Using the Biological Literature: A Practical Guide

The Web pages listed on this site are taken from the fourth edition of Using the Biological Literature: A Practical Guide, by Diane Schmidt (CRC Press, 2014). This annotated guide to the literature of the biological sciences covers over 3,000 major books, journals, and Web sites of interest to biologists and biologists-in-training. It is divided into the chapters listed below.


The fourth edition of the guide includes numerous Web sites. These were chosen on the basis of their importance and presumed stability. Of course Web sites change frequently, so the author has extracted all of the Web resources listed in the book and presents them here. This site will be kept up to date, with annotations changing as sites change their focus or their URLs. New sites will not be added so that this Web site is kept in sync with the print book.

To see a list of important resources for biologists, click on the links below.

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Chapter 1: Introduction

Electronic biological literature

The vast proliferation of the biological literature has made the computer an indispensable part of any biologist's toolkit. Abstracts and indexes have been computerized since the early 1970s and were originally searched by trained intermediaries such as librarians and information specialists (see the introduction to Chapter 4 for more information). Beginning in the mid-1980s, these tools have been available for end users, and their availability has only expanded in the years since then. The next wave of computerization improved access to journals, and electronic books trailed behind their periodical siblings by a couple of decades but are beginning to come into their own.

Electronic journals have become commonplace today; only 15 years ago they were a novelty, eliciting a great deal of discussion concerning utility, availability, cost, archival storage, ownership, intellectual property rights, peer review, and copyright compliance. These controversial issues are still relevant but the electronic age is proceeding apace. All of the major commercial publishers and society publishers currently make their journals available electronically, and several initiatives in the biological sciences assisted smaller society publishers to move to full text. Stanford University Library has been
Most of the e-journals presently available are electronic versions of existing print journals. In the heady early days of electronic publishing a number of new paradigms were envisioned, including abolishing or drastically modifying the present system of peer review. Preprint archives such as the physics service arXiv (http://arxiv.org/) were seen as a way of providing speedy access to research. Partly due to the concerns about peer review mentioned earlier, the beginning of the electronic journal age in the life sciences got off to a much more sedate start than in physics. The earliest e-journals in the mid to late 1990s were simply electronic versions of standard print journals, usually in bundled subscriptions with both print and online versions for one price. New journals published in electronic format only, without a print equivalent but after undergoing the usual peer review process, were launched but faced numerous hurdles. The first well-funded online journal in the life sciences was the Online Journal of Current Clinical Trials (OJCCT), which was founded in July 1992. Despite extensive efforts, it was initially difficult to find authors willing to publish in the journal, even after 1994 when it gained an official stamp of approval by becoming the first online journal indexed in Index Medicus. It ceased publication in 1996, but it was only the first of many online-only journals. Now in the mid-2010s, many standard journals have ceased publication in print and are only available online and many newly created journals are only available online.

The issue of how to archive electronic journal backfiles is one that publishers and librarians have wrestled with extensively. We know how to preserve copies of print books and journals: publishers print them on acid-free paper and librarians place copies of them in climate-controlled facilities in multiple locations around the world. The situation is profoundly different in the case of electronic journals. Initially, publishers kept control of the electronic backfiles for their journals, causing librarians and users to be concerned about what would happen when keeping the files was no longer economically advantageous to the publishers, or if they went out of business. Also, given all the changes in electronic media (magnetic tapes to thumb drives) and standard software programs (remember WordPerfect?), there are concerns about migrating all the masses of data from one standard platform to another. Librarians and publishers have worked on this issue, and robust and redundant standards and systems are in place that should allow seamless updates and transfers in the future. These systems have yet to be significantly tested in real life, but having them in existence is a relief to everyone involved.

Another series of initiatives that have revolutionized the biological literature focuses on Open Access (OA). The genesis of the OA movement goes back to the beginning of the Internet age, with its mantra that “Information wants to be free.” In addition, the subscription price crisis in the 1980s and 1990s encouraged authors and librarians to explore alternatives to the traditional modes of publishing. The final outcome of the tension between traditional publishing and OA is yet to be determined, but among other things governmental policies such as the NIH Public Access Policy discussed below guarantee that there will be a place for OA in the future of scientific communication.

There are many “flavors” of Open Access, but the basic definition provided by advocate Peter Suber (2013) is that “Open-access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions.” The two types of OA found in the life sciences include Author Pays (also known as “gold” OA) and Open Access repositories (“green” OA). The Author Pays model has attracted most of the attention, both positive and negative. In this model, authors of scientific publications pay a fee to the journal publisher to make their articles available for free immediately upon publication. Some journals are completely OA, such as the PLoS journals, but there are many other mixed journals in which some authors choose to pay for Open Access and some do not. These OA articles receive the same peer review that other articles receive and many grants provide funds for OA publications. This model is rather similar to the system found in many society publications, in which authors are expected to pay page charges. This helps keep subscription prices low. Two major resources for OA information are the Directory of Open Access Journals (DOAJ), which lists OA journals (http://www.doaj.org/), and the SHERPA/Romeo Web site (http://www.sherpa.ac.uk/romeo/), which lists publisher OA policies.

The biological and medical sciences have been in the vanguard of the Open Access movement. More than half of the substantial journals listed in the DOAJ are biomedical; biomedical journals also publish more articles than the journals in other fields and charge higher author fees. The three largest OA publishers, PLoS, Biomed Central, and Oxford University Press, all publish in the biomedical field (Walters and Linville, 2011). More recently, in August 2013 a series of reports commissioned for the European Commission’s Directorate-General for Research and Innovation showed that 40% of articles published worldwide from 2004-2011 were available as Open Access (Archambault et al, 2013). Biology had achieved 57% OA, while 61% of biomedical research articles were available as OA. The NIH and NSF Public Access policies discussed below have also had a significant effect on the OA cause in the biomedical fields.

Some of the early concern with the Author Pays model focused on the possibility of abuse. While the major OA publishers such as PLoS and BioMed Central have strict peer review processes that are equal to those in the best standard journals, the fear has always been that unscrupulous publishers would see this model as a cash cow, publishing any kind of dreck as long as authors were willing to cough up the money. While the vast majority of OA publishers are focused more on the ideal of making information available for free and breaking even rather than making money, some unscrupulous publishers have been identified. Authors looking for OA journals to publish in should ask many of the same questions that they would for any journal. Who publishes the journal? Are the author fees in line with other OA journals in your field? Have you or your mentors ever heard of it? Is the journal indexed in any of the major indexes? Have authors you know and respect published in it, or are on the editorial board?

The OA Repository or Green OA model is different from the Author Pays model. In this model, after publishing in a journal authors make their articles available for free in some kind of repository, such as the author’s personal Web site or an institutional or disciplinary repository. In some cases publishers only allow copylefted word processor versions of the final article rather than a PDF of the actual article to be available in a repository. Many journals now follow this Green model by making all of the content of their journals available for free after an embargo period, which is usually between 6 months to a
While no one can read the future of the biological literature, it is safe to say that it will continue to grow apace, and that while peer review will continue, approximately 1.8 million species of organisms (see Chapter 3). The Encyclopedia of Life, a project aimed at producing a Web page for each of the 1.8 million species of organisms (see Chapter 3).

Like other initiatives that seek to change the publication model for scientists, OA has been controversial from the start. The history of PubMed Central illustrates this. The original PubMed Central proposal, first publicized in March 1999, was for a single all-inclusive database containing all biomedical research papers from traditional journals as well as preprints, all available for free. Both parts of the proposal proved to be controversial, and when the PubMed Central project went online in February of 2000, it was with a far more limited scope than originally planned. It consisted of only a few journals and the preprint server idea was completely dropped. As of February 2001, only about 10 journals were available on PubMed Central but by 2013 over a thousand journals were included. Despite the early setbacks OA supporters soldiered on, and in April 2008 the Public Access Policy was implemented. It required that all research funded by NIH grants be made publicly available within 12 months of publication, and in February 2013 a similar policy was passed affecting the NSF and all the other Federal agencies that spend over $100 million per year supporting research. Authors must either publish in journals following the green OA system or deposit their articles in PubMed Central or another repository. The US is not the only country interested in OA repositories. At the same time PubMed Central was proposed, the E-BioSci OA portal was implemented.

One of the potential benefits of the OA model that has been extensively touted by OA advocates is that greater availability of free articles would lead to increased visibility and use of those articles. Research studying citation rates for OA and non OA articles has been mixed, with most recent studies showing only a modest increase of citation rates for OA articles (Davis and Walters, 2011; Archambault et al, 2013). That includes comparisons of OA and non OA articles within the same mixed-model journals (Davis, 2009).

Non-European and small European countries have been quick to find value in the OA model as a mechanism to promote the research performed in their own countries. One good example is Brazil’s SciELO (http://www.scielo.org), a platform that publishes over 1,000 OA journals from several South and Central American countries. Waters and Linville (2011) found that 27% of the OA journals they studied published articles in languages other than English, and that the percentage of OA journals published outside of Europe and North America had increased from 10% in 2005 to 31% in 2009. While it isn’t a completely valid comparison, compare this to the 19% of non-European and North American journals indexed in BIOSIS Previews mentioned above.

Researchers in the biological sciences create massive amounts of data that must be accessible to be useful. The data may include ecological data from long-term studies, the holdings of museum collections, neuroscience images, or molecular or genetic sequences. Formerly, the data were published in articles or books and rarely updated but with the development of electronic journals and databases this material is far more accessible and easier to manipulate. Molecular biology is a good example of a discipline that uses electronic publishing to share new data with a multi-disciplinary research community through electronic productions like GenBank, PDB (the Protein Data Bank), the Human Genome Project, and so on. What is unique about these databases is that data is accepted before being published in the journal literature, and in fact most journals require that sequences be added to GenBank prior to their publication in print.

As a result of the availability of all this data, techniques for finding and interconnecting data have become one of the fastest growth areas in biology and information science. Bioinformatics, the use of computer and information science to analyze biological data, has exploded in use. While the term is often used to refer just to the analysis of genomic or molecular biology information, all areas of biology that create large amounts of data have their own bioinformatics needs and practitioners. The Open Access movement has made some areas of bioinformatics such as text mining possible. Articles that are locked away behind a paywall are not available for text mining sweeps, but abstracts in PubMed and full text from OA journals are. The next step is to combine the journal literature with the huge molecular biology databases in new and interesting ways.

All of the above discussion of the electronic biological literature focuses on electronic journals and databases, a measure of their importance to the biological sciences. Electronic books have been slower in coming. The earliest e-books included encyclopedias, dictionaries, and textbooks. While some implementations of electronic textbooks have not been popular with students, their promise is obvious. More recently, monographs that mimic journals in that they consist of individual chapters acting like separate articles rather than a cohesive whole have been successful online, and most publishers produce electronic versions of their books. One complication is the multiplicity of incompatible e-book readers, although one way around this problem is to publish scientific books as PDF files of individual chapters. Libraries can subscribe to individual titles or large or small book packages, much like the infamous Big Deals that journal publishers offer.

There are relatively few OA books, but out of copyright books could be seen as the e-book equivalent of OA although the two issues are only tangentially related. At this point, according to US copyright law all books published before 1923 are out of copyright (also known as in the public domain) and can be used and republished as desired; books published between 1923 and 1989 may or may not be out of copyright and materials published after 1989 are almost certainly in copyright. Other countries’ copyright laws vary, so the issue is extremely complicated and can slow scientific advancement. Probably the most famous digitization project is Google’s Google Book project (http://books.google.com), which aims to digitize all the world’s literature, ran into many issues related to copyright but has made public domain books much more accessible. The Internet Archive at http://archive.org (also home to the Wayback Machine, which archives Web pages) is another digitization project, although it focuses on material in the public domain.

