A Biologist's Guide to Internet Resources

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Chapter 1

Introduction

Due to its large and steadily increasing size, this guide has been split into 6 parts for distribution via the Internet. Each part is fairly independent of the others, and can be obtained separately, if desired. However, this guide was written as a single document, and is most useful when complete.

If you find this guide difficult to understand, you might want to read one of the published Internet guidebooks listed in the bibliography and mentioned several times in this guide. In the interest of brevity, no information that is easily obtained elsewhere is duplicated here in any detail, thus, for a full understanding of the resources and tools listed here, it is helpful to read the cited material as well. To get started, check the table of contents for interesting parts, and skim through the whole document to get an idea of the scope and layout of what it covers.

1.1 What's New

This guide has been assigned an ISSN by the United States Library of Congress. Note to Usenet FAQ maintainers: it is classified as a serial because it is distributed periodically to e-mail subscribers and Usenet readers. Due to evident confusion among some US readers over the lack of a copyright notice, I have given in and added one. A notice has not been required by US law since the US signed the Berne Convention several years ago, but some readers incorrectly assume that because the guide had I no explicit copyright statement, it is in the public domain. This is not and never has been the case. Rest assured, all previous versions of the guide were (and still are) copyrighted. The conditions-of-use statement continues to change as readers to think of new ways to use the guide that I did not anticipate. Please bear with me.

The procedure for e-mail subscriptions to the bionet.* newsgroups (via BIOSCI) has changed significantly for some people. See section 2.2.2.

The appendix lists many new electronic mailing lists. Environmental policy and technology transfer lists have been separated out from conservation biology and environmental studies. Many new FAQs listed in section 4.

Just a reminder: Internet computer names in the United Kingdom (JANET) are written in the reverse of the order used everywhere else. All e-mail addresses listed in this guide that are at JANET sites are written in the usual Internet style, with the top-level domain name last. Thus to the Internet world, MAILBASE-style mailing lists are hosted on mailbase.ac.uk, but to JANET users the address is ...@uk.ac.mailbase. Got that?

A nifty way to find out what else is new in this version is to check the acknowledgement section, where my many helpful correspondents are thanked for their input. I could not keep up with all the new Internet resources without them! To facilitate identifying new items in the text, I will try to remember to add vertical bars in the left margin[1].

1.2 Conditions of Use

This guide is intended for use as a handout for training in seminars, workshops, and user services supporting use of the Internet by biologists, and for personal use. This guide may be freely distributed in parts or concatenated, with the e-mail and/or Usenet headers and ending signature removed. The file format may be changed in any way that is convenient for presentation. Internet archive keepers: please use a gopher link to the official copy on sunsite.unc.edu (see the following section) or, if you wish to maintain your own copy, use the correct title and make an effort to keep your copy up to date.

This guide may be adapted, within the limits of fair use, provided that a citation is given. Single copies of any document citing this guide would be much appreciated! The suggested citation is:

> Smith, Una R. (1993) A Biologist's Guide to Internet Resources. Usenet sci.answers. Available via gopher, anonymous FTP and e-mail from many archives. For a free copy via e-mail, send the text `send pub/usenet/sci.answers/biology/guide/*` to the e-mail address mail-server@rtfm.mit.edu. 45 pages.

Any questionable use should be discussed in advance with the author. This guide may not be sold for profit, in either the original or an adapted form, without permission from the author.

Virtually every service or resource mentioned in this guide (and this guide itself) is the un-paid, voluntary contribution of scientists and students, both graduate and undergraduate. Please give credit where due. If you make significant use of any document, data or software provided via the Internet, the authors would be grateful if you would cite them or otherwise acknowledge their efforts. You may want to acknowledge the administrators of archives from which you obtain data, software, or other material; contact the administrator to ask about the prefered citation.

Every attempt is made to keep the information in this guide up-to-date and correct. Your assistance is greatly appreciated! Before reporting an error or omission, please be sure that you have the latest version. Thank you!

