Reviewing Scientific Literature:

Reading, Writing, and Reviewing Articles and Recent Forensic Genetics Literature

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A copy of this presentation is available at:
http://www.cstl.nist.gov/strbase/NISTpub.htm

Scientific Publication:
Reading, Writing, and Reviewing

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Forensic Science International: Genetics Supplement Series

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

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

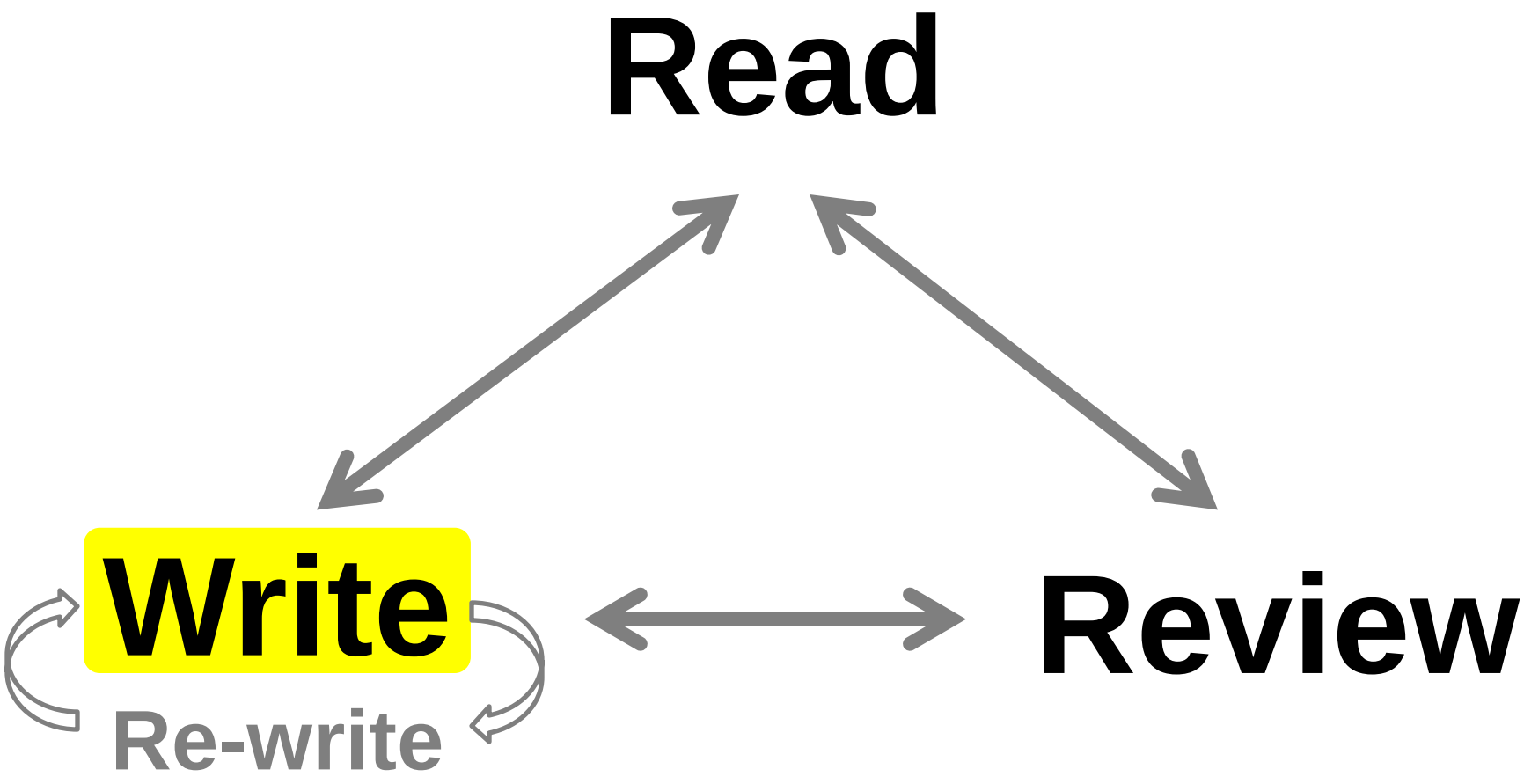
John M. Butler *

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

…“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…”

The Triad of Scientific Publishing



Presentation Outline

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

- Reading
  - Tools for reference collection
- Writing
  - Submission & peer-review process
- Reviewing
- *FSI Genetics*
  - Volume 18, Special Issue articles

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."

