The Practice of Science 2019 - Annotated Bibliography

I've focused on print resources and some of the more obscure or older (but still useful!) resources to complement your web search for useful information on careers and career guidance. Consider the starred (*) articles as essential reading early in your career (or now, if they're new to you). Sample the remainder as time, interest and need—or need of diversion—dictate. Enjoy!

1. Getting Started - Choice of problem and direction


*a few additional articles of interest:*


2. Getting Stuff Done


*Fisher, D. (2003). The Henry Kunkel Legacy: through the eyes of his last graduate student. Lupus 12:172-174. (an engaging, informal look at Henry Kunkel and his essence as a mentor: the creative spark for your science must come from you; smart people will always see an interesting angle on any solid result; and the way to build a big, interesting and potentially important story is with that first small, solid experimental result. So get started!).


Lee, A., Dennis, C. and Campbell, P. (2007) Nature’s guide for mentors. Nature 447:791-797. Even though this is billed as a guide for mentors, it has a great deal to say about identifying good or great mentors and the important roles a mentor plays in one's scientific career. Have a look!

Two interesting perspectives on the vexing issue of choice of a lab are given in: Holden, C. ‘Eight attributes of highly successful postdocs’, and Vogel, G. ‘A day in the life of a topflight lab’ (Bob Langer’s lab at MIT), both in the 3 Sept 1999 issue of Science.


Sabertooth the lab head (2001) A memo to graduate students and post-docs. J Cell Science 114:2547-48. A tongue-in-cheek contribution to JCS's entertaining StickeyWicket/Caveman series reminding you—again—that you are the chief agent of your success or failure in science. The first sentence gives you the flavor: 'I'm sorry to be unhelpful, but I am not your mother!'

Burroughs Wellcome/HHMI (2006) Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty. 2nd Edition (a 250 pp guide that can be requested free from HHMI or downloaded and printed from the HHMI website where you’ll find additional resources: http://www.hhmi.org/grants/office/graduate/labmanagement.html. Includes excerpts from the Barker books noted below as well. Very useful advice and free to boot!).

Future Faculty Fellows short course: The HHMI funded a series of 'Future Faculty Fellows' boot camps at many institutions including the UW. These are now being continued with other support, and provide 2 days of very practical talks, hand-on advice and materials. If available to you, sign up both for the resources and opportunity to compare notes with other trainees and faculty.
American Society for Cell Biology (2004) *Career Advice for Life Scientists vols I-III*. These books are soft bound and free as pdfs (search the title or see the ASCB website) and a great complement to HHMI above.


Barker, Kathy (2002,2005) *At the Helm and At the Bench: Laboratory Navigator*. Cold Spring Harbor Laboratory Press. (two useful guides, one now in 2nd edition, by Kathy Barker of ISB on setting up and running your lab. *At the Helm* is the more useful of the two for senior students, post-docs and new faculty).


Bliss, E.C. (1976) *Getting Things Done*. Bantam Books, New York. (73 short chapters with a few amusing little drawings on how to tackle daily life. Got me to throw out all the other time management books I bought, but was procrastinating about reading!).


In the same vein is the recently published ‘*Why People Believe Weird Things*’ by Michael Shermer (WH Freeman, 1997 and recently updated). Shermer has also written the ‘Skeptic’ column for *Scientific American*. Look around - you’ll have no trouble finding local examples...


National Academy Press (1995 +) *On Being a Scientist: Responsible Conduct in Research*, 2nd and subsequent editions. (Responsible conduct of research, and dealing with the ethical dilemmas posed
by science, are part of all of our lives. This short booklet has case studies and a good bibliography. You'll receive additional training as part of your graduate career).

3. Essential Skills I - Reading and writing

Warren, K., ed. (1981) *Coping with the Biomedical Literature*, Praeger, New York (useful compilation, with the most useful-and least dated-those of how to approach ‘the literature’).

Medawar, P. (1963) Is the scientific paper a fraud? This was a BBC radio address by the redoubtable Medawar, gently reminding the audience of the gap between the mess that's day-to-day science and the finished product, the pristine, logical sequence we eventually publish to tell our stories. Republished in Medawar's collection of essays *'The Threat and the Glory - Reflections on Science and Scientists'* Harper-Collins.


Tim Albert's article-writing bootcamp and checklist. Not sure you can start writing? Or how to? Here's drill sergeant Tim Albert to the rescue! This very useful short article can be found at: [http://www.biomedcentral.com/authors/report](http://www.biomedcentral.com/authors/report)


Williams, R. (∼1990 on) *The PC (or Mac) is not a Typewriter* series. Peachpit Press, Berkeley. (very useful older series providing a painless introduction to typography and how to use any word processor/graphics program to produce words/figures that look good and are a pleasure to read. Word processing programs paradoxically institutionalize lots of typographical mistakes and errors—e.g., this series will convince you never to ‘fully justify’ anything again! Use these to spot and correct the more egregious mistakes or achieve special effects. Little ‘how-tos’ that make the difference!