[1] Feature removed in this TeX formated version

1.3 How to Get the Latest Version

This guide is updated more-or-less monthly. The most current version is available via Usenet, gopher, anonymous FTP and e-mail. Please do not ask the author to send you a copy, nor refer others to the author.

- In Usenet, look in sci.bio or sci.answers.
- Gopher to sunsite.unc.edu, and choose this sequence of menu items:

  ```
  Sunsite Archives
     Ecology and Evolution
  ```

  Or, from any gopher offering other biology gophers by topic, look for the menu item `Ecology and Evolution [at UNC and Yale]`. The guide is stored there in two ways: as a file for easy retrieval and as a menu for browsing.
- FTP to rtfm.mit.edu. Give the username `anonymous` and your e-mail address as the password. Use the **cd** command to go to the directory

  `pub/usenet/news.answers/biology/guide/`

  and use `prompt` and `mget *` to copy all 6 parts of the guide to your computer. For information about how to get many other useful documents from this archive, send the message `help`.

  You can also use anonymous FTP to sunsite.unc.edu, where this guide is stored as

  `pub/academic/biology/ecology+evolution/FAQ`.
- Send e-mail to mail-server@rtfm.mit.edu with the text

  `send usenet/news.answers/biology/guide/*`.

  You will receive 6 files in response, one for each part: save each part separately, delete the e-mail headers and footers, and merge them.

See section 3.6, Access Tools, for more information about retrieving information from the Internet.

1.4 Some Mind-Boggling Statistics

Recently, approximately 37,000 articles per day were copied worldwide through Usenet (Reid 1993b). This traffic constituted 77 megabytes (or 30,000 printed pages) per day of announcements, questions and answers, advice and bits of program code, references, heated debates, and raw data. This is only a small fraction of the information added to the Internet in that same time. There are now over two million registered computers on the Internet, according to the October 1993 Internet Domain Survey, and thus tens of millions of people. An estimated 13.8 million people have accounts on 120,000 computers carrying Usenet, and 4.1 million people read Usenet news at least occasionally (Reid 1993b). The fraction of people with access to Usenet news who actually read it is increasing rapidly, from 26% in July to 30% in October 1993. There are several thousand world- wide Usenet newsgroups and many thousands more electronic mailing lists.

It appears that there are on the order of 10,000 people who read Usenet newsgroups relating to biology (Reid 1993a), and there may be that many using mailing lists for topics in biology. All together, there are one hundred newsgroups and 250 mailing lists that may be of particular interest to biologists. They are listed in section 2, Networking, and the appendix, Assorted Mailing Lists Using LISTSERV.

Chapter 2

Networking

The Internet has become an excellent place in which to look for academic and professional job announcements, conference announcements and calls for papers, and important notices about recent events in many fields of biology. Generally, notices of all forms appear on the Internet well in advance of traditional journals and newsletters. Scientific interest groups, both formal and informal ones, maintain electronic discussion groups, directories, digests and newsletters. These resources are distributed in three principal ways: via Usenet newsgroups, (automated) listserver mailing lists, and mailing lists administered by real people. Increasingly, the two forms of mailing list have *gateways* connecting them with Usenet newsgroups.

2.1 Netiquette

The professionally-oriented newsgroups and mailing lists follow certain conventions of etiquette. These are none other than those used by most people at public events such as academic conferences. In fact, most of the science-related newsgroups (and mailing lists) are very much like mid-sized meetings of any professional society, except that they never end. The participants come and go as they please, but the discussion and exchange of ideas and information continues.

Submitted articles tend to be of the following types:

- Discussions on topics of general interest. Discussions on specific topics, techniques, or organisms are also frequent.

- Announcements of upcoming conferences or other events, calls for papers or grant proposal deadlines. In Usenet, announcements can be set to expire (and thus disappear from the list of current articles), and may be limited in their distribution so that they are seen only by readers in the appropriate organization or geographical area (Beware, this feature is often leaky; see section 2.2, Usenet).

- Academic and professional job announcements, including many graduate fellowships. These are generally posted in newsgroups/mailing lists reserved for such notices, often in advance of publication elsewhere.

