

**Final Project Report for
"The BIOSCI Electronic Newsgroup Network for the Biological Sciences"**

Principal Investigators: Dr. David Kristofferson and David Mack

Period Covered: 10/1/92 - 6/30/96

Recipient Organization: Knight-Ridder Information, Inc.
2440 El Camino Real
Mountain View, CA 94040

DOE Award #: DE-FG03-95ER62129/A000 to Knight-Ridder Information, Inc.
which superseded DE-FG03-94ER61871/A001 to IntelliGenetics, Inc.

NSF Award #: BIR-9117137 (funding from 10/1/92 to 3/31/95 and no-cost extension to 6/30/96)

Amount of unexpended funds: \$0.00

DOE Grant DE-FG03-95ER62129/A000 was the final allotment of funding for the BIOSCI project which originated as an interagency funding initiative between NSF, DOE, and NIH under NSF grant number BIR-9117137. Interagency funds transfer problems resulted in a decision by DOE to channel its remaining committed funds directly to the BIOSCI project in a separate grant instead of transferring them via NSF. The funding situation was further complicated by the transfer of the project from IntelliGenetics, Inc. to Knight-Ridder Information, Inc. in May 1995 when Dr. Kristofferson changed jobs.

The goals of the project were described in the original NSF grant and continued unchanged in the DOE grant. Although the funding for **DE-FG03-95ER62129/A000** only covered the final period of 9/1/95 to 8/31/96 (these funds were expended by 5/31/96), this final report reviews the overall project which spanned the period from 10/1/92 to 6/30/96. The latter date coincides with the end of the no-cost extension of the NSF grant. Work performed during the final year of DOE funding (**DE-FG03-95ER62129/A000**) is explicitly mentioned below.

From Skepticism to Success

Although the initial project review in 1991 included some comments doubting the value of the BIOSCI project and questioning the use of research funds to support what appeared to be work analogous to a journal publication effort, we are pleased to say that the project has completely vindicated itself and achieved enormous success, one highlight being the decision by the Secretary of the Nobel Prize Committee for Physiology or Medicine to choose BIOSCI as the medium to announce the 1994 and 1995 Nobel prizes over the Internet. The project has made a major contribution to biological research particularly through our METHODS-AND-REAGENTS newsgroup. This newsgroup currently receives about 1500 messages a month, is the feature of a monthly review column in *Trends in Biochemical Sciences* written by Paul Hengen at NIH, and, most importantly, provides a mechanism for scientists around the world to resolve problems with their experiments that are NOT working. The published scientific literature for years has been the record of successful experiments. However, as every practicing scientist knows, most experiments do not work the first time, and a major part of scientific work involves fixing the problems. BIOSCI utilized the communication potential of the Internet, years before it became fashionable, to create a place where scientists could discuss these problems. This forum is used by scores of scientists every day of the year. It is impossible to quantify precisely the benefits that have resulted

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

**Portions of this document may be illegible
in electronic image products. Images are
produced from the best available original
document.**

from this newsgroup, but the record is archived for everyone to see on the World Wide Web at URL <http://www.bio.net/hypermail/METHODS-REAGNTS/>. Please also note that while METHODS is probably our highest profile initiative, it is only one of over 100 communication forums that BIOSCI has created for research fields in biology. BIOSCI's record is evident by visiting its home page at <http://www.bio.net/>. The entire list of our 100+ forums is on the Web at <http://www.bio.net/archives.html>. A current copy is appended to this report. Tens of thousands of biologists around the world have used the BIOSCI/bionet newsgroups to exchange research ideas, resolve experimental problems, receive journal tables of contents prior to publication, access the latest funding agency and professional society announcements, find jobs, learn about upcoming meetings, coordinate international genome research collaborations, and more.

We would like to take this final opportunity to thank our project officers at NSF, DOE, and NIH for believing in us back in the early days of the project. The government's support was vital to our success and has resulted in a far larger payback to biological research than the project cost. We now review our results in light of the original project goals which are reproduced in *italics* below.

