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Resources for effective communication, career advancement, professional development, research integrity, and teaching in the (molecular life) sciences: a compilation of books, articles, and web links

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General Advice for Graduate Students:

Resources prepared for a teaching program in professional survival skills and ethics operated by Michael Zigmond and Beth Fischer:
http://www.skillsandethics.org/Site_2/Resources.html
overview: http://www.angelfire.com/la3/laprairie/FischerZigmond.pdf

Slightly cynical "guide" for grad careers:
http://www.eeb.yale.edu/stearns/advice.htm
More upbeat response to Stearns:http://faculty.washington.edu/hueyrb/pdfs/reply.pdf
Lots of links to info about grad studies:
http://www.anu.edu.au/BoZo/Scott/Studentresources.html
More links with lighter touch: http://www-personal.umich.edu/~danhorn/graduate.html

Seeking Letters of Recommendation:

Applications for most jobs, scholarships, and other awards require letters of recommendation, usually from relevant professionals. Graduate students should cultivate relationships with potential referees so that the letters can be based on true knowledge and then request letters appropriately. E.g.:
http://www.universityaffairs.ca/how-to-ask-for-a-reference-letter.aspx

General and Science Writing Guides:

Style: Ten Lessons in Clarity and Grace by Joseph M. Williams
The Elements of Style by W. Strunk, Jr., and E.B. White (3 rd edition; a classic, must read); online at http://www.bartleby.com/141/index.html

A Short Guide to Writing about Biology by Jan A. Pechenik (5 th edition, 2004)
Writing Papers in the Biological Sciences by Victoria E. McMillan (2 nd edition)
How to Write and Publish a Scientific Paper (5 th ed., 1998) by R.A. Day; Oryx Press.

Presenting Science to the Public. By B. Gastel (1983); ISI Press

"The Science of Scientific Writing" by G.P. Gopen and J.A. Swan, *American Scientist* 780-550-558. (an informative discussion of the how's and why's of scientific writing):
http://www.amstat.org/publications/JCGS/sci.pdf

A comprehensive guide to writing and communication related to science:
http://www.writing.eng.vt.edu/

Components and purposes of each part of a scientific paper well explained:
http://www.survival.pitt.edu/library/documents/ComponentsofaResearchArticle.doc

How to Teach Scientific Communication by F.P. Woodford (1999). Council of Biology Editors, Reston, VA. (includes some useful before and after revision examples)

Eats, Shoots and Leave. The zero tolerance guide to punctuation. by Lynne Truss (2006). Gotham Books PB. An amusing guide to an often neglected topic.

Style and Technical Guides; Writing Conventions:

The Chicago Manual of Style. University of Chicago Press

Scientific Style: The CBE Manual for Authors, Editors, and Publishers by the Style Manual Committee, Council of Biology Editors. Cambridge University Press. THE reference style guide for us.

Using the Biological Literature . E.B. Davis and D Schmidt (1995); Dekker

"Guide to Grammar and Style" by Jack Lynch:
http://andromeda.rutgers.edu/~jlynch/Writing/

Online grammar and punctuation guides:
http://owl.english.purdue.edu (select grammar, spelling, punctuation; includes writing exercises and guidance).
http://writing-program.uchicago.edu/resources/grammar.htm

Proper use of numbers: http://www.councilscienceeditors.org/publications/ssf_numberstyle.cfm

Format for bibliographic citation of internet sources:
http://www.nlm.nih.gov/pubs/formats/internet.pdf
http://www.councilscienceeditors.org/publications/citing_internet.cfm

Guides to genetic and cytogenetic nomenclature by organism:
http://www.councilscienceeditors.org/publications/resources.cfm

Commonly confused words:
http://www.ucalgary.ca/UofC/eduweb/writing/confuse.htm

Microsoft manual of style for technical publications (downloadable):
http://www.microsoft.com/downloads/details.aspx?displaylang=en&FamilyID=B494D46B-073F-46B0-B12F-39C8E870517A