Of even greater interest to biologists, especially taxonomists, is the Biodiversity Heritage Library (BHL), which has the goal of digitizing all the biodiversity literature in the world. This project began in 2005 and was created by a coalition of major botanical gardens, natural history museums, and universities in the US and the UK. One major benefit of this project is to make the historical taxonomic literature (which can go back to Linnaeus’s publications) more widely available to local taxonomists who do not have easy access to the major American and European institutional libraries, which may hold the only copies of rare taxonomic works. The BHL records feed into the Encyclopedia of Life, a project aimed at producing a Web page for each of the approximately 1.8 million species of organisms (see Chapter 3).

While no one can read the future of the biological literature, it is safe to say that it will continue to grow apace, and that while peer review will continue,
new formats merging the best of the print world and the new electronic world will emerge. Publishers, authors, and librarians will continue to wrestle with issues related to Open Access and journal prices.

Bibliography


Chapter 3: General Sources

Introduction

This chapter describes selected sources that are relevant to biology in general, with no attempt to be comprehensive. These titles were chosen as especially appropriate for undergraduates needing an introduction to the field, or for anyone requiring sources covering the broad spectrum of the biological sciences. In addition, there are a number of resources that are useful for new graduate students, including books on how to fit in to a lab, how to publish a paper, and so on. Knowledge of most of the publications annotated in this chapter is helpful in effectively utilizing the more specialized chapters that follow. Arrangement is by topic, presenting publications that acquaint readers to the field of biology from the viewpoint of the history of the life sciences, mathematical and statistical sources, and pertinent techniques, just to name a few of the sections that follow. These general sources may be used as a base upon which to expand or define more specific subjects, to open up the literature as a beginning, not an end.

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- Writing Guides
- Periodicals
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Associations

- **American Association for the Advancement of Science (AAAS)**. 1200 New York Ave., NW, Washington, DC 20005. E-Mail: membership@aaas.org. URL: http://www.aaas.org Founded 1848. This the largest general scientific organization representing all fields of science. Membership includes 10 million individuals and 261 affiliated societies and academies of science. Objectives are to further the work of scientists to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, to advance education in science, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress. Publications include *Science, Science Signaling, Science Translational Medicine, Science Books and Films, Science
American Institute of Biological Sciences (AIBS). 1444 I St. NW, Ste. 200 Washington, DC 20005. E-Mail: rogrady@aibs.org. URL: http://www.aibs.org. Founded 1947. 6,000 members. This is a professional member organization and federation of biological associations, laboratories and museums whose members have an interest in the life sciences. Publications: BioScience and ActionBioscience.org, an English-Spanish science education resource. The Web site includes information about AIBS, publications, outreach and education, and public policy. AIBS member societies are participating in the electronic publishing venture, BioOne (see Chapter 1).

Association for Tropical Biology and Conservation (ATBC). PO Box 37012, Washington, DC 20013-7012. E-Mail: kressj@si.edu. URL: http://www.tropicalbio.org. Founded 1963. 1,350 members. An international organization of persons who are interested in tropical biology, seeking to coordinate existing information and provide new information about the plants and animals (including humans) of the tropics. Affiliated with AIBS. Publications: Biotropica. The Web page provides information about the association. Formerly: Association for Tropical Biology (ATB).


European Molecular Biology Organization (EMBO). Meyerholstrasse 1, D-69117 Heidelberg, Germany. E-Mail: embo@embo.org. URL: http://www.embo.org. Promotes the advancement of molecular biology in Europe and neighboring countries, administers programs funded by the European Molecular Biology Conference consisting of fellowships and courses. The organization holds courses and workshops, and presents an annual award. Publications: EMBO Journal, EMBO Reports, Molecular Systems Biology, and EMBO Molecular Medicine. They hold periodic general assemblies and an annual symposium.

Federation of American Societies for Experimental Biology (FASEB). 9650 Rockville Pike. Bethesda, MD 20814. E-Mail: info@faseb.org. URL: http://www.faseb.org. Founded 1912. 110,000 members in 27 member societies. Member societies include American Physiological Society, American Society for Biochemistry and Molecular Biology, American Society for Pharmacology and Experimental Therapeutics, American Society for Investigative Pathology, American Society for Nutritional Sciences, American Association of Immunologists, American Society for Cell Biology, Biophysical Society, American Association of Anatomists, and The Protein Society among others. Publishes the FASEB Journal, Breakthroughs in Bioscience, and Horizons in Bioscience. The Web page has links to the member societies, public affairs, career resources, meetings and conferences, membership directories, publications, and employment opportunities.

International Union of Biological Sciences (IUBS); Union Internationale des Sciences Biologiques. Bat 442 Universite Paris-Sud 11. 91 405 Orsay Cedex, France. E-Mail: nfomproix@iubs.org. URL: http://www.iubs.org. Founded 1919. 117 member societies. This is an organization of national societies and international associations and commissions engaged in the study of biological sciences. Their aims are to promote the study of biological sciences; to initiate, facilitate, and coordinate research and other scientific activities; to ensure the discussion and dissemination of the results of cooperative research; to promote the organization of international conferences; and to assist in the publication of their reports. Publications: Biology International; Monograph Series, Methodology Series, and the proceedings of the IUBS General Assembly. The Web page has primarily society information.

Marine Biological Association of the United Kingdom (MBAUK). The Laboratory, Citadel Hill, Devon, Plymouth PL1 2PB, UK. E-Mail: sec@mba.ac.uk. URL: http://www.mba.ac.uk. Founded 1884. 1,500 members. Marine biologists, botanists, and scientists encourage cooperation among members; disseminates information on latest research; studies living resources of the seas. Publishes Journal of the Marine Biological Association. The Web page provides access to MBA information, research, biodiversity initiatives, education, communication, membership, and knowledge exchange.

National Academy of Sciences (NAS). 500 5th St. NW, Washington, DC 20001. URL: http://www.nasonline.org. Founded 1741. 2,200 members. Honorary organization dedicated to the furtherance of science and engineering. Members are elected in recognition of their distinguished and
The number of Open Access journals is increasing rapidly so this site provides a valuable service. It "covers free, full text, quality controlled scientific and scholarly journals". Viewers can search for specific titles or browse by subject area. The Directory of Open Access Journals (DOAJ) is available for free online at http://doaj.org. It covers over 11,000 journals, annual reports, technical reports, working papers and newsletters regularly screened for quality. As the site states, this directory provides information on the Academy, news bulletins, numerous online reports created by the Academy, and links to the National Academy Press. Thousands of books published by the press can be viewed for free on their Web site.


- **Society of Systematic Biologists (SSB)**. c/o David Hibbett, Exec. VP, Clark University, 15 Maywood St., Worcester, MA 01603. E-Mail: dhibbett@clarku.edu. URL: http://systbiol.org. Founded 1948. The society represents 1,550 scientists interested in classification of animals or other aspects of taxonomy or systematics. They promote the study of animals, invertebrate and vertebrate, living and fossilized, and all aspects of systematic zoology. Publishes *Systematic Biology*. Formerly Society of Systematic Zoology. The Web page provides information about the Society, their journal, and news.

- **Tropical Biology Association (TBA)**. Dept. of Zoology, Downing St., Cambridge CB2 3EJ, UK. E-Mail: tba@tropical-biology.org. URL: http://www.tropical-biology.org. Founded 1994. 37 members. The Association aims to meet the challenge of biodiversity conservation by establishing an informed, well-motivated community of tropical biologists based both in Europe and in tropical countries. The Web site contains information about the association and resources for funding, skill building, and much more.

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**Bibliographies**


- **CAB International Serials Checklist**. New York: CAB International, 1996. $85.00. ISBN 0851989713; 9780851989716. This list contains references to over 11,000 journals, annual reports, technical reports, working papers and newsletters regularly screened for CAB Abstracts. While not updated very often (the previous edition was done in 1988), this is the best directory for information on agricultural journals. The list of journals covered in CABI can also be found at the CABI Web site at http://www.cabi.org/publishing-products/online-information-resources/cab-abstracts/.

- **Chemical Abstracts Service Source Index: 1907-2004 Cumulative**. Columbus, OH: Chemical Abstracts Service, 2005. $731.00. This serial list for the Chemical Abstracts database has about 155,000 entries covering over 80,000 scientific journals and non-serial publications. CASSI, as it is universally known, cumulates every five years. It is particularly useful since it covers a vast number of journals in all fields of science and technology back to 1907 and is thus valuable for its coverage of obscure foreign journals or journals that have ceased publication. CASSI is also available for free online at http://cassi.cas.org and can be searched by journal title, abbreviation, and ISSN.

- **Directory of Open Access Journals: DOAJ**. Lund, Sweden: Lund University Libraries, 2003-. http://www.doaj.org. As the site states, this directory "covers free, full text, quality controlled scientific and scholarly journals". Viewers can search for specific titles or browse by subject area. The number of Open Access journals is increasing rapidly so this site provides a valuable service.
Genamics JournalSeek. Genamics, 2000s-. http://journalseek.net/. This useful database contains information on nearly 100,000 periodicals from over 5,500 publishers, with ISSNs, links to publisher web sites and online content, and subject descriptors. It is supported by OCLC as part of the WorldCat Knowledge Base.


A very extensive list of biological journals, arranged alphabetically by abbreviation with full title spelled out. It includes journals in multiple languages. It is not comprehensive but is a very good resource for abbreviations and full titles for current serials.


This database provides information on all journals indexed by PubMed and other NCBI databases. The journal database can be searched by title, title abbreviation, or ISSN and includes basic publication information such as dates, title changes, publisher, and more. A very useful tool to verify journal titles and publication information. Replaces List of Journals Indexed for MEDLINE.


This journal list is similar to the BIOSIS Serial Sources, above, and is equally useful for verifying journals. It covers 4,500 current titles and 5,500 archival titles. The list of current titles is also available at http://science.thomsonreuters.com/cgi-bin/jrnlst/jloptions.cgi?PC=B7. The online version does not include abbreviations.

The Barcode of Life Data Systems (BOLD) is an informatics workbench aiding the acquisition, storage, analysis, and publication of DNA barcode records. By assembling molecular, morphological, and distributional data, it bridges a traditional bioinformatics chasm. BOLD is freely available to any researcher with interests in DNA barcoding. By providing specialized services, it aids the assembly of records that meet the standards needed to gain BARCODE designation in the global sequence databases. Because of its web-based delivery and flexible data security model, it is also well positioned to support projects that involve broad research alliances.

The PhyloCode is a formal set of rules governing phylogenetic nomenclature. It is designed to name the parts of the tree of life by explicit reference to phylogeny.” The site allows users to download PDF and HTML versions of the draft code.

The Timetree of Life. New York: Oxford University Press, 2009. 551 p. (Oxford biology). $200.00. ISBN 0199535035; 9780199535033. This book provides a timeline of evolution for the major taxa of organisms. Each section summarizes the taxa (order or family), its phylogenetic relationships, the time of divergence, and usually concludes with a brief discussion of geological events at the time. A companion Web site at http://www.timetree.org allows users to discover the estimated time of divergence for any two taxa (dogs and cats or oaks and pines, for instance). The data is also available for mobile Web devices, and chapters of the book are available at the site for free download for non-commercial use.

Integrated Taxonomic Information System: ITIS. Washington, DC: Integrated Taxonomic Information System, 1996-. http://www.itis.gov. ITIS provides authoritative taxonomic information on plants, animals, fungi, and microbes of North America and the world. It is a partnership of US, Canadian, and Mexican agencies (ITIS-North America), other organizations, and taxonomic specialists. ITIS is also a partner of Species 2000, the Global Biodiversity Information Facility (GBIF), and Encyclopedia of Life (see under Dictionaries and Encyclopedias, below).