Project Goals and Results

1) maintain the current newsgroups and resolve some of the problems with the current distribution scheme. Provide archival services via e-mail server and FTP.

The “problems with the current distribution scheme” referred to mailing list issues which were fixed in 1992. The newsgroups in existence at the start of the project were not only maintained but expanded dramatically as noted under goal 2A below. Our FTP archive was available on the Internet in October 1992 and e-mail retrieval capabilities added by the end of April 1993. We did not stop there however. By August 1993 access to the BIOSCI archives was available via gopher to host gopher.bio.net. This archive work was done by Kenton Hoover. In January 1995, our new systems administrator David Mack established a WWW home page for BIOSCI at <http://www.bio.net/>, but at the time this served primarily as a gateway to the gopher archive. **During the final year of DOE funding (DE-FG03-95ER62129/A000)** we did a major overhaul of the archives using the freely available “hypermail” program from EIT, Inc. Hypermail allowed us to convert the text messages into HTML and change all of the embedded e-mail addresses automatically into mailto: URLs. This gave the users a Web interface to not only browse the BIOSCI archives, but immediately contact either the entire newsgroup or an individual poster of a message simply by clicking on an e-mail address with their Web browser. The original e-mail retrieval server featured one index for the entire newsgroup system. When we released the Web interface in December 1995, we also expanded the indexing by over 100-fold, so that each newsgroup had its own index. Over 5,000 users a week access our Web site and countless others around the world participate in BIOSCI via e-mail and USENET news. In addition to maintaining/expanding our communications system and WWW message archive, BIOSCI continues to provide technical support for use of the system through the e-mail address biosci-help@net.bio.net.

2) expand the newsgroups as follows:

A continue to arrange new newsgroups as suggested and voted upon by the user community; expand the scope of BIOSCI to cover any branch of the biological sciences;

When our NSF grant was submitted in 1991, BIOSCI ran 22 newsgroups primarily in molecular biology. At the time of this report, the total now stands at 101, almost a five-fold increase, and proposals for additional newsgroups have been submitted to us. The current list is appended to this report and future versions can be found on the Web at <http://www.bio.net/archives.html>.

During the final year of DOE funding (DE-FG03-95ER62129/A000) we created the following 14 mailing lists/newsroups (** = moderated newsgroup):

PEPTIDES/bionet.molecules.peptides - Chemical and biological aspects of peptides

VECTOR-BIOLOGY/bionet.biology.vectors - Research and control of arthropods which transmit disease

MOLECULAR-REPERTOIRES/bionet.molecules.repertoires - Generation and use of libraries of molecules

PSEUDOMONADS/bionet.organisms.pseudomonas - Research on the genus Pseudomonas

ECOPHYSIOLOGY/bionet.ecology.physiology ** - Research and education in physiological ecology

MUTATION - Discussions about mutation research.

RECOMBINATION/bionet.molbio.recombination - Research on the recombination of DNA or RNA.

ANNELIDA - Discussions of the scientific study of Phylum Annelida

DEEPSEA/bionet.biology.deepsea ** - Research in deep-sea marine biology, oceanography, and geology

BIOHERV - Discussions about human endogenous retroviral elements.

MAIZE - Research on maize.

AUTOMATED-SEQUENCING/bionet.genome.autosequencing ** - Research and support on automated DNA sequencing

AIBS/bionet.prof-society.aibs ** - American Institute of Biological Sciences announcements.

PLANT-SIGNAL-TRANSDUCTION/bionet.plants.signaltransduc ** - Research on plant signal transduction.

