Reviewer #1 completes review and requests minor revisions
7	7 Aug	88	Reviewer #2 accepts invitation
8	11 Sept	123	Reviewer #2 completes review and requests major revisions
9	28 Sept	140	Handling Editor completes review and provides feedback to authors to revise their submission
10	3 Nov	176 0	Authors submit revision
11	5 Nov	178 2	Handling Editor assigned
12	5 Nov	178 2	Same reviewers invited to examine revision
13	12 Nov	185 9	Reviewer #2 accepts invitation
14	14 Nov	187 11	Reviewer #2 completes review and accepts revision
15	20 Nov	193 17	Reviewer #1 accepts invitation
16	29 Nov	202 26	Reviewer #1 completes review and accepts revision
17	29 Nov	202 26	Handling Editor accepts the revision and notifies the authors
18	22 Dec	225	Publisher notification of accepted manuscript

Some Problems I Have Seen as an Editor

- All authors did not review article before submission of revision (and the corresponding author had moved to another laboratory)
- Methods were missing critical details so that experiments could not be repeated
- Misspellings and grammar mistakes
- Potential conflicts of interest not identified

Galley Proof Review

- Galley proofs are provided to authors to verify the type composition when a manuscript is laid out for publication
- **Review them carefully** – **all authors should see them** – this is your last chance to avoid appearing foolish before your article goes into print...
- **This can be a lot of work** for the first author and/or corresponding author

Reprints

- Ordering reprints to give to colleagues is not as common today as it was in the past
- Check with publisher for rules with providing pdf files via email or via website
- **Open Access** enables authors to purchase articles and cover the costs associated with publication (layout, printing, creating e-file, etc.)

The Elsevier Publishing Campus

<https://www.publishingcampus.elsevier.com/>



Free lectures, training and advice in:

- **writing** a journal article or book,
- learning **how to conduct peer review**,
- **understanding** research and publishing **ethics**
- **preparing a successful grant application**

My Overall Summary Thoughts

- READ** • The best preparation to write well is to **critically read a lot of papers**
- WRITE** • **Writing well takes practice** and is one of the most valuable skills you can develop
 - Effective communication benefits scientific advancement
- REVIEW** • **Help review** the work of other scientists
 - As an editor, I appreciate your willingness to be a reviewer when you are asked to help
 - An important way to give back to the community

A 2017 U.S. National Academies of Sciences Report

Communicating SCIENCE Effectively

A Research Agenda

Committee on the Science of Science Communication:
A Research Agenda

Division of Behavioral and Social Sciences and Education

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- "Communicating science effectively ... is a complex task and an **acquired skill**." (p. 1)
- "Many believe the scientific community has a **duty to engage with society to disseminate this knowledge** and provide a return on society's investment in the science enterprise." (p. 11)
- "Any **communication involves a communicator, an audience, and channels of communication** that are often bidirectional..." (p. 11)
- "The scientific community has an **obligation to communicate** the results of its work to the rest of society." (p. 16)

Thank you for your attention

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The triad of scientific publication: Reading, writing, and reviewing



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ABSTRACT

A workshop on scientific publication was presented at the 2013 ISFG conference by the author, who has written four widely used textbooks and 150 peer-reviewed articles and invited book chapters. This article is a summary of key points made during the workshop. Slides from the workshop are available on the NIST STRBase website at <http://www.cstl.nist.gov/strbase/NISTpub.htm>.

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1. Introduction

Effective communication is important to advancing quality science. Scientists publish their work to share knowledge with others and to gain recognition and prestige for their efforts. In university settings, publication improves academic standing and opportunities for research funding. Scientific publication involves three important efforts: reading, writing, and reviewing.

2. Reading

Reading the literature in a scientific discipline develops expertise as new advances are better understood. Extensive, careful reading can also improve writing skills and the quality of scientific work performed. Relevant reference lists and insightful introductions to new manuscripts result from a knowledge base developed through reading the current literature. In graduate school, I began what will hopefully be a life-long effort to collect and study articles relating to forensic DNA typing. What began as a collection of 687 articles used for my PhD dissertation has now expanded to almost 9000 articles cataloged in a Reference Manager database. I have used several methods to locate articles that may interest me ranging from examining a physical copy of a journal to viewing a table of contents on-line to directed searches using tools like PubMed [1].

Scientific articles are not designed to be read like novels nor does every aspect of an article always have to be fully comprehended. I first skim an article and scan the tables and figures and their captions. Next I examine results and conclusions

to see if the data presented support the statements made. I skim most articles rather than reading them from start to finish in their entirety. I highlight key points and make notes on a printed copy of the article so that I can go back later and quickly find the portions of the paper that were most interesting to me. I find the reference listing of an article important as a way to assess the attention to detail that authors have and to find other potentially interesting articles.