The Tree of Life Web Project. Tucson, AZ: D. R. Maddison and W. P. Maddison, 2007-. http://tolweb.org/. Intended to provide a means for finding information on all taxa of living organisms, especially their evolutionary relationships.

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Dictionaries and Encyclopedias

The Encyclopedia of Life: EOL. 2008-. http://www.eol.org/”Ultimately, the Encyclopedia of Life will provide an online database for all 1.8 million species now known to live on Earth.” (from the Web site) A speech by E.O. Wilson was the impetus for this site, which is supported by a
consortium of major research institutions. Each species page will contain summary information on biology, systematics, and distribution; images; maps; Web resources and links to the literature. The literature page also provides links to digitized books from the Biodiversity Heritage Library (see full description in Full Text section, below).

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Directories

- Lists about 250 biological field stations in North and Central America. Information includes address, contact information, and link to Web sites.

Ostriker, J. P., Charlotte V. Kuh and James A. Voytuk. *A Data-Based Assessment of Research-Doctorate Programs in the United States.* Washington, DC: National Academies Press, 2011. 304 p. $99.95 (pa). ISBN 0309160308 (pa); 9780309160308 (pa). The data for this assessment was collected in the 2005-2006 academic year from 212 universities. It includes both faculty and student characteristics as well as size of program and time to degree. The print volume comes with a CD containing an Excel spreadsheet with all the data for users to manipulate. The full text and spreadsheet are also available for free at the NAP site at [http://www.nap.edu/rdp/](http://www.nap.edu/rdp/). The most respected assessment of doctoral programs.

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Field Guides

- Schmidt, Diane. *International Field Guides.* Urbana, IL: University of Illinois, 1999-. [http://www.library.illinois.edu/bix/fieldguides/index.html](http://www.library.illinois.edu/bix/fieldguides/index.html). Companion to the print guide to North American field guides listed above. Over 6,000 field guides from all parts of the world, including North America, are described. Most are in English, though many other languages are also represented.

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Full Text Sources

- **Biodiversity Heritage Library.** Biodiversity Heritage Library Consortium, 2007-. [http://www.biodiversitylibrary.org/](http://www.biodiversitylibrary.org/). Created by a consortium of major natural history libraries and institutions, this online library has digitized thousands of rare books dealing with taxonomy and natural history. Most of the books are out of copyright, but several of the participating institutions have digitized all of their own publications regardless of copyright status. The BHL is a partner in the *Internet Archive* and its records feed into the *Encyclopedia of Life* (both discussed in this chapter).

Google Books. 2004-. [http://books.google.com/](http://books.google.com/). Probably the best known source for digital books. Google has digitized millions of both in-copyright and out-of-copyright books. Books that are out of copyright may be viewed in their entirety while in copyright books can be searched but only viewed in short “snippets”. Many libraries and publishers have provided Google with material to digitize. Some serial volumes are also included although the focus is on books.

Highwire Press. Stanford, CA: Board of Trustees of the Leland Stanford Junior University, 1995-. [http://highwire.stanford.edu/](http://highwire.stanford.edu/). Highwire Press is a digital publishing endeavor of Stanford University that provided one of the earliest e-journal publishing platforms. As of May 2013 the press published 1775 journals, books, proceedings, and other publications. This included over 2.25 million free articles, usually available after an embargo period of 6 months to a year or more.

Internet Archive. 1996-. [http://archive.org/index.php](http://archive.org/index.php). This site provides access to millions of books, videos, and music recordings, as well as the Wayback Machine (archived Web pages). The majority of the digitized books are out of copyright although some are more recent and available through Creative Commons licenses. The *Internet Archive* is home to many other projects, including Project Gutenberg and the *Biodiversity Heritage Library*, above. Books can be downloaded or read online in PDF, EPUB, Kindle, Daisy, Fulltext, and DjVu formats.

PubMed Central: An Archive of Life Science Journals. Bethesda, MD: National Library of Medicine, 2000-. [http://www.pubmedcentral.nih.gov/](http://www.pubmedcentral.nih.gov/). A free, full-text repository for biomedical and life science journal articles. Some of the content comes from participating publishers wanting to make their content available, usually after an embargo period, while much of the content is from authors depositing their manuscripts in accordance with the NIH Public Access Policy (see Chapter 1). As of May 2013, over 2.7 million articles had been deposited.
General Works


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Guides for Young Scientists

- Dee, Phil. *Building a Successful Career in Scientific Research: A Guide for Ph.D. Students and Post-Docs.* New York: Cambridge University Press, 2006. 130 p. $96.00; $31.00 (pa). ISBN 0521851912; 9780521851916; 0521617405 (pa); 9780521617406 (pa). This guide is based on columns from *Science* magazine’s Next Wave site (now part of [http://sciencecareers.sciencemag.org/](http://sciencecareers.sciencemag.org/)). The advice is aimed at graduate students and post-docs and covers topics such as choosing an advisor, how to write well, the transition to a post-doc, writing grants, and succeeding as a scientist.

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Guides to the Literature

- INFOMINE Scholarly Internet Resource Collections. Biological, Agricultural and Medical Sciences. Riverside, CA: Regents of the University of California, 1994-. [http://infomine.ucr.edu/cgi-bin/search?bioag](http://infomine.ucr.edu/cgi-bin/search?bioag). This site links to both free and fee-based Internet resources in the life sciences and has very extensive coverage.

- *The Scout Report: A Publication of the Internet Scout Project: A Project of the InterNIC.* Madison, WI: Internet Scout Research Project, 1994-. [https://scout.wisc.edu/scout-report](https://scout.wisc.edu/scout-report). This weekly report lists the best free Internet resources in a variety of subjects, including science and technology. The reports are available from the Internet Scout Web site and also by email subscription.

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Handbooks

- IUCN Red List of Threatened Species. [http://www.iucnredlist.org/](http://www.iucnredlist.org/). This site provides detailed information on endangered, threatened, or vulnerable species of plants and animals from around the world. It is the most comprehensive source of information on the conservation status of species, and the Web site provides conservation and taxonomic notes on individual species as well as statistics, maps, and other resources for conservation groups. The IUCN has been publishing the list (formerly printed in red volumes, hence the title) since the 1960s. Formerly: *Red Data Book.*


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- **Journal of Visualized Experiments: JoVE.** v. 1- , 2006- . Boston, MA: MYJoVE Corp. Price varies. ISSN 1940-087X. A Web-based video journal providing video demonstrations of scientific procedures and methods. There are currently several sections, including neuroscience, immunology, clinical and translational medicine, bioengineering, applied physics, and chemistry. Subscriptions are available only to institutions, and may be purchased for the entire collection or individual sections. Some articles are available for free at [http://www.jove.com/](http://www.jove.com/).


Writing Guides

- **The Chicago Manual of Style.** 16th ed. Chicago, IL: The University of Chicago Press, 2010. $65.00. ISBN 0226104206; 9780226104201. One of the standard style manuals. Most of the advice in this manual is aimed at authors in the humanities and social sciences, though the manual provides information on scientific citation style. The manual’s Web page at [http://www.chicagomanualofstyle.org](http://www.chicagomanualofstyle.org) contains some free content, but most of the site is available only to subscribers.

- **ICMJE: International Committee of Medical Journal Editors.** International Committee of Medical Journal Editors, 2009-. [http://www.icmje.org/index.html](http://www.icmje.org/index.html). This committee is composed of editors of general medical journals. Its purpose is to prepare the Uniform Requirements for Manuscripts. This annually updated document outlines requirements such as parts of an article, standards for references and tables, abbreviations, and information that should be included with article submission. The document is available at the committee’s web site in PDF.


- Purdue University Writing Lab. **The Purdue Online Writing Lab (OWL).** West Lafayette, IN: Purdue University, 1990s-. [http://owl.english.purdue.edu/](http://owl.english.purdue.edu/). This website links to many sites dealing with writing, including academic writing, professional writing in several different areas, the job search, English as a Second Language, grammar and punctuation, and much more. The site also provides links to information on the APA and Chicago Manual of Style citation formats.

Periodicals

- **Biology Direct.** v. 1- , 2006-. London: BioMed Central. Continually updated. Open Access. ISSN 1745-6150. "Biology Direct considers original research articles, hypotheses, comments, discovery notes and reviews in subject areas currently identified as those most conducive to the open review approach, primarily those with a significant non-experimental component. Subsequently, new sections will be added." Authors select reviewers from the BMC board and reviewer comments are publicly available. To date, the subjects covered by this new model focus on molecular biology and ‘omics. The journal’s website is at [http://www.biology-direct.com/](http://www.biology-direct.com/).

- **Biology Open: BiO.** v. 1- , 2011-. Cambridge, UK: Company of Biologists. Monthly. Open Access. ISSN 2046-6390 (online). "Biology Open is an online-only Open Access journal that publishes original research across all aspects of biological science, including cell science, developmental biology and experimental biology." Many of the articles in this journal were originally submitted to the other Company of Biologists periodicals. The journal is available at [http://bio.biologists.org](http://bio.biologists.org).

- **BMC Biology.** v. 1- , 2003-. London: BioMed Central. Continually updated. Open Access. ISSN 1741-7007. "BMC Biology is the flagship biology journal of the BMC series, publishing peer-reviewed research and methodology articles of special importance and broad interest in any area of biology, as well as reviews, opinion pieces, comment and Q&As on topics of special or topical interest." Articles are available at [http://www.biomedcentral.com/bmcbiol](http://www.biomedcentral.com/bmcbiol).

F1000 Biology Reports. 2009-. London: Faculty of 1000. Open Access. ISSN 1757-594X. "Publishes short commentaries by the world's top scientists in which the hottest biology papers/clusters of papers identified by Faculty of 1000 are put into a broader context." Articles are available at http://f1000.com/prime/reports/biology.

Genome Biology. v. 1- , 2001-. London: BioMed Central. Monthly. Price varies. ISSN 1474-7596. "Genome Biology publishes research articles, new methods and software tools, in addition to reviews and opinions, from the full spectrum of biology, including molecular, cellular, organism or population biology studied from a genomic perspective, as well as sequence analysis, bioinformatics, proteomics, comparative biology and evolution." Research articles are Open Access, while access to reviews, opinion pieces, and meeting reports requires a subscription. Free content available at http://genomebiology.com/.


PLoS Biology. v. 1- , 2003-. San Francisco, CA: Public Library of Science. Weekly. Open Access. ISSN 1545-7885 (print); 1544-9173 (online). The first of the PLoS journals, publishing "works of exceptional significance, originality, and relevance in all areas of biological science, from molecules to ecosystems, including works at the interface of other disciplines, such as chemistry, medicine, and mathematics." Articles available at http://www.plosbiology.org/.

PLoS Computational Biology. v. 1- , 2005-. San Francisco, CA: Public Library of Science. Weekly. Open Access. ISSN 1553-7358 (print); 1553-734X (online). The journal "features works of exceptional significance that further our understanding of living systems at all scales—from molecules and cells, to patient populations and ecosystems—through the application of computational methods." Articles available at http://www.ploscombiol.org/.


Science. v. 1- , 1880-. New York: American Association for the Advancement of Science. Weekly. Price varies. ISSN 0036-8075. Prestigious general scientific journal with a majority of biological articles reporting original research, news, comments, book reviews, and special sections for grants, laboratory aids, etc. At http://www.sciencemag.org/ there is access to content highlights.


The Scientist. v. 1- , 1986-. Midland, ONT: LabX Media Group. Monthly. Price varies. ISSN 0890-3670. " The Scientist is the magazine for life science professionals—publication dedicated to covering a wide range of topics central to the study of cell and molecular biology, genetics, and other life-science fields." Available at no charge on the Web at http://www.the-scientist.com, although there is an institutional subscription as well.