In addition, the following existing groups were converted from open, unmoderated forums to moderated newsgroups:

URODELES/bionet.organisms.urodeles

MOLLUSC-MOLECULAR-NEWS/bionet.molbio.molluscs

PHOTOSYNTHESIS/bionet.photosynthesis

HUMAN-GENOME-PROGRAM/bionet.molbio.genome-program

VECTOR-BIOLOGY/bionet.biology.vectors

B monitor newsgroup traffic on current unmoderated newsgroups and find moderators as conditions dictate;

For the first several years of the project, the Internet was primarily the domain of researchers, and moderating newsgroups to filter out irrelevant postings was not an easy idea to sell to our users. Unfortunately, the growing commercialization of the network and its use for mass mailings of advertisements has made this idea very popular now. Under DOE grant DE-FG03-95ER62129/A000, most new newsgroups that we have created in the last few months have been moderated and several of our older newsgroups have converted to moderated status. In most cases moderators have stepped forward from among the readership, though Dr. Kristofferson continues to moderate the BIONEWS,

COMPUTATIONAL-BIOLOGY, and EMPLOYMENT newsgroups himself, while Julie Lawrence, the BIOSCI technical support person, moderates BIO-JOURNALS and SCIENCE-RESOURCES. Currently 27 of our 101 newsgroups are moderated, 2 others will be converted very soon, and one new moderated newsgroup on free radical research is about to be created.

C contact the leaders of the various subdivisions of the Genome Project and establish newsgroups for their work;

BIOSCI is running the following genome project-related newsgroups (genome issues are also discussed on many other BIOSCI groups as well):

ARABIDOPSIS	Newsgroup for the Arabidopsis Genome Project
AUTOMATED-SEQUENCING **	Research and support on automated DNA sequencing
CHROMOSOMES	Discussions about mapping and sequencing of eucaryote chromosomes
EMBL-DATABANK	Messages to and from the EMBL database staff
GENBANK-BB	Messages to and from the GenBank database staff
HUMAN-GENOME-PROGRAM **	Newsgroup on human genome issues (moderated by <i>Human Genome News</i> editor Betty Mansfield)

Attempts to get smaller genome groups such as the chromosome 22 community to participate in newsgroups were not successful. In fact, a newsgroup specifically dedicated to the chromosome 22 project was shut down due to lack of use. We believe that the ARABIDOPSIS initiative succeeded while others failed primarily because NSF actively encouraged its Arabidopsis genome grantees to collaborate over the network while other agencies were less aggressive in this aspect.

D convert some of the scientific specialty newsgroups into moderated forums by finding recognized authorities to serve as moderators - this could be a first step towards encouraging electronic publications;

Most of the newsgroup moderators have volunteered from the user community, and we are not in a position to evaluate their scientific reputation in most cases. In cases where we have contacted leading scientists about moderating newsgroups, we have found that they are usually too busy to undertake this kind of task, particularly since newsgroup moderation does not carry with it the prestige associated with being on journal editorial boards. We list the current moderators of scientific specialty groups below:

AUTOMATED-SEQUENCING **	David Cain (dcain@hgmp.mrc.ac.uk) and Robert Feakes (rwf@mole.bio.cam.ac.uk)
COMPUTATIONAL-BIOLOGY **	David Kristofferson (biosci-help@net.bio.net)
ECOPHYSIOLOGY **	Martyn M. Caldwell (mmc@cc.usu.edu)
EMF-BIO **	Allan H. Frey (afrey@uunet.uu.net)
HUMAN-GENOME-PROGRAM **	Betty Mansfield (k76@ornl.gov)
INSULIN-ACTION **	T. S. Pillay (tpillay@ucsd.edu)
MOLLUSC-MOLECULAR-NEWS **	Elizabeth Grace Boulding (boulding@uoguelph.ca)
PHOTOSYNTHESIS **	Larry Orr (larry.orr@asu.edu)
PLANT-SIGNAL-TRANSDUCTION **	Bratislav Stankovic (stankovic.1@osu.edu)
URODELES **	Susan Duhon (duhon@ucs.indiana.edu) and Anthony Mescher (mescher@ucs.indiana.edu)
VECTOR-BIOLOGY **	Dennis Knudson (dknudson@lamar.colostate.edu) and Martin Ferguson (martinf@lamar.colostate.edu)
VIROLOGY **	Marnix L. Bosch (marnix@saul.u.washington.edu) and Brett Lindenbach (bd1@borcim.wustl.edu) and Thomas Pfitzner (sttpfi@med-rz.uni-sb.de)