- Reports or comments on new books, papers, methods or software. Full citation of sources is always appropriate and appreciated. Requests for references or comments are also welcome and, when posed as specific questions of general interest, often lead to interesting discussions.

Unacceptable articles include:

- Commercial advertizements, political lobbying messages, and anything not pertaining directly to the topic or purview of the newsgroup or mailing list. Discussions about some commercial products, especially books and software, are generally allowed as long as they do not constitute advertisements.

- Requests by students for explicit answers to homework and exam or essay questions are generally not welcome. Requests for help understanding problems in biology are welcome, but the requester should demonstrate at least a basic understanding of the question.

Some helpful suggestions:

- *Read before you post (look before you leap)*

  Before posting an article for the first time, read the discussions for a week or so. Look for an *FAQ* document that covers frequently asked questions (thus the name) before you make the mistake of asking one yourself. FAQs are an excellent way to learn a great deal about the culture and resources of the Internet, plus a great deal more. FAQs about resources are updated often (usually monthly), to stay current. (They are far more current than traditionally published books listing Internet resources!) Each newsgroup or mailing list has its own unique character, that is built from the shared experience of loyal and active participants exchanging ideas and information over the course of years.

- *Always include your full name and e-mail address*

  Put these at the end of your message, with your usual signature. You might want to use a .signature file (standard on most Unix systems, also implemented for Usenet and e-mail readers under VM/CMS) to make this automatic. This is necessary because strange things often happen to headers in e-mail or Usenet articles sent from one network to another. You may want to include your affiliation and/or mailing address, so that others can send you re-prints, and to help in networking outside of the Internet. Traditionally, people do not indicate their status; whether student or professor, Ph.D. or not, etc. It is generally believed that the text-only nature of communication via the Internet allows people to form opinions of one another that are based more on intellectual merit than on other, perhaps more superficial qualities. Either way, you have an unusual degree of control over what others can know about you, and it is to your advantage to use a .signature file that reflects you well.

- *Send private replies whenever appropriate*

  Answers to very esoteric questions are often best sent directly to the person who asked for help, rather than to the newsgroup; the choice of whether to post a (public) reply or send (private) e-mail is a personal decision. If you send a reply by e-mail, and would prefer that it be kept private, you should say so in your note, because otherwise the other person may share your comments with others. If the original poster promises to post a summary at the outset, then all replies should be sent by e-mail, unless they constitute an important re-direction of the original question.

- *Summarize the replies to your article*

  Whenever a question or request for information results in many replies, it is expected that the person who posted the original article will compile and post a summary of the responses.

- *Use care when writing summaries*

  - The *best* answers should come first.
  - All answers should be separated clearly, and nicely formatted.
  - Redundant, irrelevant or verbose comments, and errors of fact or spelling should be edited out. It is appropriate to use square brackets and dots to indicate editing [...].
  - Exercise discretion and tact, to ensure a fair and accurate summary.
  - Unless they asked that their names be withheld, the contributors of each answer should be named and thanked, individually or as a group.

- *Avoid starting nasty arguments or* flame wars

  - Be generous when interpreting the arguments of others.
  - Avoid jargon; write as though addressing an educated lay audience.
  - Avoid personal attacks on the honor or character of others.
  - Remember, the exercise will be good for you.

  If something you read angers you, save it for a few hours while you do something else (don't reply on an empty stomach). Go back to it when you are calm and relaxed (and you have thought of a good rebuttal!). If you simply must say something highly critical that is not confined to the subject under discussion (i.e., strays from intellectual argument into the realm of personal insult), consider sending it privately via e-mail, rather than posting or mailing to the group. And if you read something insulting to you, do not respond immediately; give yourself time to cool off and think of a tactful (but also devastating) response. E-mail can be a powerful tool, but only if you use it well.

- *Be careful about quotations, citations and copyrights*

  The Internet has grown to the point where it has become reasonable to cite documents that exist officially only in an electronic version on the Internet. And the issue of authenticity and version control has become extremely important. Thus, it has become appropriate to express copyrights, and to specify within documents how they may or may not be used, both within the Internet and in print. Please respect these restrictions, which are often very generous, and send the author e-mail if you have any doubts about the intended use of any Internet document.

