> URLs in this document have been updated. Links enclosed in **{curly brackets}** have been changed. If a replacement link was located, the new URL was added and the link is active; if a new site could not be identified, the broken link was removed.

Science and Technology Resources on the Internet

Mapping the Brain: Resources for Researchers in Neurosciences

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Introduction

James D. Watson, one of the discoverers of the structure of the DNA molecule, called the human brain "the last and grandest biological frontier, the most complex thing we have yet discovered in our universe." During the 1990s, in the so-called decade of the brain, more may have been learned about the brain than during the entire previous history of neuroscience. Areas of rapid progress include the study of brain development, sensation and perception, learning and memory, movement, sleep, stress, aging, and neurological and psychiatric disorders. As we progress into the 21st century, neuroscience continues to yield more insights into the study of brain and nervous system, insights that can be applied for human benefit in the areas of mental health and treatment of neurological diseases.

The Internet continues to be of great importance to neuroscientists: not only does it facilitate the conduct of research by providing wide, convenient, and expeditious access to scientific data, it also allows researchers to convey their ideas and discoveries more rapidly to their peers and the public. In addition, the advent and dissemination of open access resources have greatly contributed to revolutionizing scholarly communication by promoting an open exchange of scientific ideas and information.

Librarians play a critical role in scholarly communication and information exchange. Scientists rely on the expertise of librarians to guide them through the labyrinth of resources. In a scholar-librarian collaboration, librarians bring to the partnership their unique competencies, skills, and knowledge. As Samuel Johnson said, "knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it."

The following webliography annotates selected web-based resources for researchers in neuroscience and is primarily intended for librarians who assist neuroscientists engaged in research. The inclusion of resources was based on the following criteria:

- Authority: web sites are published and maintained by research institutions, science laboratories, scholarly organizations, scientific societies, or experts in the field;
- Content: web sites provide access to scholarly, current, and free data and do not require memberships and/or registrations; the webliography excludes subscription-based online journals and bibliographic databases as well as the sites that contain information for general public;
- Audience: particular emphasis is placed on providing information for investigators engaged actively in scholarly research in neurosciences.

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Top four web sites for neuroscientists

BrainInfo
{http://braininfo.rprc.washington.edu/}
> A searchable web site for identifying structures in the brain and providing information about each structure, developed by the Neuroscience Division, National Primate Research Center, University of Washington. Includes NeuroNames, a semantic network of neuroanatomical nomenclature; the Template Atlas of the Primate Brain, a stereotaxic atlas of Macaca fascicularis; and NeuroMaps, a soon to be posted collection of overlays to Atlas templates showing the location of many kinds of neuroscientific data in the standard framework of the Template Atlas.

Internet Analysis Tools Registry
http://www.cma.mgh.harvard.edu/iatr/index.php
> A searchable listing of all image analysis tools available to the neuroscience community. Supported by the Human Brain Project and launched in 1993 by the National Institute of Mental Health to develop and support a new research field - neuroinformatics.

Neuroscience Database Gateway
{http://www.sfn.org/index.aspx?pagename=NDG_main}
> A searchable database of neuroinformatics resources on the Internet, maintained by the Society for Neuroscience. Provides links to five main types of database: databases of experimental data; knowledge bases; software tools for neuroscience; bioinformatics resources; providers of research materials; all neuroscience databases.

PubMed
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=PubMed
> A service of the National Library of Medicine and the National Institutes of Health, this resource includes Medline, a free bibliographic database with over 16 million citations for biomedical articles back to the 1950s. PubMed also provides access to the other molecular biology databases such as Nucleotide and Protein Sequences, Protein Structures, Complete Genomes, Taxonomy, and OMIM.

Open access resources in neuroscience

BMC: Neuroscience, Neurology & Psychiatry Gateway
http://www.biomedcentral.com/gateways/neuropsych
> A gateway to neuroscience research highlights, journals, latest research articles, and the section New on Faculty of 1000 Biology (subscription required for Faculty of 1000) published by BioMed Central (BMC), an open access publishing house. BMC provides immediate and open access to full-text of peer-reviewed research articles published in its 130+ online journals covering all areas of biology and medicine. Neuroscience journals available through BMC Neuroscience, Neurology & Psychiatry Gateway include:

BMC Behavioral and Brain Functions
http://www.behavioralandbrainfunctions.com/
> Publishes research articles on all aspects of neurobiology and behavior.