An appreciation for good writing is developed through careful reading of many articles and books.

3. Writing

An important purpose of scientific publication is to document work performed to aid the advancement of science. In short, writing enables history. Work conducted in the present, which hopefully will benefit the future, grows from knowledge of the written past. Numerous journals exist for sharing information with a diverse audience of scientists.

Selection of an appropriate target journal for your work is an important first step in writing. Journals have submission guidelines to help authors in formatting their manuscript. Journal editors appreciate when these guidelines are followed.

An efficient writing process begins with an outline, which is a short written plan for organizing how data will be shared [2]. After the manuscript scope is defined, often with input from co-authors, supporting text can be built around the outline. Word processing programs have greatly aided the speed and ease of writing.

As the first author on a manuscript, I typically begin writing the Materials and Methods section to describe the experiments performed. Of course, if I am writing an article with co-authors, then I regularly seek their input as appropriate. Next I prepare figures and tables to help describe the available data. Captions should concisely describe information contained in the figures and

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tables so that they can stand independent of the text. The Results and Discussion sections are written to provide text to the figures and tables followed by the Introduction to provide context and purpose for the article.

My preference is to note any appropriate references in the text as I am composing my manuscript and then complete the citations in full at the end of the writing process with the required journal format (using a tool such as Reference Manager [3]). I often gather physical copies of the cited articles in order to refer to them while I am writing. Finally, I write the abstract and create a meaningful title. An article's title and abstract are crucial items since they will be read most. Selecting appropriate key words along with descriptive titles enables interested readers to locate your work once it is published.

Authorship brings both credit and responsibility. Co-authors should read and agree with the final version of a manuscript prior to submission. The acknowledgments section exists to express appreciation for those who have contributed to your work but perhaps not enough for authorship. Many journals now require the role of each listed author to be described. Always acknowledge funding sources and disclose any potential conflicts of interest. Some institutions require a disclaimer statement.

Active author and two-time Pulitzer Prize winner David McCullough has described the process of writing: "Writing is thinking. To write well is to think clearly. That's why it's so hard" [4]. I find that I need a quiet place to work with no interruptions in order to get into the flow of writing. The best time for me is often late at night when I can focus and write for several hours uninterrupted.

Creating clear, flowing concepts in my experience requires significant effort and many re-writes. I may review a manuscript dozens of times as I polish the words in an attempt to clearly convey my thoughts. I often read my text aloud as I try to think about how the words might be received from a reader's perspective. This requires knowing the audience you are trying to reach and thinking of them as you write. Short sentences and regular paragraph breaks enable readers to stay more focused. Create meaningful tables and figures—but not too many in the portion of your manuscript intended for print. With the advent of electronic publishing, supplemental materials can be shared online.

George Gopen and Judith Swan wrote a classic article in 1990 [5] with useful recommendations to improve the accessibility of written scientific communication. More recently, the journal *BioTechniques* provided a series of articles with helpful tips in preparing manuscripts [6]. Writing can improve with study and lots of practice.

4. Reviewing

The editors of peer-reviewed journals rely on input from scientific colleagues to judge the merits of submitted manuscripts. For the peer-review process to be successful, knowledgeable reviewers are needed [7]. Timely feedback from reviewers enables editors to make decisions on whether or not to accept an article that has been submitted. Good reviewers provide objective feedback to editors and constructive comments to authors. If reviewers supply sufficient detail and reasons for needed

corrections, then authors may use that feedback to improve their writing.

When I review manuscripts, I like to print out the article so that I can mark corrections and comments on it. I first skim the article to get an idea of the material being covered. I review the title, abstract, and conclusions and then proceed to read the text carefully. I examine the reference list for consistency, accuracy, and format. If authors are sloppy in their citations, then they may not be paying attention to detail with other aspects of their experimental or written work. After fully examining the article, I submit my review to the journal editor with a recommendation of acceptance, revision, or rejection based on clear comments to the authors that begin with my major concerns and conclude with minor issues. As I provide these details, authors are given an opportunity to improve their work if they so choose.

Reviewing manuscripts is a chance to influence the community for good and to provide service back to journals that have previously published your work (or perhaps a journal where you would like to submit in the future). Having reviewed hundreds of articles for more than two dozen different journals over the past two decades, I know that reading the literature and reviewing journal submissions have made me a better writer.

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Conflict of interest

None.

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