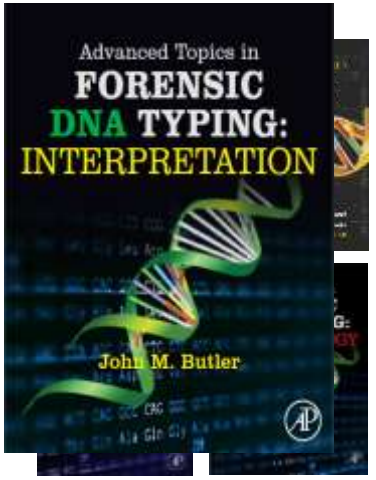
- Dr. Nathan Blow, *BioTechniques* editor-in-chief (May 2013, p. 235)

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**

THOMSON REUTERS
SCIENCE WATCH

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

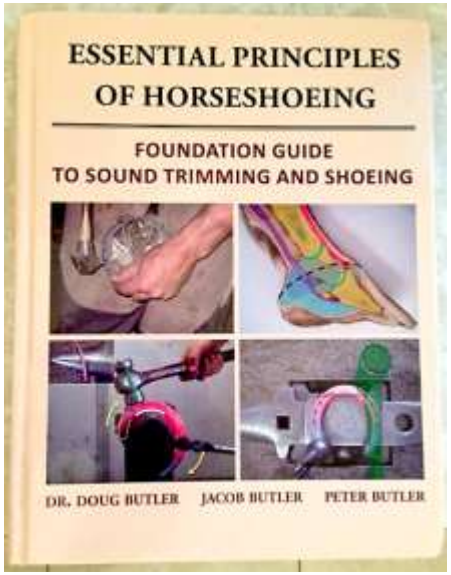
Quote on p. xv, J.M. Butler (2015) *Advanced Topics in Forensic DNA Typing: Interpretation* (Elsevier: San Diego)

Doug Butler Thoughts on Learning

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

Butler Professional Farrier School LLC
"The trusted voice in farrier education"

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

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"

Some Forensic Science Journals

Elsevier

Elsevier

Elsevier

Elsevier

Elsevier

Springer

Springer

Taylor & Francis

Wiley-Blackwell

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…

FBI Quality Assurance Standards

Requirement for Literature Review

Quality Assurance Standards for Forensic DNA Testing Laboratories
(effective September 1, 2011)

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

http://www.fbi.gov/about-us/lab/biometric-analysis/codis/qas-standards-for-forensic-dna-testing-laboratories-effective-9-1-2011

Benefits of Reading the Literature

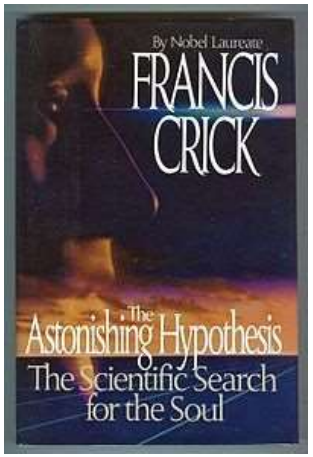
- You become familiar with authors and institutions
- You can improve as a writer and a presenter
- Your laboratory can improve its protocols
- Over time you will be building your knowledge
  - In graduate school, I read over 100 articles on PCR before I ever did a single experiment
  - I have gathered and cataloged ~9,000 articles over the last 20 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?

http://www.biography.com/people/francis-crick-9261484

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."

My thoughts on how to read a scientific article

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

Selecting What to Read…

- 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**

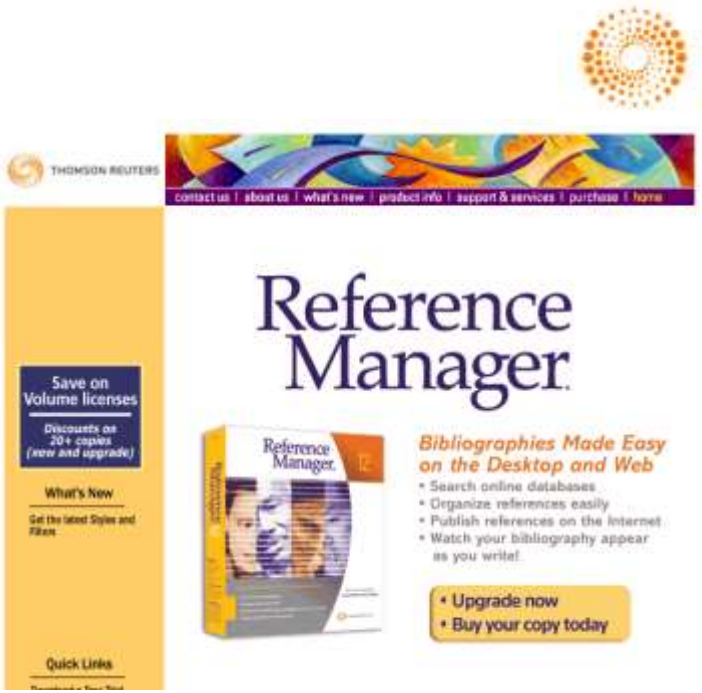
Review Articles and Citations in Volume 18