Effective Poster Presentations:
Posters sessions have become an important way to present and discuss your research at meetings. It is important to do them well.
Useful summary of advice: http://the-scientist.com/2011/09/01/poster-perfect/
"Do's and Don'ts of Poster Presentations" by Steven M. Block (1996) Biophys J. 71: 3527-3529 (Old but good tips, including what to avoid): www.biophysics.org/education/block.pdf
http://ublib.buffalo.edu/libraries/asl/guides/bio/posters.html (links to many resources)
Links to advice on posters: http://www.the-aps.org/careers/careers1/GradProf/gposter.htm
http://www.biology.lsa.umich.edu/research/labs/ktosney/file/PostersHome.html(quite useful)
http://www.ncsu.edu/project/posters/IndexStart.html
http://www.kumc.edu/SAH/OTEd/jradel/Poster_Presentations/PstrStart.html (very useful site with many examples; courtesy of Prof. Jeff Radel, U. Kansas Med. Center)
http://courses.washington.edu/imt05595/posters.html (how to use MS PowerPoint to make posters; some useful hints and links)

Effective Oral Presentations and Visuals :
http://www.kumc.edu/SAH/OTEd/jradel/Preparing_talks/TalkStrt.html
http://www.kumc.edu/SAH/OTEd/jradel/Effective_visuals/105.html (on preparing visuals for oral presentations courtesy of Prof. Jeff Radel, U. Kansas Med): **Make it Big, Simple, Clear, & Consistent)**
http://www.swarthmore.edu/NatSci/cpurrin1/powerpointadvice.htm
http://www.anu.edu.au/BoZo/Scott/Talks.html (short and to the point do's and don'ts)
http://www.anu.edu.au/BoZo/Scott/SharonTalks.html (more short, good advice)
http://www.skillsandethics.org/Survival_Skills_%26_Ethics/Resources_files/Attending%20professional%20meetings%202009g.pdf (practical advice on attending meetings, including reservations, planning, travel, posters, presentations, and networking)

The Craft of Scientific Presentations. Critical steps to succeed and critical errors to avoid by Michael Alley (2003) Springer-Verlag: New York.

Dazzle 'em With Style: The Art of Oral Scientific Presentation by Robert R.H. Anholt (1994). W.H. Freeman: New York. (New edition available?)

Advice on keeping laboratory notebooks:
http://www.swarthmore.edu/NatSci/cpurrin1/notebookadvice.htm
http://www.skillsandethics.org/Survival_Skills_%26_Ethics/Resources_files/Laboratory%20notebooks.pdf

Advice on Critical Reading and Presentation of Research Articles:

http://www.skillsandethics.org/Site_2/Resources_files/Reading%20a%20journal%20article%20%282010%29.pdf

Making effective graphs, tables and figures:
The Visual Display of Quantitative Information 2 nd ed. by E. R. Tufte (2001), Cheshire , CT :Graphics Press (ISBN: 9613921) (really enlightening and fun to read).

The Elements of Graphing Data by W.S. Cleaveland (1985), Wadsworth Advanced Books and Software, Monterey, CA .

Preparing Scientific Illustrations: A Guide to Better Posters, Presentations, and Publications. 2 nd Ed. By M.H. Briscoe (1996). Springer, NY

Advice on statistics and data analysis:
Intuitive biostatistics by M. Motulsky (1995). Oxford University Press
Experimental design and data analysis for biologists by G.P. Quinn and M.J. Keough (2001). Cambridge University Press.

"Statistical significance tests: Equivalence and reverse tests should reduce misinterpretation". D.F. Parkhurst (2001), BioScience 51:1051-1057.
http://www.graphpad.com (general tutorials, not strictly limited to applications of this software)

Short, focused advice for students: (courtesy of Professor Colin Purrington, Swarthmore College)
Advice on presentations using Powerpoint, slides:
http://www.swarthmore.edu/NatSci/cpurrin1/powerpointadvice.htm
Advice on seeking letters of recommendation:
http://www.swarthmore.edu/NatSci/cpurrin1/letters.htm
Advice on searching for literature: http://www.swarthmore.edu/NatSci/cpurrin1/litsearch.htm

Tips for Writing Successful Grant Proposals:
General Grant Writing Guides:
www.umanitoba.ca/research/funding/tips/general_grant_tips.pdf
www.research.umich.edu/proposals/PWG/pwgcontents.html
www.hfsp.org/how/ArtofGrants.htm
http://www.learnerassociates.net/proposal/ (very helpful guide to the mechanics)
http://www.physpharm.fmd.uwo.ca/undergrad/survivalwebv3/ArtofGrantsmanship.html (comprehensive, excellent guide to grantsmanship by a Canadian)
http://www.survival.pitt.edu/library/documents/grantspersonshipmanual.pdf (lots of specific advice)