**More than ink on the real (or virtual) page:** For more information on typography, the field once moribund but resurrected by digital fonts, see: “Stop Stealing Sheep, and Learn How Type Works” by Erik Spiekermann and E. M. Ginger. More detail can be found in Robert Bringhurst's classic “*The Elements of Typographic Style*” an in-depth, workbook-style look at typesetting. Read Carolina de Bartolo’s “*Explorations in Typography*” (or just visit the book’s terrific website). And Ellen Lupton’s “Thinking With Type” (web link is: [http://www.thinkingwithtype.com/](http://www.thinkingwithtype.com/)) provides a good all-round introduction or self-teaching the basics. For all things typographic, see [typographica.org](http://typographica.org)

### 4. Essential Skills II - Speaking

McGovern, V. (2009) *The one-minute talk.* Let's start small, with the even shorter version of the elevator pitch—master this shortest of short forms first, which you'll use almost every day, then work up to the perfect short talk and hour lecture.


Maitreya's Stream of Consciousness Poster Presentation Guide (2014 - unpublished). A very useful guide to poster presentations created by my GS faculty colleague Maitreya Dunham - everyone should write her to encourage her to update and publish this!

Sam Hertig’s detailed video guide to poster prep (2016). You can find this via the following link: [go.nature.com/2aetlrc](http://go.nature.com/2aetlrc) See also the related good article by Chris Woolston (2016) Lead the poster parade. *Nature* 536:115-117.

**ABRCMS Judging Rubric - Poster and Oral Presentations** (2019) ASM-ABRCMS. Very useful scoring sheet to help keep you on the straight-and-narrow when developing and presenting posters or short talks.

Peter Cook's Oxford website: [http://users.path.ox.ac.uk/~pcook/w1/resources.htm](http://users.path.ox.ac.uk/~pcook/w1/resources.htm). Peter runs the Nuclear Structure and Function Research Group at the Dunn School of Pathology at the University of...
Oxford. His long-stranding interest in teaching and better-communicating is on display in his 'Resources’ page that includes up-to-date material and live links to many very useful resources.

5. Essential Skills III - Collaboration


Twyla Tharp and Jesse Kornbluth (2009) *The Collaborative Habit: Life Lessons for Working Together*. Interesting statement on the importance and mechanics of collaboration from one of the giants of 20th century American modern dance. This book aims to be a practical guide, and is made all the more interesting by focusing on generalizable lessons.

6. Essential Skills IV - Statistical and Computational Tools

Haddock, S.H.D. and Dunn, C.W. (2011) *Practical Computing for Biologists*. Sinauer Associates, Sunderland, MA. Includes a plethora of topics in readily accessible form that are becoming increasingly important: familiarity with text manipulation and command line resources, programming (the appropriately focus on Python), computer graphics, remote access and building simple electronic devices using Arduino. A great way to dip your toe in on any of these topics.

Buffalo, V. (2015) *Bioinformatics Data Skills: Reproducible and Robust Research with Open Source Tools*. O'Reilly, 508 pp. This book picks up where Haddock and Dunn leave off. *R* has become the standard scientific statistical computing package. There are myriad good introductory books, free on-line tutorials and guides that will get you started.


Bailey, N.T.J. (1995) *Statistical Methods in Biology, 3rd Ed.* Cambridge University Press, Cambridge. 255pp. (Everyone needs a ‘statistical crutch’ - this is mine: good introductions to simple concepts and their application, with a Summary on what approach or test to choose as a function of distribution, sample size and type of comparison. Needs to be used with software (e.g., R), and a biostatistician you can trust and work with).


Tufte, E.D. (1983/2001) *The Visual Display of Quantitative Information.* 1st/2nd Editions. Graphics Press, Cheshire, CT. 197pp. (Stunning! Most useful work on graphical excellence in theory and practice. After reading this you'll never look at a multicolor, overproduced 3D Powerpoint slide again without weeping at the lost opportunity to accurately and economically convey information! See also Tufte's 3 sequels, the most recent of which *Beautiful Information* includes the full text of his ‘take-no-prisoners’ shred of Powerpoint. All 4 books are equally useful and enjoyable to read or thumb through, as well as stunningly produced - Tufte also teaches a course that includes all of the books in the registration fee).

Gladwell, M. (2002) *The social life of paper.* New Yorker 25 March issue. (The real skinny on paper, and why it's so useful: paper is a remarkably efficient and versatile, low cost, low tech but ‘high-touch’ crutch to support the life of the mind. This article starts with air traffic controllers, who use small scraps of paper to track and clear even very busy flight schedules. Available free at the author’s website: www.gladwell.com).


7. **Style in Science/The Wellsprings of Creativity**


See also the entertaining take in Peter Doherty’s ‘The Beginner’s Guide to Winning the Nobel Prize, esp his Chapter 9 which is reprinted in Reginald Smith’s compendium *Scientific Work and Creativity: Advice From the Masters* noted below.