  As a rule of thumb, you may freely cite or quote anything posted to a newsgroup or mailing list in that forum *only*. For citations or quotes elsewhere, it is hoped, even expected, that you will first request express permission from the author, which is easy, given the author's e-mail address. Although there has been a trend to cite specific articles posted in Usenet, it is generally satisfactory to use the *personal communication* formula, but for this reason you should request a specific, personal statement from the author that is directly relevant to and given in the context of the issue that you wish to address.

2.2 Usenet

Usenet is a convention, in every sense of the word.

Usenet is a system of organized **newsgroups** sharing many features with traditional newsletters, mailing lists and focused scientific societies. Usenet is Internet-based (although before the Internet existed it was distributed via UUCP), and strongly developed so that end users need know only how to interact with the particular Usenet *reader* program on their computers. Features of Usenet that make it far superior to the two types of mailing lists generally include the sorting or "threading" of all articles on a related topic, control of the distribution of posted articles to hierarchical levels (e.g., the author's university, state, country, or continent–but this feature may *leak*), the ability to cancel an article even after it has been distributed, and automatic expiration of dated articles. To test any of these features, especially the distribution control, try posting an article to misc.test; your article will receive *echoes* from other sites that receive it.

Usenet is *free*, but not cheap; because it requires a lot of computer disk space, and a certain amount of installation and regular maintenance work by a system administrator, not all computer systems carry Usenet. If Usenet is carried locally, it may still be necessary to prod the local Usenet administrator to add the bionet and bit.listserv newsgroups to the local *feed*. Usenet was created by two Duke University graduate students in 1979: see Spafford (1993) for the definitive history of Usenet and a list of Usenet software for virtually every type of computer.

To paraphrase Spafford and Salzenberg (1992): Usenet is *not* a network. Usenet is an anarchy, with no laws and no one in charge. No one has any real control outside of their own site. Computer system administrators who distribute Usenet *feeds* to other sites gain some authority by virtue of being *upstream*; that is, they have some say over what newsgroups their *downstream* neighbors can receive. Usenet feeds are stored at each site in *spools*; it is common for universities to have Usenet spools on one or two computers, and to allow everyone at the university to read Usenet news via *client* programs that connect to the remote *news server*.

The particular configuration of the Usenet feed to your university or organization determines whether the distribution control feature of most Usenet posting programs will work properly for you. For example, the mailing lists for the bionet.* newsgroups are gated on the west coast of North America, and you might think that it is safe to post local items in a bionet.* newsgroup if you live elsewhere. But many sites get their feed of bionet.* groups directly from the machine that runs the mailing lists, which is definitely outside your geographic area. So your article will be distributed at your site, but will not be propagated from your site to any other site in your area if it must pass out of your region and then return through a separate feed to a university in the next city. Furthermore, it is a more efficient use of network resources to get as much Usenet traffic as possible from the nearest site available. It is important, therefore, to do a little research on Usenet feeds in your area before asking your Usenet administrator to add one of the newsgroup hierarchies listed in section 2.2.2, Special Usenet Hierarchies and Gated Mailing Lists.

Usenet etiquette:

- New users should read the Usenet FAQs posted in news.announce.newusers.
- Use the misc.test newsgroup for posting test articles. Be sure to test the distribution feature here. Do not post test articles to other newsgroups.
- Use the expiration feature for job and conference announcments.
- When posting to more than one newsgroup, use the cross-posting feature so only one copy of your article goes out, but is seen by many people.
- Post (and cross-post) sparingly to groups that have associated mailing lists, to give a break to people who must read the groups via e-mail.

  The cross-posting of articles to more than one gated newsgroup is strongly discouraged, since the e-mail subscribers will get multiple copies of any cross-posted articles. Usenet readers should be aware of proper etiquette for mailing lists when posting to gated newsgroups.