E increase the offerings on the BIO-JOURNALS newsgroup. Contact more editors and publishers to obtain advance table of contents submissions; if possible, try to obtain abstracts as well;

When our NSF grant was submitted, there were 9 journals that submitted their Tables of Contents ahead of hardcopy publication to the BIO-JOURNALS newsgroup. We have now received submissions from 80 journals (see list appended to this report). In the last year, however, some journals have ceased submitting this data, probably in an effort to entice readers to visit their newly emerging Web pages. Regarding abstracts, only a very small number (2 or 3) of journals ever agreed to provide this data to BIOSCI. The vast majority provided citations in BRS Medline format.

F expand the use of SCIENCE-RESOURCES to include funding announcements from any relevant agency in the field of biology;

In 1991 BIOSCI was distributing only the NIH *Guide to Contracts and Grants* on this newsgroup. Subsequently, weekly postings from NSF's STIS service were added. DOE and private foundations occasionally submit material for dissemination on this newsgroup, although we would encourage DOE to make greater use of this resource than it has to date, particularly for OHER funding initiatives.

3) maintain a database of information about electronic communication resources in biology and a database of e-mail addresses of biological scientists;

BIOSCI established its Directory of Biologists in May 1993. A form was previously broadcast on our newsgroups which users could voluntarily fill out and return by e-mail. The database was WAIS-indexed and searchable through e-mail and gopher. Under DOE grant DE-FG03-95ER62129/A000 as part of our expansion of our WWW capabilities, we created an address submission form available on the Web at <http://www.bio.net/adrform.html> and also added search capabilities through the Web interface at <http://www.bio.net/addrsearch.html>. As of 7/30/96 there were 8,642 voluntarily registered users in the database and the number continues to grow daily.

The rapid growth of both the BIOSCI system and the Internet made it impossible for us in the time allotted to catalog other resources. This work was undertaken independently by other groups, and we decided not to duplicate it. Instead, for example, we simply put in a link from our Web page to the Biosciences Virtual Library maintained at Harvard (<http://golgi.harvard.edu/biopages.html>).

4) serve as a technical resource to assist other sites in installing mail and news software, and in getting USENET newsfeeds; provide guidance for biologists interested in obtaining better network connections;

As network awareness increased, this part of our work diminished because most places now recognize the need to have good local resources. This was not always the case in 1991. We have over the years answered e-mail questions from systems administrators as they arose. We continue to provide direct newsfeeds of the bionet USENET hierarchy to many sites from our machine at net.bio.net, and link to documentation about network access issues from our Web site.

5) provide training about mail and news software to systems administrators and end users.

Under the NSF grant, Dr. Kristofferson delivered well over 40 seminars at professional society meetings, universities and companies about the use of the Internet for biological research and included in these talks many examples of the use of mail, USENET news, WAIS, gopher, and WWW browser software. These efforts have been described in past progress reports, especially the report submitted for June 1994 - April 1995 in which an estimated number of 2,800 biologists were reached in 38 seminars throughout the U.S. and Puerto Rico. Under DOE grant DE-FG03-95ER62129/A000, no travel funds were available, but Dr. Kristofferson has continued to talk about BIOSCI at trade shows where he worked in the Knight-Ridder Information booth and on other occasions when he has been an invited speaker provided with travel

money. These included talks to about 800 people at the June 1995 Special Libraries Association meeting in Montreal, 150 people at the 1996 AAAS Annual Meeting in Baltimore, 200 people at the 1996 FASEB meeting in D.C., and 100 people at the 1996 Amer. Society for Information Science meeting in San Diego.