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Reviews of the Literature

Chapter 4: Abstracts and Indexes

Introduction

This chapter can be seen as a companion to Chapter 2, “Searching the Biological Literature”. Abstracts and indexes are used to locate articles, proceedings, patents, dissertations, books, and book chapters in various subjects. Because the literature of biology is so vast it should come as no surprise to find that there are many indexes offering access to that literature. This chapter annotates the major indexes and abstracts that cover general science and/or multiple subjects in biology. Those indexes that deal with narrower fields such as entomology or plant taxonomy will be covered in the appropriate subject chapter.

Current Awareness

- **AGRICOLA.** Washington, DC: National Agricultural Library, 1970-. [http://agricola.nal.usda.gov](http://agricola.nal.usda.gov). Covers the worldwide literature of agriculture, including journal articles, monographs, government documents, technical reports, and proceedings; from the National Agriculture Library (NAL). This database is valuable for life sciences students and researchers who are interested in plants or animals of economic importance. Available for free from NAL or through several other vendors by subscription. The ceased print version of AGRICOLA was the Bibliography of Agriculture. The list of serial titles indexed in AGRICOLA is available at [http://www.nal.usda.gov/nal-catalog/journals-indexed-agricola-jia](http://www.nal.usda.gov/nal-catalog/journals-indexed-agricola-jia).

- **Embase.** 1974-. New York: Elsevier Science. Daily. Price varies. ISSN 0929-3302. This biomedical database is a competitor to MEDLINE, and contains records from the 41 sections of the print Excerpta Medica indexes plus MEDLINE records. EMBASE covers more than 7,600 journals and 2,000 conferences, including many not covered by MEDLINE. EMBASE focuses on the European literature, especially in pharmacology and related fields. An EMBASE Classic version is also available, searchable back to 1947. The list of journals covered can be found at [http://www.embase.com/info/what-is-embase/coverage](http://www.embase.com/info/what-is-embase/coverage). EMBASE is available directly through Elsevier or via several other vendors.

- **Google Scholar.** Mountain View, CA: Google, 2004-. [http://scholar.google.com](http://scholar.google.com). Indexes scholarly articles, theses, books, white papers, court opinions, and Web sites harvested from academic publishers, professional societies, scholarly repositories, and universities in all areas of scholarly endeavor. Libraries can link their holdings and subscriptions to Google Scholar, allowing users to connect directly to subscription-based resources. The index also indicates who has cited indexed works, and users with Google accounts can create alerts to keep up to date.


- **Open WorldCat.** OCLC Online Computer Library Center. [http://www.worldcat.org](http://www.worldcat.org). This is a freely searchable database that corresponds to the subscription WorldCat database, the largest library catalog in the world. Users can search for books and journals and find out which libraries hold the material. The majority of the participating libraries are in the United States, but most of the large national and academic libraries from around the world are also included.

- **PubMed.** Bethesda, MD: NCBI, 1949-. [http://www.ncbi.nlm.nih.gov/pubmed](http://www.ncbi.nlm.nih.gov/pubmed). PubMed is another version of the MEDLINE database and offers a number of useful services aimed at the biological research community. It is available for free at the National Center for Biotechnology Information’s (NCBI) site. The PubMed database indexes articles that are not included in the main MEDLINE database, including all articles from journals that are indexed selectively in MEDLINE. Citations show up earlier in PubMed than in MEDLINE as well. PubMed also provides links to articles from over 700 full text journals and to the molecular biology databases of DNA/protein sequences and 3-D structure data that have been developed by NCBI. Researchers can set up Current Awareness searches through the “MyNCBI” account. There are also a number of other useful services such as browseable databases for journal titles and MeSH headings, and citation matching services.

- **Scirus: For Scientific Information Only.** Amsterdam, Netherlands: Elsevier Science. 2001-2014. Scirus was a database of scientific information, including scientists' homepages, courseware, pre-print servers, patents and institutional repository and websites. Results can be limited to journal articles, trusted Web sites, other Web sites, and file types (PDFs, Word documents, etc.). Similar in intent to Google Scholar (above).
This site was retired in 2014, statement from Elsevier: “We are sad to say goodbye. Scirus is set to retire in early 2014. An official retirement date will be posted here as soon as it is determined. To ensure a smooth transition, we are informing you now so that you have sufficient time to find an alternative search solution for science-specific content. Thank you for being a devoted user of Scirus. We have enjoyed serving you.”

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Retrospective Tools

- **Index-Catalogue of the Library of the Surgeon-General’s Office.** 1st-5th series, 1880-1961. Washington, DC: GPO. This series indexes the publications held in the library of the Army’s Surgeon-General and predates *Index Medicus*. The articles and transactions are indexed in a mixed author and subject list. The *Index-Catalogue* was the most comprehensive biomedical index of its time. The full text of the *Index-Catalogue* is freely available at NLM’s site at [http://indexcat.nlm.nih.gov/](http://indexcat.nlm.nih.gov/).

Chapter 5: Biochemistry and Biophysics

Introduction

Biochemistry and biophysics have been grouped together in this chapter. Biochemistry is “the study of the chemistry of living organisms, especially the structure and function of their chemical components”, while biophysics is “the study of physical aspects of biology” (*Oxford Dictionary of Biology*, 4th ed., 2000). Both are integral parts of biology, and their interdisciplinary relationship with basic biological sciences often blurs subject area lines. Frequently, the materials and literature for one discipline will satisfy the demands or questions posed by the other.

There will be substantial overlap, also, between biochemistry/biophysics with molecular and cellular biology which have been placed in Chapter 6. Toxicology is also included in this chapter.

Jump to Section:

- Abstracts and Indexes
- Associations
- Guides to the Literature
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Abstracts and Indexes

- **Toxicology Literature Online (TOXLINE).** Bethesda, MD: National Library of Medicine, 1900s- . [http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?TOXLINE](http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?TOXLINE). This free database consists of records from a number of sources dealing with toxicology. It indexes journal articles, technical reports, and many other resources dealing with the biochemical, pharmacological, physiological, and toxicological effects of drugs and other chemicals.

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Associations

- **American Chemical Society (ACS).** 1155 16th St. NW, Washington, DC 20036. E-Mail: help@acs.org. URL: [http://portal.acs.org/portal/acs/corg/content](http://portal.acs.org/portal/acs/corg/content). Founded 1876, 151,000 members. Scientific and educational society of chemists and chemical engineers. Publishes 50 journals including *ACS Chemical Biology*, *ACS Chemical Neuroscience*, *Biochemistry*, *Journal of Agricultural and Food Chemistry*, *Journal of Natural Products*, *Journal of the American Chemical Society*, and *Journal of Physical and Chemical Reference Data*, as well as numerous books. CAS (Chemical Abstract Service), a division of ACS, publishes *Chemical Abstracts* (see Chapter 4). The ACS Web site is a major source of information for chemists.

Guides to the Literature


- Biochemical Society (BS). 3rd Fl., Eagle House, 16 Procter St., London WC1V 6NX, UK. E-Mail: genadmin@biochemistry.org. URL: http://www.biochemistry.org. Founded 1911. 9,000 members. Objectives are to promote biochemistry and to provide a forum for information exchange and discussion of various aspects of teaching and research in biochemistry. Publishes Biochemical Journal, Biochemical Society Transactions, The Biochemist, Essays in Biochemistry, Journal of Lipid Research, Molecular and Cellular Proteomics, and more. Web site contains membership information and links to education resources.


- Canadian Society for Chemistry (CSC) Societe Canadienne de Chimie. The Chemical Institute of Canada, 130 Slater St., Ste. 550, Ottawa, ONT, Canada K1P 6E2. E-Mail: info@cheminst.ca. URL: http://www.chemistry.ca. Founded 1985, 3,500 members. Scientific association of chemists in education, government, and industry. Covers chemical research, development, management, and education. Publishes Canadian Chemical News. Web site primarily for society information, but has links to other chemical resources.

- Federation of European Biochemical Societies (FEBS). The Weizmann Institute of Science, Department of Immunology, PO Box 2676100 Rehovot, Israel. E-Mail: febs@weizmann.ac.il. URL: http://www.febs.org. Founded 1964. 39,000 members. Purpose is to further research and education in the field of biochemistry and to disseminate research findings. Publishes FEBS Journal, FEBS Letters, FEBS Open Bio, and Molecular Oncology. Web site primarily for society information.

- International Union for Pure and Applied Biophysics (IUPAB) Organisation Internationale de Biophysique Pure et Appliquee. c/o Prof. Chris dos Remedios, Sec. Gen., University of Sydney, Bosch Institute Anderson Stuart F13, Sydney, New South Wales 2006, Australia. E-Mail: criados@anatomy.usyd.edu.au. URL: http://iupab.org. Founded 1966. National committees appointed by academies and research councils representing 50 countries. Purposes are to organize international cooperation in biophysics and to promote communication between the various branches of biophysics and allied subjects; to encourage cooperation between the societies that represent the interests of biophysics; and to contribute to the advancement of biophysics. Publishes Biophysical Reviews and IUBG Report. Web site primarily for membership information.

- International Union of Biochemistry and Molecular Biology (IUBMB). University of Calgary, Faculty of Medicine, Dept. of Biochemistry and Molecular Biology, 3330 Hospital Dr. NW, Calgary, AB, Canada T2N 4N1. E-Mail: walsh@ucalgary.ca. URL: http://www.iubmb.org. Founded 1955. 65 member societies. National academies, research councils, or biochemical societies; associated bodies represent national biochemical and molecular biology societies; special members are organizations representing industrial and other groups. Publishes Biochemistry and Molecular Biology Education, Biotechnology and Applied Biochemistry, IUBMB Life, Molecular Aspects of Medicine, and Trends in Biochemical Sciences. Web site primarily for society information.

- Protein Society. 9650 Rockville Pike, Bethesda, MD 20814-3999. E-Mail: cyablonski@proteinsociety.org. URL: http://www.proteinsociety.org. Founded 1986. To promote international interactions among investigators in order to explore all aspects of the “building blocks of life: protein molecules.” Membership is open to scholars and researchers interested in the analysis, chemistry, folding, structure, function, and regulation of proteins. Publishes Protein Science. Web site provides membership information and educational resources.

Guides to the Literature

Chapter 6: Molecular and Cellular Biology

Introduction


Molecular biology is among the most rapidly growing fields within biology with recent success stories such as the sequencing of the entire human genome (reported in Science and Nature). Molecular biology is unusual in that the major information source for molecular biologists is not journal articles, but public databases such as GenBank, PDB, and DDBJ (annotated below in the database section). This is one reason why there are relatively fewer handbooks and treatises for molecular biology than there are for other biological subjects.

There is a natural affinity between this chapter and the ones discussing reference materials for biochemistry (Chapter 5) and genetics (Chapter 7). Given this very substantial overlap, it is essential to review the sources annotated in these chapters for a more complete understanding of the literature of molecular biology.
### Placement service is offered. Publications: ASCB Newsletter, Molecular Biology of the Cell, and CBE—Life Sciences Education. Web site provides membership information and access to the Society's products and services, meetings, news, publications, public policy, and careers.

- **European Molecular Biology Laboratory (EMBL).** Meyerhofstrasse 1, D-69117 Heidelberg, Germany. E-Mail: info@embl.de. URL: [http://www.embl.de](http://www.embl.de). Founded 1975. 16 member countries. Conducts molecular biological research in a wide array of areas. Their Website lists their outstation locations and provides information about each site. Formerly European Laboratory for Molecular Biology.