Special Issue: New Trends in Forensic Genetics

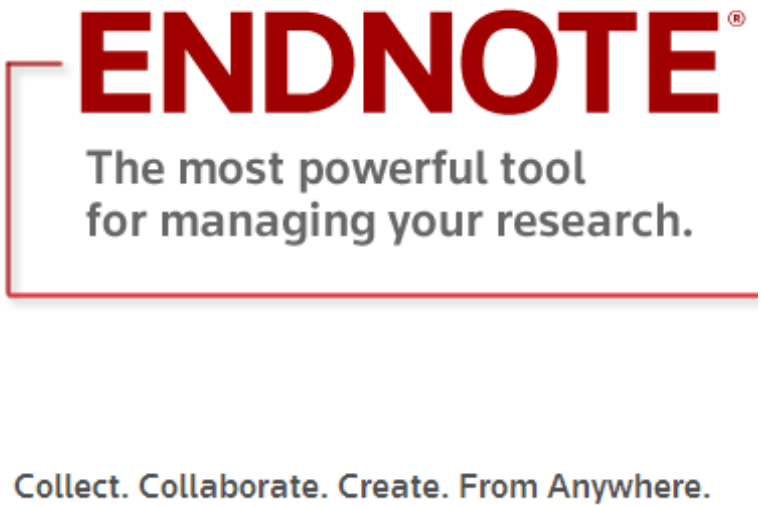
1591 references cited in these 14 articles

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. Morling	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

Reference Management Systems



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

Writing
Scientific Articles

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

Thoughts on How to Write a Scientific Article

- **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!

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
  - Original article, technical report, case report, etc.
- Pay attention to the reference format

<u>As an editor, one of the first things I examine is the reference list…</u>
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!**

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?

David McCullough

www.barnesandnoble.com

1968 1972 1977 1981 1992 1992 2002 2005 2009 2010 2011

"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)

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)

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

The Science of Scientific Writing

George Gopen & Judith Swan (1990)

http://www.americanscientist.org/issues/pub/the-science-of-scientific-writing

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

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

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/ethical_1author.html

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

Data Display – Tables & Figures

- Think carefully about how data are conveyed
- An entire workshop could be taught on best practices for displaying data in figures or tables
- Captions should enable a table or figure to be understandable independently of the text

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 lose confidence in the quality of the work
- **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?

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 unneccessary 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

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

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**
- 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