BMC Cerebrospinal Fluid Research
http://www.cerebrospinalfluidresearch.com/
> Publishes research articles on all aspects of cerebrospinal fluid in health and disease

BMC Neurology
http://www.biomedcentral.com/bmcneurol/
> Publishes research articles on the prevention, diagnosis and management of neurological disorders, as well as related molecular genetics, pathophysiology, and epidemiology. Indexed by PubMed, CAS, Scopus, EMBASE, Thomson Scientific (ISI), and Google Scholar.

BMC Neuroscience
http://www.biomedcentral.com/bmcneurosci/
> Publishes research articles on cellular, tissue-level, organismal, functional and developmental aspects of the nervous system. Indexed by PubMed, BIOSIS, CAS, Scopus, EMBASE, Thomson Scientific (ISI), and Google Scholar.

BMC Journal of NeuroEngineering and Rehabilitation
http://www.jneuroengrehab.com/
> Publishes articles on research that result from cross-fertilization of the fields of neuroscience, biomedical engineering, and physical medicine & rehabilitation.

BMC Journal of Neuroinflammation
http://www.jneuroinflammation.com/
> Publishes research articles on innate immunological responses of the central nervous system.

BMC Molecular Pain
http://www.molecularpain.com/
> Publishes research articles on all aspects of pain research at the cellular, subcellular and molecular levels.

Epilepsy Currents
{http://www.aesnet.org/go/publications/epilepsy-currents}
> The publication of the American Epilepsy Society. Publishes reviews, commentaries and abstracts from the world's literature on the research and treatment of epilepsy.

Journal of Psychiatry and Neuroscience
{http://jpn.ca/}
> A publication of the Canadian Medical Association. Publishes research articles and review papers in clinical psychiatry neuroscience related to major psychiatric disorders and neurodegenerative diseases.

PLoS Biology
{http://journals.plos.org/plosbiology/}
> One of the six open access peer-reviewed journals published by the Public Library of Science (PLoS), a California non-profit group of bioscientists formed in 2000. PLoS Biology features works of exceptional significance in all areas of biological science, including works at the interface with other disciplines, such as chemistry, medicine, and mathematics. PLoS Biology was recently ranked in the top-tier of life science journals by The Institute for Scientific Information (ISI), with a preliminary impact factor of 13.9.

PLoS Computational Biology {http://journals.plos.org/ploscompbiol/}
> A new PLoS journal launched in June 2005. Aims to report major biological advances achieved through computation. Published in partnership with the International Society for Computational Biology.

Digital journal archives

Cell Press
http://www.cellpress.com/
> Provides free access to the online archive of the Cell Press journals, including the journal Neuron that publishes reports of novel results in all areas of neuroscience. The archive includes content that is 12 months old or older and dating back to content from 1995. Available on both ScienceDirect and on the Cell Press journal sites.

CogPrints
http://cogprints.org/
> A digital archive for self-archived papers in the areas of psychology, neuroscience, linguistics, computer science, philosophy, and biology.

HighWire Press
http://highwire.stanford.edu/
> A division of the Stanford University Libraries. A searchable free repository of 900+ full-text peer-reviewed journals. The embargo period varies from journal to journal but generally less than two years from publication date.

Proceedings of the National Academy of Sciences (PNAS)
http://www.pnas.org/contents-by-date.0.shtml
> The online archive of the Proceeding of the National Academy of Sciences provides free access to back issues 6 months after print publication. Immediate open access to some articles.

PubMed Central (PMC)
http://www.pubmedcentral.nih.gov/
> The free digital archive of full-text life sciences journal literature at the U.S. National Institutes of Health (NIH). Developed and managed by NIH's National Center for Biotechnology Information in the National Library of Medicine. Provides free access to all content. Selected journals may delay release of its full text in PMC for some period of time after publication but generally less than three years from publication date.

Directories, databases, and search engines

ClinicalTrials
http://www.clinicaltrials.gov/
> A service of the National Library of Medicine. Includes listings of federally and privately supported research in human volunteers.

Computational Neuroscience on the World Wide Web
http://home.earthlink.net/~perlewitz/index.html
> An annotated directory for computational neurobiology designed and maintained by Dr. Jim Perlewitz. Includes links to laboratories, individual researchers' web sites, conferences, software, and funding for theoretical neurobiology.

CRISP: Computer Retrieval of Information on Scientific Projects
{http://www.crisp.cit.nih.gov/}
> A searchable database of federally funded biomedical research projects conducted at research institutions. Maintained by the Office of Extramural Research at the National Institutes of Health. Users can search for scientific concepts, trends and techniques as well as for specific projects and investigators.