The Future of BIOSCI

One of the key issues that our project officers asked us to address at the beginning of the BIOSCI project was to develop a way to wean the project from federal support by the end of the grant. We are happy to say that we have succeeded in that task. BIOSCI has lined up the following commercial sponsors who have funded our work since the end of our DOE funding. These sponsors support our work in exchange for advertisements on our Web site at <http://www.bio.net/>. Their ads can be viewed on our main home page and in association with many of the individual newsgroup archives. We are grateful for their support and believe that we can at least cover the cost of operating BIOSCI at a minimal level, i.e., maintain the existing system, for the foreseeable future.

BIOSCI Sponsors as of 7/31/96:

Molecular Dynamics, Inc., a leading producer of innovative instrumentation systems for the life sciences
Knight-Ridder Information, Inc., a major provider of electronic information to business, research, and scientific professionals
BIOSIS, publisher of Biological Abstracts and Zoological Record
CLONTECH Laboratories, Inc., a leading manufacturer of innovative reagents and kits for the life sciences
The UnCover Company, an internationally-known firm that offers article delivery and current issue alerting from 17,000 periodicals.
LI-COR, Inc., manufacturer of automated infrared DNA sequencing and genetic analysis systems.
The Nest Group, Inc. a value-added distributor of HPLC columns, DNA kits, and electrophoresis gels for biomolecule separation.
Sun Microsystems, Inc., a leading provider of solutions for open network computing environments.
Academic Press, a leading scientific publisher for more than 50 years.
QIAGEN, a leading provider of innovative, user-friendly technologies for nucleic acid and protein purification.
Trends in Biochemical Sciences, the leading monthly magazine in biochemistry and molecular biology.

Finally, however, had it not been for our federal support, we would not have been able to build the current system which is now highly automated and requires much less labor than in the years past. Some reviewers of the initial proposal to NSF commented that such systems should be run by volunteers around the Internet and not receive government funding. Subsequent developments have shown that **no other branch of science has developed anything remotely comparable to the BIOSCI system**. We continue to get envious inquiries about our system from, e.g., chemists. Volunteer efforts in other disciplines have led only to fragmented mailing lists/newsgroups scattered throughout the network. Researchers who were not systems administrators had nowhere to turn in most cases to create electronic forums for their communities.

Once again, we would like to thank our project officers at DOE, NSF, and NIH for funding this service and making it possible.

Publications

No publications were submitted under DOE grant DE-FG03-95ER62129/A000. Publications under NSF grant BIR-9117137 were submitted with previous progress reports to both NSF and DOE.

Appendices

- **List of BIOSCI/bionet Newsgroups as of 7/31/96**
- **List of Journal Tables of Contents in the BIO-JOURNALS newsgroup archives**

BIOSCI bionet Newsgroup Archives

ACEDB/bionet.software.acedb

Discussions by users of genome DBs using ACEDB.

ADDRESSES/bionet.users.addresses

Who's who in Biology.

AFCR/bionet.prof-society.afcr

American Federation for Clinical Research announcements (Moderated)

AGEING/bionet.molbio.ageing

Research into cellular and organismal ageing.

AGROFORESTRY/bionet.agroforestry

Agroforestry research.

AIBS/bionet.prof-society.aibs

American Institute of Biological Sciences announcements. (Moderated)

AMYLOID/bionet.neuroscience.amyloid

Forum for researchers on Alzheimer's disease and related disorders.

ANNELIDA/Prototype

Discussions of the scientific study of Phylum Annelida

ARABIDOPSIS/bionet.genome.arabidopsis

Information about the Arabidopsis project.

ASCB/bionet.prof-society.ascb

Am. Soc. for Cell Biology announcements. (Moderated)

AUDIOLOGY/bionet.audiology

Topics in audiology and hearing science

AUTOMATED-SEQUENCING/bionet.genome.autosequencing

Research and support on automated DNA sequencing (Moderated)

BIGBLUE/Prototype

Discussions between researchers who use transgenic animal systems for mutation assays.

BIO-MATRIX/bionet.molbio.bio-matrix

Computer applications to biological databases.