2.2.1 Newsgroups of Special Interest

An **F** after the newsgroup name indicates an FAQ is available. **M** means that the newsgroup is moderated. **G** means that the newsgroup has a gateway to a parallel mailing list: see section 2.2.2, Special Usenet Hierarchies and Gated Mailing Lists, for details.

alt.agriculture.*		[2 groups]
alt.bbs.internet	F	Announcements of new Internet services
alt.cyb-sys		Cybernetics and Systems
alt.internet.access.wanted	F	Help getting full Internet access
alt.internet.services	F	Announcements of new Internet resources
alt.native		Indigenous peoples
alt.sci.*		[6 groups]
alt.earth_summit		Discussion of the recent Earth Summit
alt.sustainable.agriculture	G	Sustainable agriculture
bionet.agroforestry	G	Agroforestry research
bionet.announce	FGM	Announcements
bionet.biology.computational	GM	Comp. and math. applications in biology
bionet.biology.n2-fixation	G	Biological nitrogen fixation
bionet.biology.tropical	G	Tropical biology and ecology
bionet.chlamydomonas	G	Chlamydomonas discussion
bionet.cellbio	G	Cell biology discussion
bionet.drosophila	G	Drosophila discussion
bionet.general	FG	General discussion
bionet.genome.*	G	[3 groups: Arabidopsis and chromosomes]
bionet.immunology	G	Research in immunology
bionet.info-theory	FG	Information theory applied to biology
bionet.jobs	G	Job opportunities in biology
bionet.journals.contents	GM	Biological journal TOCs
bionet.journals.note	G	Publication issues in biology

bionet.metabolic-reg	G	Metabolic regulation and thermodynamics
bionet.molbio.ageing	G	Cellular and organismal ageing
bionet.molbio.bio-matrix	G	Computer searches of biological databases
bionet.molbio.embldatabank	G	Info about the EMBL Nucleic acid database
bionet.molbio.evolution	G	Evolution, especially molecular
bionet.molbio.gdb	G	The GDB database
bionet.molbio.genbank	G	The GenBank nucleic acid database
bionet.molbio.gene-linkage	G	Genetic linkage analysis.
bionet.molbio.genome-program	G	Human Genome Program issues
bionet.molbio.methds-reagnts	G	Tips on lab techniques and materials
bionet.molbio.hiv	G	The molecular biology of HIV
bionet.molbio.proteins	G	Proteins and protein database searches
bionet.molbio.rapd	G	Randomly Amplified Polymorphic DNA
bionet.molbio.yeast	G	Yeast researchers' discussion
bionet.mycology	G	Mycological research discussion
bionet.neuroscience	G	Research issues in the neurosciences
bionet.photosynthesis	G	Photosynthesis research
bionet.plants	G	Plant biology, inc. genetics and ecology
bionet.population-bio	G	Population biology, especially theory
bionet.sci-resources	GM	Information about funding agencies, etc.
bionet.software	G	Software for biology, esp. free/shareware
bionet.software.*	G	[3 groups: acedb, gcg, and sources]
bionet.users.addresses	G	Help locating biologists who use e-mail
bionet.virology	G	Research in virology
bionet.women-in-bio	G	Discussion by and about women in biology
bionet.xtallography	G	Protein crystallography
bit.listserv.biosph-l	G	Biosphere, ecology, Discussion List
bit.listserv.devel-l	G	Tech. Transfer in Internat. Development
bit.listserv.ethology	G	Ethology List
bit.listserv.geograph	G	Geography List
bit.listserv.medforum	MG	Medical Students Discussion
bit.listserv.uigis-l	G	User Interface for GIS
bit.listserv.vpiej-l	G	Electronic Publishing Discussion List
bit.org.peace-corps	G	International Volunteers Discussion Group
comp.infosystems.gis	FG	Geograpical Information Systems
comp.infosystems.gopher	F	The Internet gopher access tool
comp.infosystems.wais	F	The Internet WAIS access tool
comp.infosystems.www		The Internet WWW access tool
comp.soft-sys.sas	G	SAS Discussion
comp.soft-sys.spss	G	SPSS Statistical Discussion
comp.text.tex	F	TeX, LaTeX and related text format systems
comp.theory.cell-automata	G	Cellular automata research
comp.theory.dynamic-sys	G	Ergodic theory and dynamic systems
comp.theory.self-org-sys	G	Topics related to self-organization
embnet.news.admin	G	EMBnet news helpline for administrators
embnet.general	G	General discussion
embnet.net-dev		Network development discussion
embnet.rpc		Technical discussion of data transfers
info.grass.programmer	GM	GRASS GIS programmer issues
info.grass.user	GM	GRASS GIS user issues
info.ietf	GM	Internet Engineering Task Force
info.nsf.grants	GM	NSF grants announcements
info.wisenet	G	Women in Science and Engineering Network
news.announce.newusers	FM	FAQs for new users of Usenet
news.answers	FM	All FAQ documents
news.lists	FM	Statistics and data about Usenet