- **Society for in Vitro Biology (SIVB).** 514 Daniels St., Ste. 411, Raleigh, NC 27605-1317. E-Mail: sivb@sivb.org. URL: [http://www.sivb.org](http://www.sivb.org). Founded 1946. 2,500 members. Professional society of individuals using mammalian, invertebrate, plant cell tissue, and organ cultures as research tools in chemistry, physics, radiation, medicine, physiology, nutrition, and cytogenetics. Publications: In Vitro-Animal, In Vitro-Plant, and In-Vitro Report. Their Web site provides access to society information and links to educational material.

### Databases

Molecular biology information is available extensively on the Web. Many of the databases discussed here provide access to gene or protein sequences. Each time a researcher sequences a gene or protein, he or she is expected not only to publish the sequence in a research journal, but also to submit the sequence to a sequence database. Sometimes journals will not accept articles until the sequences have appeared in a database, which is one of the few cases in which journals will accept data previously published elsewhere. The annual Nucleic Acids Research Database Issue is the best source for information on the major databases (currently volume 42, issue D1 or at [http://nar.oxfordjournals.org/content/42/D1.toc](http://nar.oxfordjournals.org/content/42/D1.toc)). The associated 2013 Molecular Biology Database ([http://www.oxfordjournals.org/nar/database/a/](http://www.oxfordjournals.org/nar/database/a/)) lists 1,512 databases, and there are many others as well.

- **DDBJ (DNA Data Bank of Japan).** Mishima, Japan: National Institute of Genetics, 1986-. [http://www.ddbj.nig.ac.jp/](http://www.ddbj.nig.ac.jp/). Collaborates with GenBank and EMBL (both below) to collect nucleotide sequences, which are compiled to form the INSD: International Nucleotide Sequence Database.


- **European Nucleotide Archive.** Heidelberg, Germany: EMBL Data Library, 1980-. [http://www.ebi.ac.uk/ena/](http://www.ebi.ac.uk/ena/). A nucleotide sequence database, created by EMBL in collaboration with GenBank and DDBJ.


- **Protein Data Bank (PDB).** Research Collaboratory for Structural Bioinformatics (RCSB), 1993-. [http://www.rcsb.org/pdb/home/home.do](http://www.rcsb.org/pdb/home/home.do). "The single international repository for the processing and distribution of 3-D macromolecular structure data primarily determined experimentally by X-ray crystallography and NMR." (from the Web page). It was established at Brookhaven National Laboratories in 1971 and contained just 7 structures; by June 2000, there were over 12,500 structures and by December 2013, there were 96,250 structures. The PDB Web site provides links to many molecular biology databases and other resources. There are three other mirror sites in Europe, Japan, and the US.

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Textbooks and Treatises

- DNA Learning Center. Cold Spring Harbor, NY: Cold Spring Harbor Laboratory, Dolan DNA Learning Center, 1993-. http://www.dnalc.org/."The DNA Learning Center (DNALC) is the world’s first science center devoted entirely to genetics education and is an operating unit of Cold Spring Harbor Laboratory, an important center for molecular genetics research." The learning center offers on-site courses but also provides numerous Web sites and tools for educators and students.

- Mount, David W. Bioinformatics: Sequence and Genome Analysis. 2nd ed. Cold Spring Harbor, NY: Cold Spring Harbor Laboratory Press, 2004. 692 p. $95.00 (pa). ISBN 0879696877; 9780879696870; 0879697121 (pa); 9780879697129 (pa). This guide is a comprehensive introduction to bioinformatics at both the undergraduate and graduate level. Unlike most bioinformatics texts, it includes information on collecting and storing sequences, not just analyzing them. It also discusses programming using Perl and analysis of genomes and microarrays. The text is augmented by a Web site, http://www.bioinformaticsonline.org/.

Periodicals


Chapter 7: Genetics, Biotechnology, and Developmental Biology

Introduction

Genetics is "the branch of biology concerned with the study of heredity and variation". Biotechnology is "the development of techniques for the application of biological processes to the production of materials of use in medicine and industry." Development is "the complex process of growth and maturation that occurs in living organisms." (Oxford Dictionary of Biology, 4th ed., 2000). This chapter also includes the study of "omics", a suffix used to indicate studies in several fields performed on a genome-wide scale, such as proteomics or metabolomics. The more applied aspects of biotechnology and genetics such as plant or animal breeding and industrial biotechnology are not included.
All of the subjects covered in this chapter overlap with other chapters. For instance, molecular biologists study DNA while geneticists study genes so Chapter 6, “Molecular and Cellular Biology”, should also be checked for information sources. Research in development may be done by geneticists, cell biologists, or physiologists, so other related resources are found in Chapter 11, “Anatomy and Physiology”.

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- Dictionaries and Encyclopedias
- Histories
- Periodicals

Associations


- **British Society for Developmental Biology (BSDB)**. MRC Brain Development Programme, Centre for Developmental Neurobiology, King’s College London, New Hunt’s House (4th Floor), Grey’s Hospital Campus, London SE1 9RT. URL: [http://bsdb.org/](http://bsdb.org/). 1,000 members. Aims "to represent developmental biology to external organizations in the UK and Europe." Organizes meetings and publishes newsletter. Web site contains society information and list of useful links for developmental biologists and teachers.

- **Canadian Society for Molecular Biosciences (CSMB)**. c/o Mrs. Wafaah H. Antonious, Canadian Society for Molecular Biosciences, 17 Dossetter Way, Ottawa, ON, Canada K1G 4S3. E-Mail: Contact@csmbca.ca. URL: [http://www.csmb-csbm.ca/](http://www.csmb-csbm.ca/). Society for professional biochemists, molecular biologists, and geneticists in Canada. Publishes quarterly *Bulletin*. Holds annual meeting. Originally called the Canadian Biochemical Society; merged with the Canadian Society of Cellular and Molecular Biology in 1992 and with the Genetics Society of Canada in 2010.

- **European Society of Human Genetics (ESHG)**. c/o Vienna Medical Academy, Alser Strasse 4, 1090 Vienna, Austria. E-Mail: office@eshg.org. URL: [http://www.eshg.org](http://www.eshg.org). Founded 1967. “Promotes research in basic and applied human and medical genetics and facilitates contact between all persons who share these aims.” Publishes *European Journal of Human Genetics*.


Databases

- **Mouse Genome Informatics.** Bar Harbor, ME: Jackson Laboratory, 1980-. [www.informatics.jax.org](http://www.informatics.jax.org). Maintained by the Jackson Laboratory, a major mouse mutant repository and center for mouse research, this site “is the international database resource for the laboratory mouse, providing integrated genetic, genomic, and biological data to facilitate the study of human health and disease.” (from the Web site). Includes the Mouse Genome Database, the Gene Expression Database and the Mouse Tumor Database projects, among others.

- **Xenbase:** Xenopus laevis and Xenopus tropicalis Biology and Genomics Resource. [http://www.xenbase.org/common/](http://www.xenbase.org/common/). A “database of information pertaining to the cell and developmental biology of the frog, Xenopus’. Also contains genetic and genomic information, as well as directories, methods, links to databases and electronic journals, announcements of conferences and more.

- Davidson, Duncan and Richard Baldock. *The e-Mouse Atlas Project.* [www.emouseatlas.org](http://www.emouseatlas.org). This site contains two projects, EMA, the e-Mouse Atlas (3-D anatomical atlas of mouse embryo development and histology) and EMAGE, the e-Mouse Atlas of Gene Expression, a “database of mouse gene expression where, uniquely, the gene expression is mapped into the EMA 3-D space and can be queried spatially”. The site includes tutorials and a glossary of terms to aid new users.


- **WormBase Consortium. Wormbase.** 2000-. [http://www.wormbase.org/](http://www.wormbase.org/). “WormBase is an international consortium of biologists and computer scientists dedicated to providing the research community with accurate, current, accessible information concerning the genetics, genomics and biology of *C. elegans* and related nematodes.” (from the Web site). Includes news, resources, and tools for researchers.

- **The Zebrafish Model Organism Database.** Eugene, OR: University of Oregon. [http://zfin.org](http://zfin.org). Provides access to a wealth of information for researchers on this fish which is a major model organism for developmental studies. Database includes developmental atlases and dictionaries, genetic mutants and maps, nomenclature, publications, resources, conference information and directories of people in the field.

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Dictionaries and Encyclopedias

- **Talking Glossary of Genetic Terms.** Bethesda, MD: National Human Genome Research Institute, National Institutes of Health, 2001-. [http://www.genome.gov/glossary/index.cfm](http://www.genome.gov/glossary/index.cfm). This free online dictionary provides audio definitions, illustrations, animations, and other resources for more than 200 terms. A text-only version is also available at the site. Also available as an iTunes app.

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Chapter 8: Microbiology and Immunology

Introduction
This chapter includes reference sources useful for microbiology and immunology. Microbiology is “the scientific study of microorganisms (e.g. bacteria, viruses and fungi).” For purposes of this discussion, however, fungi such as yeasts are included with plant biology in Chapter 10, “Plant Biology”. Immunology is the study of immunity, “the state of relative insusceptibility of an animal to infection by disease-producing organisms”. (Oxford Dictionary of Biology, 4th ed, 2000) Because microbial systems are convenient and effective for studying a whole range of life processes, there is a significant overlap between this chapter and Chapters 5-7, covering biochemistry and biophysics, molecular and cell biology, and genetics, respectively. Although medical microbiology and immunology are not comprehensively discussed in this chapter, some basic materials are included that pertain to the study of pathogenic microbiology and diagnostic immunology.

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- Associations
- Classification, Nomenclature, and Systematics
- Directories
- Handbooks
- Methods and Techniques
- Textbooks and Treatises
- Periodicals

Associations
- **American Type Culture Collection (ATCC)**. PO Box 1549, Manassas, VA 20108. E-Mail: sales@atcc.org. URL: http://www.atcc.org. Founded 1925. 225 staff. A private organization seeking to collect, propagate, preserve, and distribute authentic cultures of microorganisms and genetic materials for reference purposes for use in educational, research, and other scientific and industrial activities. Conducts research, maintains depository for cultures, aids in processing and packaging biohazardous materials, and identifies cultures. Web site provides access to catalogs, news, and information about the ATCC.

American Association of Immunologists (AAI). 9650 Rockville Pike, Bethesda, MD 20814-3998. E-Mail: infoaai@aai.org. URL: http://www.aai.org. Founded 1913, 5,500 members. Scientists engaged in immunological research including aspects of virology, bacteriology, biochemistry, genetics, and related disciplines. Goals are to advance knowledge of immunology and related disciplines and to facilitate the interchange of information among investigators in various fields. Promotes interaction between laboratory investigators and clinicians; conducts training courses, symposia, workshops, and lectures; bestows awards; compiles statistics. Publishes quarterly AAI Newsletter and Journal of Immunology. Web site contains membership information, and information on educational and policy programs.

American Society for Microbiology (ASM). 1752 N St. NW, Washington, DC 20036. E-Mail: oed@asmusa.org. URL: http://www.asm.org. Founded in 1899, 42,000 members with 36 local groups. Scientific society of microbiologists promoting advancement of scientific knowledge in order to improve education in microbiology. Encourages the highest professional and ethical standards and the adoption of sound legislative and regulatory policies affecting the discipline of microbiology at all levels. Affiliated with the International Union of Microbiological Societies. Publishes over twenty scientific journals and many books. Formerly: the Society of American Bacteriologists. Web site includes membership information, news, and educational materials for K12 and the general public.

Canadian Society for Immunology (CSI Societe Canadienne d’Immunologie). University of Saskatchewan, Dept. of Veterinary Microbiology, 52 Campus Dr., Saskatoon, SK, Canada S7N 5B4. URL: http://www.csi-sci.ca/. Immunologists and other health care professionals and scientists with an interest in immunology. Seeks to advance immunological study, research, and practice. Promotes ongoing professional development of members. Serves as a network linking members; sponsors research and educational programs. Web site contains membership information, links to other societies and immunology journals.