BIO-SOFTWARE/bionet.software

Information about software for biology.

BIO-SRS/bionet.software.srs

Discussions about Sequence Retrieval System (SRS) software

BIO-WWW/bionet.software.www

WWW resources for biologists. (Moderated)

BIOCAN/bionet.prof-society.cfbs

Newsgroup for the Canadian Federation of Biological Societies (CFBS)

BIOFORUM/bionet.general

General BIOSCI discussion.

BIOHERV/Prototype

Discussions about human endogenous retroviral elements.

BIOLOGICAL- INFORMATION-THEORY/bionet.info-theory

Biological information theory.

BIONEWS/bionet.announce

Announcements of widespread interest to biologists. (Moderated)

BIOPHYSICAL-SOCIETY/bionet.prof-society.biophysics

Biophysical Society announcements. (Moderated)

BIOPHYSICS/bionet.biophysics

The science and profession of biophysics.

BIOTECHNIQUES/bionet.journals.letters.biotechniques

Discussion of articles from the journal Biotechniques. (Moderated)

BTK-MCA/bionet.metabolic-reg

Kinetics and thermodynamics at the cellular level.

CARDIOVASCULAR-RESEARCH/bionet.biology.cardiovascular

Research discussions between scientists engaged in cardiovascular research

CELEGANS/bionet.celegans

Research on the model organism *Caenorhabditis elegans*.

CELL-BIOLOGY/bionet.cellbiol

Cell biology research.

CHLAMYDOMONAS/bionet.chlamydomonas

Research into the green alga *Chlamydomonas*.

CHROMOSOMES/bionet.genome.chromosomes

Mapping/sequencing of eucaryote chromosomes.

COMPUTATIONAL-BIOLOGY/bionet.biology.computational

Computer and mathematical applications. (Moderated)

CSM/bionet.prof-society.csm

Canadian Society of Microbiologists announcements. (Moderated)

CYTONET/bionet.cellbiol.cytonet

Cytology research.

DEEPSEA/bionet.biology.deepsea

Research in deep-sea marine biology, oceanography, and geology (Moderated)

DIAGNOSTICS/bionet.diagnostics

problems and techniques in all fields of diagnostics.

DROS/bionet.drosophila

Research into the biology of fruit flies.

ECOPHYSIOLoGY/bionet.ecology.physiology

Research and education in physiological ecology (Moderated)

EMBL-DATABANK/bionet.molbio.embldatabank

Info about the EMBL Nucleic acid database.

EMF-BIO/bionet.emf-bio

Interactions of EM fields with biological systems. (Moderated)

EMPLOYMENT-WANTED/bionet.jobs.wanted

Requests for employment in the biological sciences.

EMPLOYMENT/bionet.jobs.offered

Job openings in the biological sciences. (Moderated)

FASEB/bionet.prof-society.faseb

Fed. of Am. Soc. for Experimental Biology. (Moderated)

FLUORESCENT-PROTEINS/bionet.molbio.proteins.fluorescent

Research on fluorescent proteins and bioluminescence

G-PROTEIN-COUPLED-RECEPTOR/bionet.molbio.proteins.7tms_r

Research on G-protein coupled receptors.

GDB/bionet.molbio.gdb

Messages to and from the GDB database staff.

GENBANK-BB/bionet.molbio.genbank

Info about the GenBank Nucleic acid database.

GENETIC-LINKAGE/bionet.molbio.gene-linkage

Research into genetic linkage analysis.

GLYCOSCI/bionet.glycosci

Research issues re carbohydrate and glycoconjugate molecules.

GRASSES-SCIENCE/bionet.biology.grasses

Research into the biology of grasses.

HIV-BIOL/bionet.molbio.hiv

Research into the molecular biology of HIV.

HUMAN-GENOME-PROGRAM/bionet.molbio.genome-program

Discussions regarding the international Human Genome Project (Moderated)

IMMUNOLOGY/bionet.immunology

Research in immunology.