Guides for Canadian Granting Agencies:
NSERC: www.nserc.ca/programs/winprop_e.htm
CIHR: http://www.cihr-irsc.gc.ca/e/24550.html
Guide to writing effective NSERC fellowship applications:
http://www.nserc.gc.ca/programs/sf/pgs_pdf_tips_e.htm

Guides for American Granting Agencies:
www.nsf.gov/home/programs/guide.htm (guide to writing NSF grants, with some general guidance)
www.niaid.nih.gov/ncn/grants/write/index.htm (guide to writing NIH grants, with general guidance)

Web Sites for Granting Agencies (most have scholarship and fellowship programs for students):
NSERC: www.nserc.ca
CIHR: www.cihr.ca
Common CV: www.commoncv.net
Michael Smith Foundation for Health Research: www.msfhr.org
Canada Foundation for Innovation: www.innovation.ca
British Columbia Knowledge Development Fund: www.aved.gov.bc.ca/bckdf/
To search for other funding (mostly Canadian) opportunities see: http://www.sfu.ca/ors/database.html
To search for American and international grants and fellowships: http://www.grantsnet.org

Getting a job in science and career development advice:
Virtually all continuing academic positions in Canada are advertised in *University Affairs* (http://www.universityaffairs.ca/) and the *CAUT Bulletin* (http://www.cautbulletin.ca/default.asp)

Link to "Landing an Academic Job. The process and pitfalls" by Jonathon Dantzig:
http://quattro.me.uiuc.edu/~jon/ACAJOB/academic_job.html

Candidate Tools: links to job and career development info from ASCB:
http://www.ascb.org/career/career-resources.html

Life Science Research and Teaching: Strategies for a Successful Job Hunt : a downloadable book from the ASCB: http://www.ascb.org/newsfiles/jobhunt.pdf *Career Advice for Life Scientists* , a downloadable book ASCB, with some focus on women's issues:
http://ascb.org/files/WICB_Pub_Vol_I_II.pdf

Career development and job seeking advice for graduate students, post-docs and junior faculty from the *Science* magazine (lots of useful information, opinion, and advice):
http://sciencecareers.sciencemag.org/tools_tips/how_to_series

Home page of *Science* Careers section for scientists: http://sciencecareers.sciencemag.org/

Online Tools for job searches via *Science*: http://scjobs.sciencemag.org/JobSeekerX/

The *Chronicle of Higher Education* has an online newsletter providing career news and advice as well as faculty and research job listing updated daily: http://chronicle.com/jobs

"A Dozen Sentences That Should Appear In Your (Academic) Job Application" P.N. Howard.
http://www.grad.washington.edu/mentoring/memos/dozen-sentences.shtml Other useful advice on this site as well.

Excellent resources for the development of early early-career scientists from the Howard Hughes Medical Institute including "making the right moves", lab management, mentoring skills, starting a research group, science management and training therein, including a free manual "Making the Right

Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty" available from: http://www.hhmi.org/resources/labmanagement/

A Ph.D. is Not Enough by Peter Feibelman (1993), Addison Wesley (somewhat useful and witty career advice from a solid state physicist with a bias toward national labs rather than academia or industry). Gist: as a graduate student you should be planning for your career in science, not just the completion of your thesis. That includes generating an appropriate publication record, producing content for your CV that includes the skills that are sought in your likely chosen career, and cultivating effective referees.

"Excessive trust in authorities and its influence on experimental design" T-T. Sun. *Nature Reviews/Molecular Cell Biology* 5:577-581 http://www.nature.com/nrm/journal/v5/n7/full/nrm1429.html Useful advice on thinking and being responsible for your own research and career, being skeptical of authorities including kits, understanding all steps of a protocol, designing proper controls, keeping a good lab notebook, and troubleshooting.