European Culture Collections’ Organisation (ECCO). DSMZ-Deutsche Sammlung von Mikroorganismen, und Zellkulturen GMBH Mascheroder Weg 1b, 38124 Braunschweig, Germany. E-Mail: bti@dsmz.de. URL: http://www.eccosite.org. Founded 1981. 61 members. Members of European organizations in 22 countries participating in the maintenance of biological material. Encourages communication and collaborative research among members. Informs members of current developments concerning taxonomy, culture identification, and patent information. Web site has links to other societies, transport regulations, and more.

European Federation of Immunological Societies (EFIS). c/o Astrid Hahner, Coor., PO Box 42 08 07, D-12068 Berlin, Germany. E-Mail: hahner@efis.org. URL: http://www.efis.org. Founded 1975, 16,000 members. Immunological societies from around the world focusing on Europe. Promotes the advancement of research and education in immunology. Publishes European Journal of Immunology and Immunology Letters. Web site includes links to databases and organizations of interest to immunologists.


Society for Applied Microbiology (SFAM). Bedford Heights, Brickhill Dr., Bedford MK41 7PH, UK. E-Mail: pfwheat@sfam.org.uk. URL: http://www.sfam.org.uk. Founded 1931, 1,800 members. Multinational. Individuals involved in the study of microbiology whose purpose is to promote and advance the study of microbiology, particularly bacteriology, in its application to agriculture, industry, and the environment. Publishes...
Microbiologist, Journal of Applied Microbiology, Letters in Applied Microbiology, Microbial Biotechnology, Environmental Microbiology, and Environmental Microbiology Reports. Holds three meetings each year. Formerly: Society for Applied Bacteriology.


**Classification, Nomenclature, and Systematics**


**Directories**


**Handbooks**

Two publishers that should be especially acknowledged are the American Society for Microbiology in Washington, DC (http://estore.asm.org/) and the Cold Spring Harbor Laboratory Press in Plainview, NY (http://www.cshlpress.com/). Both of these publishers issue authoritative laboratory methods manuals and handbooks of importance to microbiologists, immunologists, and molecular biologists.

Consult Chapter 5, “Biochemistry and Biophysics”, Chapter 6, “Molecular and Cellular Biology”, and Chapter 7, “Genetics, Biotechnology, and Developmental Biology” for other handbooks relevant to microbiology and immunology.

- *EcoSal: Escherichia coli and Salmonella: Cellular and Molecular Biology*. Washington, DC: ASM Press, 2002. $999.00 (medium, online). http://www.ecosal.org. Online only continuously updated version of the classic publications *Escherichia coli* and *Salmonella: Cellular and Molecular Biology* covering all areas of research on these two major bacterial species. Available by subscription only, although individual chapters may also be purchased online.

**Methods and Techniques**

Techniques useful for microbiology may be found, also, in the “Handbooks” section, or in the biochemistry, genetics, and molecular biology chapters.

Chapter 9: Ecology, Evolution, and Animal Behavior

Introduction

This chapter covers materials for the allied fields of ecology, evolution, and animal behavior. Ecology is “the study of the interrelationships between organisms and their natural environment, both living and nonliving.” Conservation biology and environmentalism are closely related, but not extensively covered in this chapter. Evolution is “the gradual process by which the present diversity of plant and animal life arose from the earliest and most primitive organisms.” See also Chapter 7, “Genetics”, for related materials. Animal behavior, “the activities that constitute an animal’s response to its external environment”, here encompasses all biological sub-disciplines including ethology, sociobiology and behavioral ecology. Human behavior and comparative psychology are largely excluded from consideration, and neurobiology is covered in Chapter 11.

Ecological Society of America (ESA). 1990 M St. NW, Ste. 700, Washington, DC 20036. E-Mail: esahq@esa.org. URL: http://www.esa.org. Founded in 1915, 10,000 members. The largest ecological association in the United States. Affiliated with the American Institute of Biological Sciences. Publishes the Bulletin, Ecological Applications, Ecological Monographs, Ecology, Frontiers in Ecology and the Environment, and Ecosphere. The middle four journals are available full text from volume 1 on JSTOR while Ecosphere is Open Access. Web site includes educational resources created by the society, links to ecological resources on the Web (mostly other associations), and public policy information.


Dictionaries and Encyclopedias

Invasive Species Compendium. Wallingford, UK: CABI, 2011-. http://www.cabi.org/isc/. This freely available compendium provides datasheets on over 1,500 invasive species and diseases from around the world. Each entry provides scientific and common name, original and invasive distributions, summary of invasiveness, biology, description, taxonomy, and references. The compendium also includes an extensive glossary.

Histories

Darwin, Charles. The Origin of Species by Means of Natural Selection, Or, the Preservation of Favored Races in the Struggle for Life. New York: Modern Library, 1993. 689 p. $23.00. ISBN 0679600701; 9780679600701. On the Origin of Species was first published in 1859, and hasn’t been out of print since. There are several versions available to modern readers, including multiple electronic versions. The first edition is available from the Talk.Origins Web site at http://www.talkorigins.org/faqs/origin.html and several other Web sites including van Wyhe’s Darwin Online, below.

van Wyhe, John, ed. Darwin Online. 2002-. http://darwin-online.org.uk/. This site provides access to all of Darwin’s publications, manuscripts, and some letters, including translations in other languages. An excellent resource for information about Darwin and his writings.

Periodicals

Chapter 10: Plant Biology

Introduction

Botany is “the scientific study of plants, including their anatomy, morphology, physiology, biochemistry, taxonomy, cytology, genetics, evolution, and geographical distribution (Oxford Dictionary of Biology, 4th ed., 2000).” In this chapter, the terms “botany” and “plant biology” will be used interchangeably. In practice, botany may carry the connotation of taxonomic studies, while plant biology is often the preferred “modern” term for the entire field.

The study of botany has a long and distinguished history. This fact, coupled with the complexity of the subject as it has grown from descriptive botany to the molecular plant sciences, is reflected in its literature, producing a complicated and often confusing array of resources. For the purposes of this book, plant biology encompasses the literature of botany and the plant kingdom, including fungi. This chapter does not include agriculture, forestry, horticulture, or any of the applied areas of plant science, except biotechnology and medicinal plants.

The field of plant biology overlaps significantly with other areas of biology, so also check Chapter 3, “General Sources”; Chapter 5, “Biochemistry and Biophysics”; Chapter 7, “Genetics, Biotechnology, and Developmental Biology”; and Chapter 8, “Microbiology and Immunology” for more useful resources.

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Abstracts and Indexes

Current Awareness


Retrospective Tools

Associations

- **American Bryological and Lichenological Society (ABLS)**. c/o James Bennett, Sec.-Treas., University of Wisconsin, Dept. of Botany 430 Lincoln Dr., Madison, WI 53706. E-Mail: jbennett@wisc.edu. URL: http://www.abls.org. Founded 1898, 500 members. Professional botanists, botany teachers, and hobbyists interested in the study of mosses, liverworts, and lichens. Publishes *Bryologist* and *Evansia*.


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Further reading:


- **The Kew Record of Taxonomic Literature, 1893-1995**. London: H.M. Stationery Office, 1971-2007. ISSN 0307-2835. Comprehensive publication of worldwide taxonomic literature of flowering plants, gymnosperms, and ferns. Systematic arrangement; also includes citations to phytogeography, floristics, nomenclature, chromosome surveys, chemotaxonomy, anatomy, reproductive biology, personnalia, etc. The bibliography has ceased publication, but records are available on the Web at http://kbd.kew.org/kbd/searchpage.do, along with the databases *Economic Botany* and *Plant Micromorphology*.

- **International Mycological Association (IMA)**. c/o Prof. J. Taylor, Pres., University of California, Department of Plant and Microbial Biology, 111 Koshland Hall, Berkeley, CA 94720. E-Mail: jtaylor@berkeley.edu. URL: [http://www.ima-mycology.org](http://www.ima-mycology.org). Founded 1971, 2500 members. International society representing 20,000 mycologists from 80 countries. Promotes the study of mycology in all its aspects.


- **International Society of Plant Morphologists (ISPM)**. University of Delhi, Department of Botany, New Delhi 110 007, Delhi, India. E-Mail: phytomorphology@myreabox.com. URL: [http://phytomorphology.tripod.com](http://phytomorphology.tripod.com). Founded 1950, 805 members. Individuals in 26 countries interested in plant morphology and its allied sciences. Purpose is to promote international cooperation among botanists. Publishes *Phytomorphology*.

- **Mycological Society of America (MSA)**, PO Box 7065, Lawrence, KS 66044. E-Mail: mssa@allenpress.com. URL: [http://www.msafungi.org](http://www.msafungi.org). Founded 1931, 1300 members. Researchers, industrial and medical mycologists, plant pathologists, students, and others interested in the study of fungi through research, teaching, and industrial applications. Annual meeting. Publishes *Mycologia, Mycologia Memoirs*, and *Inoculum*.


- **Phycological Society of America (PSA)**. Virginia Tech., University Libraries, Special Collections Library, PO Box 90001, Blacksburg, VA 24062 USA. E-Mail: jlopez@ua.edu. URL: [http://www.psaalgae.org](http://www.psaalgae.org). Founded 1946, 1,100 members. Educators, researchers, and others interested in the pure, applied, or avocational study and utilization of algae. Publishes *Algaezine, Journal of Phycology, Phycological Newsletter*.

- **Phytochemical Society of Europe (PSE)**. Centre for Pharmacognosy and Phytotherapy, 29-39 Brunswick Sq., London WC1N 1AX, UK. c/o Dr. Deniz Tasdemir, Membership Sec., University of London, School of Pharmacy. E-Mail: amstafford@hotmail.co.uk. URL: [http://www.phytochemicalsociety.org](http://www.phytochemicalsociety.org). Founded 1957, 500 members. Scientists in 17 countries working in the field of plant chemistry. Publishes *Proceedings of the Phytochemical Society of Europe, Phytochemistry, Phytochemistry Letters, and Phytochemistry Reviews*.

- **Phytochemical Society of North America (PSNA)**. E-mail: info@psna-online.org. URL: [http://www.psna-online.org](http://www.psna-online.org). Founded 1960. 405 members. Membership comprises primarily research scientists interested in all aspects of the chemistry of plants. Publishes newsletter and *Recent Advances in Phytochemistry*.


- **Society for Medicinal Plant Research (Gesellschaft für Arzneipflanzenforschung)**. Society of Medicinal Plant and Natural Product Research, Uttenreuther Strasse 1 D-91077 Neunkirchen am Brand, Germany. E-Mail: ga-secretary@ga-online.org. URL: [http://www.ga-online.org](http://www.ga-online.org). Founded 1953. 1300 members. Scientists in 70 countries who promote medicinal plant research. Publishes *Newsletter* and *Planta Medica*.

Checklists and Identification Manuals

- **Flora of North America: North of Mexico.** New York: Oxford University Press, 1993-. v. $95.00 (per volume). ISBN varies. This projected 30 volume monumental work aims to survey and classify all the more than 20,000 plant species known to grow spontaneously from the Florida Keys to the Aleutian Islands. This authoritative set provides identification keys; distribution maps; summaries of habitat and geographical ranges; precise descriptions for families, genera, and species; chromosome numbers; pertinent synonyms; line drawings; endangered and threatened plants; selected references. The set will be updated by a computer database for taxonomic information housed at the Missouri Botanical Garden in St. Louis, MO. See their Web site at http://floranorthamerica.org/. To date, v. 1-8, 19-27 have been published.

Classification, Nomenclature, and Systematics


- **Harvard University Herbaria Databases.** [http://kiki.huh.harvard.edu/databases/](http://kiki.huh.harvard.edu/databases/) Includes the Gray Herbarium Index of New World Plants (now incorporated into the International Plant Names Index), the Harvard University Herbaria Type SPECimen Database, Botanical Authors database, and Botanical Publications database.