INFO-GCG/bionet.software.gcg

Discussions about using the GCG software.

INSULIN-ACTION/bionet.cellbiol.insulin

Biology and chemistry of insulin and related receptors (Moderated)

JRNLNNOTE/bionet.journals.note

Advice on dealing with journals in biology.

MAIZE/Prototype

Research on maize

METHODS-REAGNTS/bionet.molbio.methods-reagents

Requests for information and lab reagents.

MICROBIOLOGY/bionet.microbiology

The science and profession of microbiology.

MOLECULAR-EVOLUTION/bionet.molbio.evolution

How genes and proteins have evolved.

MOLECULAR-MODELLING/bionet.molec-model

Physical and chemical aspects of molecular modelling.

MOLECULAR-REPERTOIRES/bionet.molecules.repertoires

Generation and use of libraries of molecules.

MOLLUSC-MOLECULAR-NEWS/bionet.molbio.molluscs

Research on mollusc DNA. (Moderated)

MUTATION/Prototype

Discussions about mutation research.

MYCOLOGY/bionet.mycology

Research into filamentous fungi.

N2-FIXATION/bionet.biology.n2-fixation

Biological nitrogen fixation research.

NAVBO/bionet.prof-society.navbo

Forum for the North American Vascular Biology Organization. (Moderated)

NEUROSCIENCE/bionet.neuroscience

Research issues in the neurosciences.

PARASITOLOGY/bionet.parasitology

Research into parasitology.

PEPTIDES/bionet.molecules.peptides

Chemical and biological aspects of peptides.

PHARMACEUTICAL-BIOTECHNOLOGY/Prototype

Discussions about research in pharmaceutical biotechnology.

PHOTOSYNTHESIS/bionet.photosynthesis

Research into photosynthesis. (Moderated)

PLANT-BIOLOGY/bionet.plants

Research into plant biology.

PLANT-EDUCATION/bionet.plants.education

Education issues in plant biology

PLANT-SIGNAL-TRANSDUCTION/bionet.plants.signaltransduc

Research on plant signal transduction (Moderated)

POPULATION-BIOLOGY/bionet.population-bio

Population biology research.

PRENATAL-DIAGNOSTICS/bionet.diagnostics.prenatal

Research in prenatal diagnostics

PROTEIN-ANALYSIS/bionet.molbio.proteins

Research on proteins and protein databases.

PROTEIN-CRYSTALLOGRAPHY/bionet.xtallography

Research into protein crystallography.

PROTISTA/bionet.protista

Research on ciliates and other protists.

PSEUDOMONADS/bionet.organisms.pseudomonas

Research on the genus Pseudomonas.

RADIATION-ONCOLOGY/Prototype

Radiation Oncology journal club (moderated list)

RAPD/bionet.molbio.rapd

Research on Randomly Amplified Polymorphic DNA.

RECOMBINATION/bionet.molbio.recombination

Research on the recombination of DNA or RNA.

RNA/Prototype

Discussions about RNA editing, RNA splicing, and ribozyme activities of RNA.

RUST-MILDEW/Prototype

Research about the biotrophic foliar fungal diseases of cereals, including rust, powdery mildews and downy mildews.

SCHISTOSOMA/bionet.organisms.schistosoma

Discussions about Schistosoma research.

SCIENCE-RESOURCES/bionet.sci-resources

Information about funding agencies, etc. (Moderated)

STADEN/bionet.software.staden

The Staden molecular sequence analysis software.

STRUCTURAL-NMR/bionet.structural-nmr

Exploring the structure of macromolecules using NMR.

SYMBIOSIS-RESEARCH/bionet.biology.symbiosis

Research in symbiosis

TIBS/bionet.journals.letters.tibs

Letters to the Editor of Trends in Biochemical Science (Moderated)

TOXICOLOGY/bionet.toxicology

Research in toxicology

TROPICAL-BIOLOGY/bionet.biology.tropical

Research in tropical biology.