sci.answers	GFM	FAQs pertaining to science
sci.anthropology		Anthropology discussion
sci.archaeology		Archaeology discussion
sci.bio	F	General biology discussion
sci.bio.ecology	G	Ecological research (sponsored by ESA)
sci.bio.technology	G	Any topic relating to biotechnology
sci.data.formats		Issues of data structure and formats
sci.engr.biomed		Biomedical engineering
sci.environment		Discussion of environmental issues
sci.geo.*		[3 newsgroups]
sci.image.processing	F	Scientific image processing
sci.lang		Linguistics discussion
sci.nonlinear		Nonlinear dynamical systems
sci.research.careers		Discussion of research careers in science
sci.stat.consult	G	Statistical consulting
sci.stat.edu	G	Journal of Statistics Education List
sci.stat.math		Mathematical statistics
sci.techniques.xtallography		Crystallography techniques
sci.*		[60 other newsgroups]

2.2.2 Special Usenet Hierarchies and Gated Mailing Lists

There has been a growing trend in the past few years to set up transparent *gateways* between mailing lists and newsgroups, and to create Usenet newsgroup hierarchies that are outside the *main stream*. Both being new, these two trends often go together.

None of the Usenet newsgroup hierarchies mentioned below are main-stream ones; that is, they do not conform to all Usenet conventions, and consequently are carried by no more than 30-50% of Usenet sites. This is not necessarily a bad thing, since few or no readers at most sites are biologists, and e-mail subscriptions are available for many groups. If your site carries Usenet, but not these hierarcies, a simple request to your Usenet administrator might be all that's needed to get them too. But see the first part of section 2.2, Usenet, for details about what to ask for.

bionet.*

Each of these newsgroups has two gateways to mailing lists, to save on trans-Atlantic transmission costs. For an e-mail subscription to any bionet.* newsgroup, if you live in the Americas or the Pacific Rim, send e-mail to biosci-server@net.bio.net with the text 'help' (leave the Subject line blank; this is an automated server). If you live elsewhere, send e-mail to biosci@daresbury.ac.uk (a person will respond). Brief descriptions of some of these groups are given in the BIOSCI FAQ, posted in bionet.announce and available on net.bio.net in the directory /pub/BIOSCI/ or by e-mail from the BIOSCI staff at biosci@net.bio.net.

bit.listserv.*

As their names imply, the bit.listserv newsgroups started out as (and remain) automated mailing lists. Most of these mailing lists became so successful that gateways to Usenet were added by popular demand. The Appendix includes 100 or so other mailing lists, most run via the LISTSERV program, of interest to biologists; those mailing lists with Usenet gateways are listed in section 2.3.3, Gateways to Usenet. Charters for each of these groups can be obtained from the listserver that administers each one. See sections 2.3, Mailing Lists Using LISTSERV, and 2.3.1, Commands, for details about e-mail subscriptions and commands for interacting with listserver programs.

comp.theory.*

Send e-mail to Erik Fair, fair@apple.com, or see the list of mailing lists posted in news.answers for details about e-mail subscriptions.

embnet.*

The European Molecular Biology Network (EMBnet) runs a group of Usenet newsgroups that are distributed in Europe. E-mail subscriptions are available from nethelp@embl-heidelberg.de, and these newsgroups can be read and searched via gopher and WAIS on nic.switch.ch. Send general e-mail queries to embnet@comp.bioz.unibas.ch.

info.*

These groups are mailing lists with gateways to Usenet at the University of Illinois. See section 2.4, Other Mailing Lists, for e-mail subscription information, or ask your local Usenet administrator to get these groups.