- **Index of Mosses Database.** St. Louis, MO: Missouri Botanical Garden, 1995-. [http://www.mobot.org/MOBOT/tropicos/most/iom.shtml](http://www.mobot.org/MOBOT/tropicos/most/iom.shtml). The Index of Mosses Database, also known as W3MOST, provides current information on bryophyte names from the TROPICOS MOST database compiled by the Index of Mosses project at the Missouri Botanical Garden.


- **Names in Current use of Extant Plant Genera (NCU-3e).** International Association for Plant Taxonomy: 1997-. [http://www.bgbm.fu-berlin.de/iapt/ncu/genera/Default.htm](http://www.bgbm.fu-berlin.de/iapt/ncu/genera/Default.htm). This online database is based on the print NCU-3 volume published in 1993 as v. 129 of Regnum Vegetabile, which attempted to establish official names for the genera of algae, bryophytes, ferns, flowering plants, and fungi. For each genus, the original citation, date, type species, and family and order are included. The database is continuously updated.

- **Plants Database.** Greensboro, NC: National Plant Data Team, 1996-. [http://plants.usda.gov/](http://plants.usda.gov/). “The Plants database provides standardized information about the vascular plants, mosses, liverworts, hornworts, and lichens of the U.S. and its territories.” (from the web site) For each species viewers can find the common and scientific names plus synonyms, classification, distribution, related taxa, and links to more information. The site also provides information on invasive or threatened plant species, cover crops, culturally significant plants, and much more.

- **The Plant List.** St. Louis, MO: Missouri Botanical Garden, 2010-. [http://www.theplantlist.org/](http://www.theplantlist.org/). “The Plant List is a working list of all known plant species; it provides the accepted Latin name for most species, with links to all synonyms by which that species has been known.” (from the Web site) Currently, the database includes vascular plants and bryophytes.

- Stevens, P. F. *Angiosperm Phylogeny Website.* St. Louis, MO: Missouri Botanical Garden, 2001-. [http://www.mobot.org/MOBOT/research/APweb/](http://www.mobot.org/MOBOT/research/APweb/). “This series of pages is a set of characterizations of all orders and families of extant angiosperms (flowering plants) and gymnosperms, i.e. all seed plants…” It is designed as a teaching tool and is frequently updated.
Directories


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Guides to the Literature


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Handbooks


- Brunt, Alan, et al., eds. *Plant Viruses Online: Descriptions and Lists from the VIDE Database.* 1996-. [http://bio-mirror.im.ac.cn/mirrors/pvo/vide/refs.htm](http://bio-mirror.im.ac.cn/mirrors/pvo/vide/refs.htm). Includes information on most species of virus known to infect plants, including data on host range; transmission and control; geographical distribution; physical, chemical and genomic properties; taxonomy and relationships; and selected literature references. Data from this resource have also been published in 1996 as *Viruses of Plants: Descriptions and Lists from the VIDE Database*.


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Histories

- Brummitt, R. K. and C. E. Powell. *Authors of Plant Names: A List of Authors of Scientific Names of Plants, with Recommended Standard Forms of their Names, Including Abbreviations.* London: Royal Botanic Gardens, 2002. 732 p. $82.00. ISBN 1842460854; 9781842460856. A standard index of the authors of plant names, including birth and death dates, recommended abbreviations, and notes on the plant taxa authored for each individual. The index can be searched as part of the *International Plant Names Index* (see Classification and Nomenclature, above), at [http://www.ipni.org/ipni/authorsearchpage.do](http://www.ipni.org/ipni/authorsearchpage.do).

Chapter 11: Anatomy and Physiology

Introduction
This chapter covers neurobiology and endocrinology as well as anatomy and physiology. Anatomy is a “the study of the structure of living organisms, especially of their internal parts by means of dissection and microscopical examination.” The same source interprets “physiology” as the “branch of biology concerned with the vital functions of plants and animals, such as nutrition, respiration, reproduction and excretion.” (Oxford Dictionary of Biology, 4th ed, 2000). Neurobiology is the study of the nervous system. This chapter includes primarily human anatomy and physiology: plants and animals are discussed in Chapters 10, “Plant Biology” and 13, “Zoology.” Although a few medical titles are included, emphasis in this chapter is on the biological sciences rather than the behavioral or clinical.

As usual, there is overlap between this chapter and Chapters 5, “Biochemistry and Biophysics,” and 6, “Molecular and Cellular Biology,” so don’t neglect to broaden the search to these other chapters. Developmental biology is covered in Chapter 7.

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Associations


- American Society for Neurochemistry (ASN). 9037 Ron Den Ln., Windermere, FL 34786. E-Mail: amazing@iag.net. URL: http://www.asneurochem.org. Founded 1969. Over 1,000 members. Investigators in the field of neurochemistry and scientists who are qualified specialists in other disciplines and are interested in the activities of the Society. Publishes ASN Newsletter, ASN Neuro and the book Basic Neurochemistry. The Web site includes membership information and links to resources.

- Anatomical Society (AS). c/o Ms. Mary-Anne Piggott, BSc, Exec. Admin., King’s College, Dept. of Anatomy Hodgkin Building, Rm. HB 4.1, London SE1 1UL, UK. E-Mail: maryanne.piggott@kcl.ac.uk. URL: http://www.anatsoc.org.uk. Founded 1887. 650 members. Individuals involved in
A wide group of student, medical, or lay person audiences. Animal atlases and dissection manuals are found in Chapter 13. A wide variety of atlases are listed, from the classic to the recently published, in an effort to provide examples of illustrations of the human body geared to

### Atlases


**International Society for Endocrinology (ISE).** c/o Hannah van Oudheusden, Exec. Off., University of Birmingham, Institute of Biomedical Research, Wolfson Dr., Edgbaston, Birmingham B15 2TT, UK. E-Mail: info@endosociety.com. URL: [http://www.endosociety.com](http://www.endosociety.com). Founded 1966. 53 member societies. Federation of national endocrinology societies with 15,000 individual members. Disseminates information on endocrinology and facilitates collaboration between national endocrinological societies and persons interested in the field. Publishes *Abstracts of Congresses and Symposia Abstracts.* Web site primarily for meeting and membership information.

**Physiological Society-UK.** Peer House, Verulam St., London WC1X 8LZ, UK. E-Mail: membership@physoc.org. URL: [http://www.physoc.org](http://www.physoc.org). Founded 1876, 1,775 members. Multinational physiologists at senior levels in universities, research institutions, hospitals, and relevant industries and government departments, about a third of whom are resident overseas. Promotes the advancement of physiology in all areas. Publishes *Experimental Physiology, The Journal of Physiology,* and *Physiology News.* Web site provides membership information and educational resources. Formerly: Physiological Society-England.


**Society for Neuroscience (SIN).** 1121 14th St. NW, Ste. 1010, Washington, DC 20005. E-Mail: info@sfn.org. URL: [http://www.sfn.org](http://www.sfn.org). Founded 1969, 28,000 members. Scientists engaged in research relating to the nervous system. Seeks to advance understanding of nervous systems, including their relation to behavior, by bringing together scientists of various backgrounds and by facilitating integration of research at all levels of biological organizations. Produces nontechnical reports on the results and implications of current research. Publishes *Brain Facts,* and *Journal of Neuroscience.* The Web site includes membership directory, links to related sites.


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### Atlases

A wide variety of atlases are listed, from the classic to the recently published, in an effort to provide examples of illustrations of the human body geared to a wide group of student, medical, or lay person audiences. Animal atlases and dissection manuals are found in Chapter 13.

a novel suite of search and viewing tools (from the website). At the time of viewing, the site contained several interactive atlases for mouse, human, and non-human primate brains plus data on glioblastoma and sleep.


- **Visible Human Project.** Bethesda, MD: National Library of Medicine, 2003-. [http://www.nlm.nih.gov/research/visible/visible_human.html] Excellent access to anatomy is provided by the Visible Human Project and the related Visible Embryo Project with the goal of creating complete, anatomically detailed, three-dimensional representations of the normal male and female human bodies.

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#### Guides to the Literature

- Busis, Neil A. *Neurosciences on the Internet* <Neuroguide.com>, 1995-. [http://www.neuroguide.com/](http://www.neuroguide.com/). This site is designed to “List the best neuroscience resources on the Web in one location [and] present original neuroscience content not available elsewhere.” The Best Bets page lists about 25 top sites, including associations, institutes, and Web accessible projects. At the time of writing, the original content was restricted to a chart of the “Cutaneous Fields of Peripheral Nerves”.

- MIT Cognet. Cambridge, MA: Massachusetts Institute of Technology, 2000-. [http://cognet.mit.edu] This site “provides a unique electronic community for researchers in cognitive and brain sciences, with in-depth current and classic text resources, and a dynamic interactive forum for today’s scholars, students, and professionals.” For an annual fee of between $15.00 and $195.00, individuals can subscribe to the service and gain access to neuroscience books, journals, and reference works published by MIT, job listings, virtual poster sessions, and other resources. A library or institutional subscription is also available.

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#### Periodicals

- **BMC Neuroscience.** v. 1-, 2000-. London: BioMed Central. Continually updated. Open Access. ISSN 1471-2202. Publishes “articles on all aspects of the nervous system, including molecular, cellular, developmental and animal model studies, as well as cognitive and behavioral research, and computational modeling.” Articles available at [http://www.biomedcentral.com/bmcneurosci](http://www.biomedcentral.com/bmcneurosci).

### Chapter 12: Entomology

#### Introduction

Entomology is “the study of insects,” according to the *Oxford Dictionary of Biology*, 4th ed, 2000. Strictly speaking, the true insects are only those belonging to the class Insecta, which does not include the spiders and other animals often thought of as insects such as millipedes or ticks. However, this chapter includes material on both insects and their close relatives since many resources treat these related groups together. Applied entomology is largely excluded, although some basic tools are mentioned. Resources about *Drosophila* used as a model organism for genetics or developmental biology are included in Chapter 7, “Genetics, Biotechnology, and Developmental Biology”.

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Associations


- **American Mosquito Control Association (AMCA)**. 15000 Commerce Pkwy., Ste. C, Mount Laurel, NJ 08054. E-Mail: amca@mosquito.org. URL: http://www.mosquito.org. Founded in 1935, 2,000 members. Web site includes membership information, “Mosquito Links” (primarily links to mosquito control districts and other technical resources), and a nice set of pages with general information on mosquitoes and their control. Publishes *Journal of the American Mosquito Control Association*, AMCA Newsletter, and *Wing Beats*.


- **International Union for the Study of Social Insects (IUSSI)**. 105 Northway Rd., Greenbelt, MD 20770. E-Mail: iussi.nas@gmail.com. URL: http://iusssi.bees.net. Founded in 1952, 800 members. There are several country-specific chapters. Publishes *Insectes Sociaux/Social Insects*. Web site includes links to information about social insects and links to various chapters.


- **Royal Entomological Society (RES)**. The Mansion House, Chriswell Green Ln., St. Albans AL2 3NS, UK. E-Mail: info@royensoc.co.uk. URL: http://www.royensoc.co.uk. Founded 1833, 2,000 members. Publishes *Agricultural and Forest Entomology, Antenna, Ecological Entomology, Insect Conservation and Diversity, Insect Molecular Entomology, Medical and Veterinary Entomology, Physiological Entomology, and Systematic Entomology*. Web site has entomological links and membership information.
Checklists and Identification Manuals

- Michener, Charles Duncan. *The Bees of the World*. 2nd ed. Baltimore, MD: Johns Hopkins University Press, 2007. 953 p. $185.00. ISBN 0801885736; 9780801885730. A comprehensive treatment of all bees world wide. There is an extensive introduction covering the evolution, systematics, anatomy, and behavior of bees. This is followed by keys to bee families and accounts of each family, subfamily, and tribe. There are a number of black and white illustrations and photographs, plus a few color photos. This new edition includes extensive updates to bee taxonomy. A freely available list of bee genera based on this text is available at http://cache.ucr.edu/~heraty/beepage.html.