Submission & Peer-Review Process

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

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

Responding to Reviews

- 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

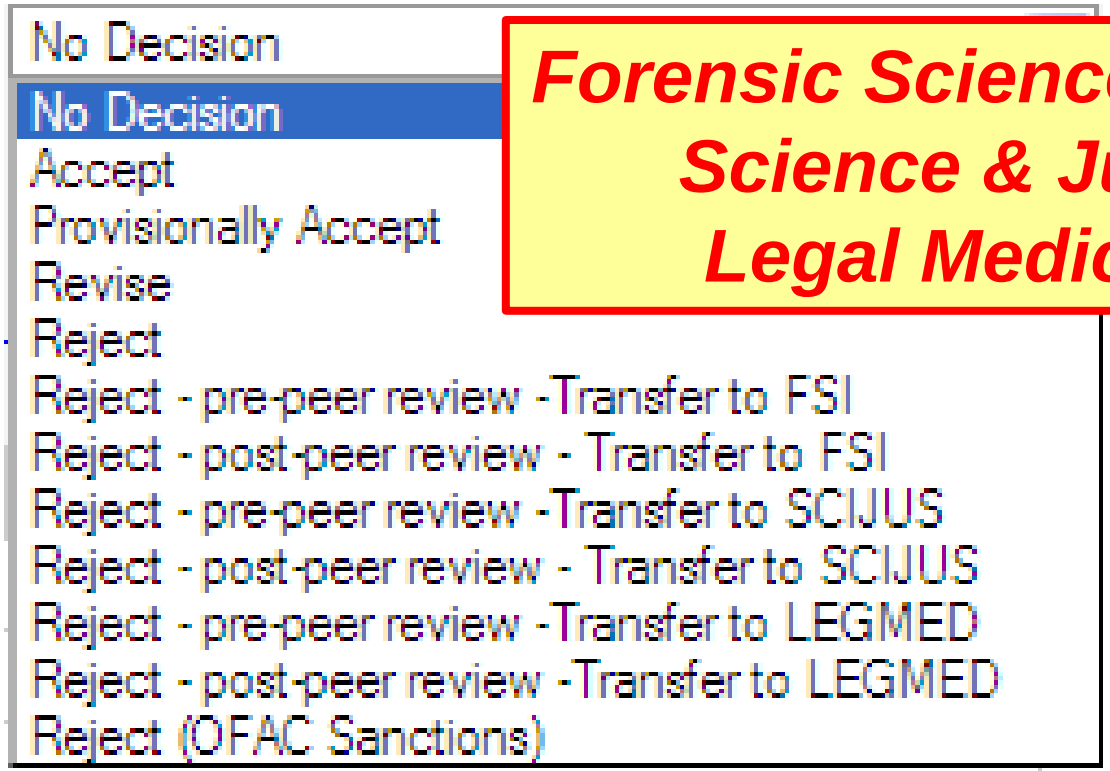
- Provide respectful rebuttals
  - Criticism is hard to take but is necessary to improve your work

Some reasons why articles may be 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

Editor Options with FSI Genetics Articles

- If *FSI Genetics* rejects an article, either pre-review or post-review, the manuscript can be transferred to another Elsevier journal for consideration



***Forensic Science International* (FSI)**
***Science & Justice* (SCIJUS)**
***Legal Medicine* (LEGMED)**

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

Reviewing
Scientific Articles

Qualities of a Good Reviewer

…"Good reviewers provide **objective feedback** to editors and **constructive comments** to authors."

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

Contents lists available at ScienceDirect

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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?**

My thoughts on 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?”**

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!

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 fullfil 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, imigration cases, typing of biological stains and tissues from

Author Information

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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

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

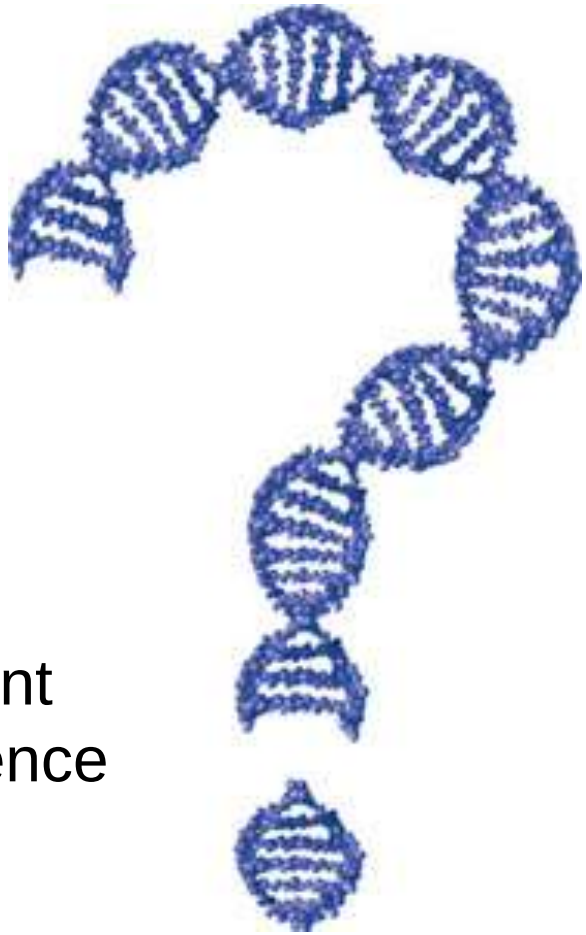
Thank you for your attention

Acknowledgments:

Aisling Murphy (Elsevier)

Kathy Sharpless (NIST) who provided feedback on this presentation

My wife for her input and support



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http://www.cstl.nist.gov/strbase/NISTpub.htm