URODELES/bionet.organisms.urodeles

Research on urodele amphibians. (Moderated)

VECTOR-BIOLOGY/bionet.biology.vectors

Research and control of arthropods which transmit disease. (Moderated)

VIROLOGY/bionet.virology

Research into virology. (Moderated)

WOMENINBIOLOGY/bionet.women-in-bio

Discussions about women in biology.

X-PLOR/bionet.software.x-plor

X-PLOR software for 3D macromolecular structure determination

YEAST/bionet.molbio.yeast

The molecular biology and genetics of yeast.

ZBRAFISH/bionet.organisms.zebrafish

Research on Zebrafish (Danio rerio).

BIO-JOURNALS/bionet.journals.contents Table of Contents Archive

Journal List

- [Anatomy & Embryology](#)
- [Antimicrobial Agents and Chemotherapy](#)
- [Applied Microbiology and Biotechnology](#)
- [Applied and Environmental Microbiology](#)
- [Aquatic Microbial Ecology](#)
- [Archives of Microbiology](#)
- [Binary](#)
- [Bioelectromagnetics](#)
- [Biological Cybernetics](#)
- [Biological Journal of the Linnean Society](#)
- [Biotecnologia-Aplicada](#)
- [Biotechniques](#)
- [Botanical Journal of the Linnean Society](#)
- [Blood Cells, Molecules, & Diseases](#)
- [Computer Applications in the Biosciences](#)
- [Cancer Chemotherapy and Pharmacology](#)
- [Cancer Immunology, Immunotherapy](#)
- [Cell and Tissue Research](#)
- [Chromosoma](#)
- [Clinical Chemistry](#)
- [Current Genetics](#)
- [Current Microbiology](#)
- [Differentiation](#)
- [Diseases of Aquatic Organisms](#)
- [EMBO Journal](#)
- [European Biophysics Journal](#)
- [European Journal of Applied Physiology and Occupational Physiology](#)
- [European Journal of Biochemistry](#)
- [European Journal of Clinical Pharmacology](#)
- [Evolution](#)
- [Experimental Brain Research](#)
- [Experimental Physiology](#)

- Genome
- Histochemistry and Cell Biology
- Human Genetics
- IEEE Engineering in Medicine and Biology
- Immunogenetics
- Journal of Bacteriology
- Journal of Biological Chemistry
- Journal of Biological Systems
- Journal of Cancer Research and Clinical Oncology
- Journal of Comparative Physiology A: Sensory, Neural, and Behavioral
- Journal of Comparative Physiology B: Biochemical, Systemic, and
- Journal of Computational Biology
- Journal of Investigative Medicine
- Journal of Membrane Biology
- Journal of Molecular Biology
- Journal of Molecular Evolution
- Journal of Physiology
- Journal of Theoretical Biology
- Journal of Virology
- Mammalian Genome
- Marine Biology
- Marine Ecology Progress Series
- Microbial Ecology
- Microbial Releases
- Molecular and Cellular Biology
- Molecular and General Genetics
- Molecular Microbiology
- Nucleic Acids Research
- Oecologia
- Planta
- Plant Cell Reports
- Protein Science
- Quarterly of Magnetic Resonance in Biology and Medicine
- Radiation and Environmental Biophysics
- Radiation Research
- The Raffles Bulletin of Zoology
- Roux's Archives of Developmental Biology

- [Seminars in Cancer Biology](#)
- [Seminars in Cell Biology](#)
- [Seminars in Developmental Biology](#)
- [Seminars in Immunology](#)
- [Seminars in the Neurosciences](#)
- [Seminars in Virology](#)
- [Sexual Plant Reproduction](#)
- [Theoretical and Applied Genetics](#)
- [Trees](#)
- [Trends in Biochemical Sciences](#)
- [Zoological Journal of the Linnean Society](#)

<!-- hhmts start -->23 July 1996 <!-- hhmts end -->/ BIOSCI Administrator / biosci-help@net.bio.net