Classification, Nomenclature, and Systematics

- **Common Names Database.** Entomological Society of Canada: 2006-. [http://www.entsoc.org/common-names](http://www.entsoc.org/common-names). This website provides access to the approved common names of Canadian insects and other arthropods, both in English and French. It can be browsed or searched, and the full database can be downloaded in Excel format. A PDF version of the list is available at [http://www.entsoc.org/sites/default/files/files/common_name.pdf](http://www.entsoc.org/sites/default/files/files/common_name.pdf).

- **Common Names of Insects and Related Organisms.** Lanham, MD: Entomological Society of America, 2003-. [http://www.entsoc.org/pubs/common_names](http://www.entsoc.org/pubs/common_names). "Now exclusively online in a database format, this resource is an essential reference for anyone who works with insects. It includes more than 2,000 common names and is searchable by common name, scientific name, author, order, family, genus, and species." (from the Website) The Website also includes PDFs of the list sorted by common name, scientific name, and taxa as well as information on how to submit new common names.


Directories


Guides to the Literature

- NC State AgNIC Team. *Systematic Entomology, NC State AgNIC*. Raleigh, NC: NC State University, 1998-. [http://www.lib.ncsu.edu/agnic/sys_entomology/index_txt.html](http://www.lib.ncsu.edu/agnic/sys_entomology/index_txt.html). A collaborative effort between NCSU Libraries and the NC State Department of Entomology to "collect, organize, and provide access to the best academic, scholarly, research, and practical resources available on the identification, classification, nomenclature, and evolution of insects and related arthropods." (from the web site)

- VanDyk, John. *The Entomology Index of Internet Resources*. Ames, IA: Iowa State University Department of Entomology. This directory covers a wide range of subjects, from beekeeping to pesticides, and an equally wide range of resource types, from bibliographies to newsgroups.
  - This resource is no longer maintained online.

Methods and Techniques

- Systematic Entomology Laboratory (U.S.). *Collecting and Preserving Insects and Mites: Techniques and Tools*. Beltsville, MD: Systematic
Chapter 13: Zoology

Introduction

Zoology is “the scientific study of animals,” according to the *Oxford Dictionary of Biology*, 4th ed, 2000. Entomology is treated separately in Chapter 12 since it has traditionally been treated as a separate discipline. The other branches of zoology such as ornithology or nematology are not separated in this chapter; rather, the arrangement is by type of material following the pattern established earlier.

Anatomical atlases and dissection manuals for non-human animals are found in this chapter; for human anatomy see Chapter 11, although some of the atlases and manuals in that chapter also briefly mention non-human animal anatomy.

Abstracts and Indexes

Current Awareness

- *Ornithological Worldwide Literature: OWL*. Oxford, UK: Edward Grey Institute of Field Ornithology, 2002-. [http://www.birdlit.org/OWL/](http://www.birdlit.org/OWL/). This resource grew out of *Recent Ornithological Literature*, a publication that was a joint supplement to *The Auk*, *The Emu*, and *Ibis* from 1983 to 1999 but is now available only online. It attempts to provide comprehensive coverage of the world literature in ornithology, scanning about 1,500 titles and at the time of writing went back to about 1980.

Retrospective Tools

Associations

- **American Association for Zoological Nomenclature (AAZN).** Founded in 1983, 250 members. For those interested in the systematics of both living and extinct animals. Publishes AAZN Newsletter. URL: [http://iczn.org/content/american-association-zoological-nomenclature-azann](http://iczn.org/content/american-association-zoological-nomenclature-azann).


- **American Society of Ichthyologists and Herpetologists (ASIH).** Florida International University, College of Arts and Science, Dept. of Biological Sciences, 11200 SW 8th St., Miami, FL 33199. E-Mail: asih@fiu.edu. URL: [http://www.asih.org](http://www.asih.org). Founded 1913, 3,600 members. For scientists and students interested in fish, amphibians, and reptiles. Publishes Copeia. Web site includes membership information.


- **Herpetologists’ League (HL).** c/o Meredith Mahoney, Treas., ISM Research and Collections Center, 1011 E Ash St., Springfield, IL 62703. URL: [http://www.herpetologistisleague.org](http://www.herpetologistisleague.org). Founded 1936, 2,000 members. Publishes Herpetologica and Herpetological Monographs. Web site includes information on membership and links to other herpetological societies.


- **Society for the Study of Amphibians and Reptiles (SSAR).** Zoo Atlanta, 800 Cherokee Ave. SE, Atlanta, GA 30315. E-Mail: sicb@burkinc.com. URL: [http://www.sicb.org](http://www.sicb.org). Founded in 1890, 2300 members. For professional zoologists. Publishes Integrative and Comparative Biology. Formerly American Society of Zoologists; absorbed American Morphological Society. Web site primarily for membership information, but also includes searchable database of educational resources.


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Atlases

- Hall, David H. and Zeynep F. Altun. C. elegans Atlas. Cold Spring Harbor, NY: Cold Spring Harbor Laboratory Press, 2008. 348 p. $179.00; $128.00 (spiralbound). ISBN 0879697946; 9780879697945; 0879697156 (spiralbound); 9780879697150 (spiralbound). This atlas provides detailed images and descriptions of internal and external structures of adult specimens of this important model organism. The images are from the online site WormBase, http://www.wormbase.org/, home to the C. elegans research community.

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Checklists and Identification Manuals

- Check-List of North American Birds: The Species of Birds of North America from the Arctic through Panama, Including the West Indies and Hawaiian Islands. 7th ed. Washington, DC: The Union, 1998. 829 p. ISBN 189127600X; 9781891276002. The checklist is prepared by the Committee on Classification and Nomenclature of the American Ornithologists' Union and is updated irregularly. Each species is listed with scientific and English name, original citation, habitat, distribution (summer and winter), and notes. The list and its supplements may also be found at http://www.aou.org/checklist/north/print.php.


- Gill, F. and D. Donsker, eds. IOC World Bird List. 2013-. http://www.worldbirdnames.org. Provides lists of accepted common names for all bird species from around the world plus spelling guidelines for English common names. The site provides the avian taxonomy information used in the Tree of Life project (see Chapter 3).

- Monroe, Burt L. and Charles Gald Sibley. A World Checklist of Birds. New Haven, CT: Yale University Press, 1993. 393 p. $75.00. ISBN 0300055471; 9780300055474. This checklist is based on the taxonomic system of Sibley and Monroe (see below). As well as the usual Latin and English names and distribution of each species, the checklist provides a column for the dedicated birder to check off which of the 9,702 species he/she has seen. The list is also available for download at http://home.planet.nl/~by000012/SM/SMorg/sibley4.html.

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Classification, Nomenclature, and Systematics

- Amphibiaweb: Information on Amphibian Biology and Conservation. Berkeley, CA: Amphibiaweb, 2000-. http://amphibiaweb.org/. This database provides taxonomic information on all species of amphibians taken from Frost's Amphibian Species of the World (below). The intent is to provide detailed taxonomic and ecological information on all species of amphibians of the world, currently over 7,000 species. The site also includes information on the decline in amphibian populations worldwide.

- Avibase. 2003-. http://avibase.bsc-eoc.org. Contains over ten million records about 10,000 species of birds world-wide. Each account includes a recording of songs, taxonomy, common names in multiple languages, authorities accepting the name, and links to range maps and other ornithological Web sites.


Index to Organism Names (ION). Philadelphia, PA: Thomson Scientific, 2007-. [http://www.organismnames.com/](http://www.organismnames.com/). This list of organismal names is taken from *Zoological Record* and contains information on millions of fossil and current species. Records include approved scientific name, source of the original description, and links to outside resources such as the *Encyclopedia of Life*, GBIF, and NCBI data. At the time of writing, only protozoa and animals were included, but the site plans on adding bacterial, plant, and fungal names from *Biological Abstracts*.


Pyle, Richard. *Zoobank*. International Commission for Zoological Nomenclature: 2008-. [http://zoobank.org/](http://zoobank.org/). According to the Web site, "ZooBank is the official registry of Zoological Nomenclature, according to the International Commission on Zoological Nomenclature (ICZN)." The database contains lists of "nomenclatural acts" (usually descriptions of new species), and will eventually include registration of type specimens.


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Dictionaries and Encyclopedias


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Guides to the Literature


Taggart, Travis William. *The Center for North American Herpetology CNAH: Home Page*. Lawrence, KS: Center for North American Herpetology, 1994-. [http://www.cnah.org/](http://www.cnah.org/). This Web portal provides links to information on amphibians and reptiles of the United States and Canada, including links to nomenclature, societies, news, meetings, forums, announcements, and much more. There is also a searchable database of over 2,000 literature references from 1586 on.

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**Methods and Techniques**


**Periodicals**

- *The Auk: A Quarterly Journal of Ornithology*. v. 1-, 1884-. Washington, DC: American Ornithologists' Union. Quarterly. Price varies. ISSN 0004-8038 (print); 1938-4254 (online). The journal of the American Ornithologists' Union. “Topics of articles appearing in *The Auk* include the documentation, analysis, and interpretation of laboratory and field studies, theoretical or methodological developments, and reviews of information or ideas.” Also publishes perspectives, comments, letters, and book reviews. Available as part of BioOne.1 and JSTOR. Backfiles available from JSTOR (subscription) or SORA (free, [http://elibrary.unm.edu/sora/Auk/index.php](http://elibrary.unm.edu/sora/Auk/index.php)).

- *The Condor: An International Journal of Avian Biology*. v. 1-, 1899-. Los Angeles, CA: Cooper Ornithological Society. Quarterly. Price varies. ISSN 0010-5422 (print); 1938-5129 (online). The journal of the Cooper Ornithological Society. “The Condor is an international journal that publishes (quarterly) original research reports, review articles, and commentary pertaining to the biology of wild bird species.” Backfiles are available online from JSTOR (subscription) or SORA (free, [http://elibrary.unm.edu/sora/Condor/index.php](http://elibrary.unm.edu/sora/Condor/index.php)).

- *Journal of Field Ornithology*. v. 51-, 1980-. New Ipswich, NH: Northeastern Bird-Banding Association. Quarterly. Price varies. ISSN 0273-8570 (print); 1557-9263 (online). The journal “publishes original empirical and methodological papers dealing with the ecology, behavior, taxonomy, life history, and zoogeography of birds in their natural habitats.” Also publishes bibliography of current foreign ornithological literature. The abstracts are in English and Spanish. Available as part of BioOne.1 and JSTOR. Backfiles available from JSTOR (subscription) or SORA (free, [http://elibrary.unm.edu/sora/JFO/index.php](http://elibrary.unm.edu/sora/JFO/index.php)). Formerly: *Bird-Banding*.


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The biological sciences cover a broad array of literature types, from younger fields like molecular biology with its reliance on recent journal articles, genomic databases, and protocol manuals to classic fields such as taxonomy with its scattered literature found in monographs and journals from the past three centuries. Using the Biological Literature: A Practical Guide, Fourth Edition is an annotated guide to selected resources in the biological sciences, presenting a wide-ranging list of important sources. This completely revised edition contains numerous new resources and descriptions of all entries including textbooks. The guide emphasizes current materials in the English language and includes retrospective references for historical perspective and to provide access to the taxonomic literature. It covers both print and electronic resources including monographs, journals, databases, indexes and abstracting.