Where do ideas come from? Ideas drive science, so it might be worth dipping a small toe into a little of the voluminous literature on this topic. For starters see the following, a Wikipedia entry and a recent 2009 Keck Futures talk on the topic plus a few items below: [en.wikipedia.org/wiki/Creativity](en.wikipedia.org/wiki/Creativity)
[www.keckfutures.org/conferences/synthetic-biology/Podcast_Tutorials_Foster_Main_Page.html](www.keckfutures.org/conferences/synthetic-biology/Podcast_Tutorials_Foster_Main_Page.html)

Holton, G. (1978) Fermi's group and the recapture of Italy's place in physics, Chapter 5 in *The Scientific Imagination: Case Studies.* Cambridge University Press, Cambridge. 382pp. (Fermi was the last great physicist to be equally adept and accomplished as a theoretician and experimentalist. A good
account of Fermi's work habits are given in Platt, J.R. (1962) *The Excitement of Science*, Houghton-Mifflin, Boston, Chs. 7 and 8).


Smith, R., Editor (2012) *Scientific Work and Creativity: Advice From the Masters*. Citizen Scientist League, Clearwater, FL. Great compendium of 29 chapters including many excerpts from famous books and scientists. My thanks to the Editor, Reginald Smith, for bringing this to my attention.


Austin, J.H. (1977) *Chase, Chance and Creativity: The Lucky Art of Novelty*. Columbia University Press, 237pp. (Austin was the long-time Chair of Neurology at Colorado, more recently famous for his excursions into cognitive neuroscience (see also his ‘Zen and the Brain’ MIT Press, 1999, 834pp. and sequels). This earlier work is a much more accessible look at the episodes from the author’s career, and how a combination of opportunity and insight were leveraged to good advantage. Certainly not the weightiest of works on creativity, but enjoyable. Recently reprinted).

Tharp, T. (2003) *The Creative Habit: Learn It and Use It for Life*. Simon and Schuster, 243pp. (very interesting statement on creativity and the conditions that foster creative thinking from one of the giants of 20th century American modern dance. This book aims to be a practical guide, and is made all the more interesting by where its coming from and by focusing on what promotes creativity across a wide range of disciplines).

Medawar, P. (1982/1990) *Pluto’s Republic* and *The Threat and the Glory*, Oxford U.P. and Harper Collins. (Medawar and Thomas (see below) were two of the most engaging and elegant stylists writing science in any century. Both are models of high intelligence, clarity and enthusiasm in presenting science and medicine to the public).

Thomas, L. (1974/79) *Lives of a Cell* and *The Medusa and the Snail*. Viking Press. (see note above. The first of these books was collected from a very unusual (for the time) column Thomas wrote for the *New England Journal of Medicine* entitled ‘Notes of a Biology Watcher’).

8. The Larger World, and a few just for fun...

several cancer centers, most recently in Utah. After having heard his ‘maxims’ quoted so many times as wisdom of a sage, I was happy to find that they’d been captured for posterity, amusement and use. Topics include institutional realities, leadership, recruiting, job changing and success.


Feynman, R.P. (1985) *Surely You’re Joking, Mr. Feynman!: Adventures of a Curious Character*. W.W. Norton, New York. 350pp. (Feynman's autobiography in the form of a collection of great stories he told his drumming buddy and fellow physicist Ralph Leighton. A gentle reminder that life and science are supposed to be fun).


Dyson, F.J. (2012) Is science driven mostly by ideas or by tools? *Science* 338:1426-1427. On the enduring tension between ideas and tools, and how both are needed to effectively drive science.


LaZeBenk, Y. (2002) Can a biologist fix a radio? - Or, what I learned while studying apoptosis. *Cancer Cell* 2:179-182. (amusing meditation on the coming tide of systems thinking as applied to biology. As is often the case, the most useful commentary is again delivered with humor).
9. Odds and ends...

**series on-line:** Science Magazine’s ‘Science Careers’ site is excellent - many interesting articles and series covering a wide range of career advice and having an excellent collection of on-line resources. See above for a relatively recent example on the need for risk-taking in science. My first stop, as there’s always something interesting here before diving into the web and science blogosphere.

**series in-print:** the ‘Sticky Wicket’ series in Journal of Cell Science is very entertaining, very funny and (usually!) anonymous, as was the previous, now apparently discontinued ‘Caveman’ series. What redeems this often-biting series is the skillful use of humor to address important topics in science and science or graduate training.

Philip Bourne’s original ‘Ten simple rules’ series in *PLoS Computational Biology* continues with various authors, providing succinct advice on a wide range of topics.

Also, Greg Petsko has also written entertainingly on a range of topics for different journals, most notably and recently his *Genome Biology* series.

**Help us with the next edition!** We’re especially interested in your favorite resources on computational biology, systems biology and on-line resources to add to what’s above. Send these and other corrections or additions, and we’ll gladly credit any we use.

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