Entrez: The Life Sciences Search Engine
http://www.ncbi.nlm.nih.gov/gquery/gquery.fcgi
> The cross-database search and retrieval system developed by the National Center for Biotechnology Information (NCBI) at the National Institutes of Health. Allows simultaneous searching of the NCBI's major databases, including PubMed, PubMed Central, Nucleotide and Protein Sequences, Protein Structures, Complete Genomes, Taxonomy, and others.

National Center for Research Resources: Access to Scientific Resources
{https://www.nih.gov/research-training/research-resources}
> A directory of scientific resources developed by the National Center for Research Resources at the National Institutes of Health. Includes links to biomedical technology resource centers; general clinical research centers; clinical-grade gene vectors; human tissues, organs, and islet cells; vertebrate and invertebrate animal models and stocks; biological materials; comparative medicine information sources; and genetic and genomic resources.

Neuroguide
http://www.neuroguide.com/
> A searchable and browsable index of neuroscience resources available on the Internet. Includes resources in neurobiology, neurology, neurosurgery, psychiatry, psychology, cognitive science, and human neurological diseases. Edited and maintained by Neil A. Busis, M.D

Research policies and guidelines

Bioethics Resources on the Web
http://www.nih.gov/sigs/bioethics/
> A directory of bioethics resources on the Internet prepared by the National Institutes of Health. Indexes resources in education, research involving human participants and animals, medical and health care ethics, and the implications of applied genetics and biotechnology.

Guidelines: Responsible Conduct Regarding Scientific Communication
{http://www.sfn.org/member-center/professional-conduct/guidelines-for-responsible-conduct-regarding-scientific-communication}
> Guidelines focusing on scientific communication within the field of neuroscience. Prepared by the Society for Neuroscience in 1998.

Handbook for the Use of Animals in Neuroscience Research
{http://www.sfn.org/advocacy/policy-positions/policies-on-the-use-of-animals-and-humans-in-research}
> The publication of the Society for Neuroscience. Outlines the principles of responsible and ethical treatment of animals.

National Institutes of Health (NIH): Public access
http://publicaccess.nih.gov/
> Developed by the Office of Extramural Research at the National Institutes of Health (NIH), the web site reviews and explains the Policy on Enhancing Public Access to Archived Publications Resulting from NIH-Funded Research (Public Access Policy), provides guidelines for authors on submitting manuscripts to the NIH's digital archive PubMed Central and links to articles, statistics, and communications that deal with the NIH Public Access Policy.

Principles of Data Sharing in Neuroscience
{http://www.nimh.nih.gov/neuroinformatics/guidelines.cfm}
> Guidelines on data sharing in neuroscience, developed by the Human Brain Project at the National Institute of Mental Health.

A Participant's Guide To Mental Health Clinical Research
{http://www.nimh.nih.gov/health/publications/a-participants-guide-to-mental-health-clinical-research/index.shtml}
> A detailed booklet published by the National Institute of Mental Health. Describes what people should know before they decide to participate in a mental health clinical trial.

Research organizations

The Blanchette Rockefeller Neurosciences Institute
{http://www.brni.org/}
> A non-profit institute dedicated to the study of human memory and discovery of tools for treating neurological diseases, including Alzheimer's disease.

FENS: Federation of European Neuroscience Societies
http://fens.mdc-berlin.de/
> The European partner of the American Society for Neuroscience. Represents a large number of national European neuroscience societies. Its aim is to advance research and education in neuroscience and represent neuroscience research in the European Commission, IBRO, and other granting bodies.

The Krasnow Institute of Advanced Studies
http://www.gmu.edu/departments/krasnow/
> Conducts research at the intersection of cognitive psychology, neurobiology, and the computer-driven study of artificial intelligence and complex adaptive systems.

National Institute of Mental Health
http://www.nimh.nih.gov/
> Part of the National Institutes of Health, a component of the U.S. Department of Health and Human Services. A leading institution for research on mental and behavioral disorders.

National Institute of Neurological Disorders and Stroke
http://www.ninds.nih.gov/
> One of the leading neuroscience institutions in the United States. Conducts and supports biomedical research on disorders of the brain and nervous system. The web site provides access to the Disorder Index, a database of symptoms, treatment, and prognosis of neurological disorders.

The Neurosciences Institute
{http://www.nsi.edu/}
> An independent, non-profit, privately supported, scientific research organization founded by Nobel laureate Gerald M. Edelman and dedicated to studying the brain.