Ethics and Integrity in the Scientific Workplace, Resources:

Singapore Statement of Research Integrity (2010). Nice 1 page summary of principles and responsibilities that should guide researchers. www.singaporestatement.org

"On Being a Scientist: A Guide to Responsible Conduct in Research". 3rd edition. National Academies of Sciences and Engineering, and Institute of Medicine. National Academies Press, 2009. Free download and podcast at: http://books.nap.edu/catalog.php?record_id=12192

A compilation by *Science* of many useful links concerning the ethics of science in a broad context: http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2002_11_29/noDOI.9541941422654441339
Links to other sources related to research integrity: http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2002_11_29/noDOI.15418829673481492130
NIH website for Bioethics Resources: http://bioethics.od.nih.gov/

What to do about suspected violations of research integrity (Koocher and Keith-Spiegel (2010) *Nature* 466: 430-440; http://www.nature.com/nature/journal/v466/n7305/pdf/466438a.pdf).
Associated website for advice: www.ethicsresearch.com

Research on human subjects in Canada must be in accordance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans. It has an on-line tutorial at: http://www.pre.ethics.gc.ca/english/tutorial/

Honesty, Accountability, and Trust: Fostering Research Integrity in Canada (2010). Council of Canadian Academies. www.scienceadvice.ca

Authorship issues: Council of Scientific Editors' White Paper on Promoting Integrity in Scientific Publications (including issues regarding authorship): http://www.councilscienceeditors.org/i4a/pages/index.cfm?pageid=3313

Authorship and acknowledgements: http://www.icmje.org/ethical_1author.html

Teaching resources: "Simplifying Teaching" *The Scientist* May 2011 P. 61-63. Simple advice oriented toward university faculty. Includes some useful citations of books, articles, and online resources some included here: http://the-scientist.com/2011/05/25/simplifying-teaching/

National Science Digital Library. A searchable database of teaching tools for all levels, e.g., use of clickers). http://nsdl.org

BioEDUCATE: Learning and Teaching Life Sciences (http://bioeducate.asch.org). Lots of resources including animations and presentations from the American Society for Cell Biology.

"Scientific Teaching" J. Handelsman et al. (2004), *Science* 304:521-22. http://www.sciencemag.org/content/304/5670/521.full.pdf?sid=1f8be973-e250-43c1-9b51-fbf88522dfc9 Good overview of new approaches to teaching science based on science, with lots of supplementary resources

"Clickers in the large classroom" J.E. Caldwell (2007). *CBE-Life Sciences Education* 6:9-20. Focus on development of questions. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1810212/

"Why peer discussion improves student performance on in-class concept questions" M.K. Smith (2009) *Science* 323:122-24. Documentation that discussion and clicker surveys improve understanding. http://www.sciencemag.org/content/323/5910/122.full.pdf?sid=60038033-6bea-4e27-be86-e1838505f462

Searching the Scientific Literature:
NCBI Literature Databases (Includes PubMed, a searchable database of abstracts of biomedical literature including extremely useful links to related articles; Bookshelf of online biomedical textbooks; PubMed Central, providing unrestricted, full text access to many life science journals; OMIM, a database of human genetic diseases): http://www.ncbi.nlm.nih.gov/Literature/index.html

Entrez (sequence oriented databases, including links to PubMed):
http://www.ncbi.nlm.nih.gov/Entrez/

Web of Science (ISI Science Citation Index) at SFU Library (find abstracts of papers by author, and find papers that cite papers of interest; also lots of citation data):
http://www.lib.sfu.ca/researchtools/databases/dbofdb.htm?DatabaseID=328

Chemical and biochemical structures, etc:
http://www.lib.sfu.ca/researchtools/databases/dbofdb.htm?DatabaseID=400

Finding worldwide universities and people working at them:
http://www.braintrack.com/

Many useful links for scientists and professionals:
http://www.councilscienceeditors.org/i4a/pages/index.cfm?pageid=3291
Dictionaries:
An on-line dictionary that includes some science terms:
http://dictionary.reference.com/
Compendium of on-line dictionaries etc., in several languages:
http://www-math.uni-paderborn.de/dictionaries/Dictionaries.html
American Heritage Dictionary: http://www.bartleby.com/61/

Pronunciation, including some scientific terminology: http://www.howjsay.com/
(has apps for iPhone and Blackberries)

Online Encylcopedias: http://en.wikipedia.org/wiki/Wikipedia
Columbia Encyclopedia: http://www.bartleby.com/65/
Thesaurus: Roget's II: http://www.bartleby.com/62/
Acronyms: Medical acronyms: http://medstract.org/
Finding the meaning of general acronyms, abbreviations, and initialisms:
http://www.acronymfinder.com/
Medical eponyms (medical phenomena named for a person): http://www.whonamedit.com/
On-line clock and calendar; time zones: http://www.timeanddate.com/
Currency converter: http://www.oanda.com/convert/classic