NIH Neuroscience: Microarray Consortium
{http://arrayconsortium.tgen.org/np2/public/overview.jsp}
A consortium of four centers to provide NIH-funded neuroscientists with the opportunity to advance translational research through acquisition and dissemination of high quality array based data.

Society for Neuroscience
http://web.sfn.org/
The world's largest non-profit organization of scientists and physicians devoted to the study of the brain.

Research and funding

National Center for Research Resources: Research Funding Opportunities
{http://www.ncrr.nih.gov/research_funding/funding_opportunities/}
Developed by the National Center for Research Resources, a component of the National Institutes of Health, to support primary research. Provides information on electronic submission of NIH grant applications; NIH "Roadmap" initiatives; NIH Neuroscience Blueprint; grant descriptions and funding mechanisms; grant programs, announcements, and notices; application forms; grant policies and guidance.

National Institute of Mental Health: Research & Funding
{http://www.nimh.nih.gov/funding/index.shtml}
Includes information on grants, contracts, research training and career development, current research projects, programs, and initiatives, research news, guidelines, and policies.

Neuroscience @ NIH
http://neuroscience.nih.gov/
Conveys the research being conducted in the neurosciences in the National Institutes of Health (NIH). Includes information on postdoctoral training programs, areas of research interest, seminar series, and special interest groups.

OER Grants Policy and Guidance
http://grants.nih.gov/grants/policy/
Developed by the Office of Extramural Research at the National Institutes of Health (NIH). Outlines grant policies statements, general policy notices, grant awards and NIH appropriations and other grant policy and guidance resources for researchers.

Resources for New Investigators
http://grants.nih.gov/grants/new_investigators/index.htm
Developed by the Office of Extramural Research at the National Institutes of Health (NIH). Provides data on new investigators, information on awards for new investigators, and help with application process.

Projects and initiatives

Cognitive and Emotional Health Project: The Healthy Brain
http://trans.nih.gov/CEHP/
A joint initiative of the National Institute on Aging, National Institute of Mental Health, and National Institute of Neurological Disorders and Stroke. Aims to assess the state of longitudinal and epidemiological research on demographic, social and biologic determinants of cognitive and emotional health in aging adults and the pathways by which cognitive and emotional health may reciprocally influence each other.

The Human Brain Project
{http://www.nimh.nih.gov/neuroinformatics/index.cfm}
Launched in 1993 by the National Institute of Mental Health to develop and support neuroinformatics, a new research field devoted to the development of neuroscience data and knowledge bases together with computational models and analytical tools for the sharing, integration and analysis of experimental data and the advancement of theories of nervous system structure and function.

SenseLab Project
{https://senselab.med.yale.edu/}
One of the projects funded as part of the Human Brain Project. Involves novel informatics approaches to constructing databases and database tools for collecting and analyzing neuroscience information and providing efficient interoperability with other neuroscience databases.

Brain atlases

Atlases of the Brain
{http://library.med.utah.edu/kw/brain_atlas/}
Contains slides for viewing MRI scans of the human brain, coronal sections, and brain stem and spinal cord cross-sections. Slides can be "zoomed-in" for closer view. Provided by Spencer S. Eccles Health Sciences Library at the University of Utah for second year medical students studying neuroanatomy.

BrainInfo: Atlases
{http://braininfo.rprc.washington.edu/OtherAtlases.aspx}

A directory of neuroscience atlases developed by BrainInfo, the Neuroscience Division, National Primate Research Center, University of Washington.

Comparative Mammalian Brain Collections
http://brainmuseum.org/

One of the world's largest collection of sectioned and stained brains of over 100 different species of mammals (including humans) representing 17 mammalian orders. Sponsored by the National Science Foundation.

High Resolution Mouse Brain Atlas
http://www.hms.harvard.edu/research/brain/

The 3D and 2D electronic mouse brain atlas developed at Harvard Medical School

The Whole Brain Atlas
http://www.med.harvard.edu/AANLIB/home.html

A detailed catalog of medical images of the human brain -- both healthy and diseased. Sponsored by the Departments of Radiology and Neurology at Brigham and Women's Hospital, Harvard Medical School, the Countway Library of Medicine, and the American Academy of Neurology.

Works Cited

Boswell, James. 1953. *Life of Johnson.* Oxford University Press.

Watson, James D. 1992. Forward to *Discovering the Brain* by Sandra Ackerman. National Academy Press.