2.2.3 Usenet FAQs about Usenet

You are strongly encouraged to read the following introductory and etiquette FAQs before posting any messages to any newsgroup. They are what might be considered the "mandatory course" for new users, and are posted frequently in the Usenet newsgroup news.newusers.announce.

See section 4, Useful and Important FAQs, for a list of additional FAQs of general use or interest to biologists, section 4.1, What's an FAQ and where can I get one?, and sections 3.6.2 and 3.6.3 for instructions on how to get copies by anonymous FTP or e-mail if you don't have access to a Usenet reader.

Title	**Archive filename**
Introductory information (recommended reading)	
What is Usenet?	what-is-usenet/part1
Answers to Frequently Asked Questions about Usenet	usenet-faq/part1
Introduction to news.announce	news-announce-intro/part1
Etiquette (strongly recommended reading)	
A Primer on How to Work With the Usenet Community	usenet-primer/part1
Emily Postnews Answers Your Questions on Netiquette	emily-postnews/part1
Hints on writing style for Usenet	usenet-writing-style/part1
Rules for posting to Usenet	posting-rules/part1

Technical issues	
How to Create a New Usenet Newsgroup	creating-newsgroups/part1
USENET Software: History and Sources	usenet-software/part1
How to become a USENET site	site-setup
NetNews/Listserv Gateway Policy	bit/policy
UNIX BBS Software FAQ with Answers	unix-faq/bbs-software
Introduction to the news.answers newsgroup	news-answers/introduction
Instructions for posting to news.answers	news-answers/guidelines
Resource listings	
Mailing Lists Available in Usenet	mail/news-gateways/part1
Publicly Accessible Mailing Lists	mail/mailing-lists/part[1-6]
List of Periodic Information Postings	periodic-postings/part[1-6]
List of Active Newsgroups	active-newsgroups/part[1-2]
Alternative Newsgroup Hierarchies	alt-hierarchies/part[1-2]

2.2.4 Usenet by E-mail

Many people who do not have direct access to Usenet do have Internet access, and can read Usenet newsgroups via gopher (see section 3.6.4 below for an explanation of gopher). Gopher is fine for reading Usenet news, but doesn't allow posting to them. Fortunately, various sites on the Internet will accept e-mail addressed to specific newsgroups, and will post it automatically. Rob Harper ¡harper@convex.csc.fi¿ in Finland offers such a service: to post to bionet.general, for example, send your article via e-mail to bionet.general@nic.funet.fi. Naturally, using a good e-mail program you can insert the usual article headers (Reply-To, Expires, References, etc.), but you can also insert bad headers and make a mess of your post, so be cautious: look carefully at the headers of other articles, and experiment by posting to misc.test.

2.2.5 Mailing Lists Using LISTSERV

It is very important that you keep a list of all mailing lists to which you are subscribed, along with the address of the list administrator and the address you used when you subscribed, if you have more than one. This is because you will need to unsubscribe yourself if you go away on vacation or your address changes. Otherwise any mail sent to you from the list may bounce or cause other, sometimes severe problems. And it's easier to check the address etc. when you want to tell friends how they can subscribe too.

The Appendix at the end of this guide includes most listserver mailing lists of particular interest or use to biologists. Internet addresses are given whenever possible, and all addresses are in standard Internet format, with the exception that portions of the Internet node names that reflect original Bitnet node names are given in uppercase, for the convenience of readers on Bitnet nodes.

Listservers were developed first many years ago on Bitnet, when Eric Thomas wrote a computer program named **LISTSERV** that could act like a regular computer user: receiving and sending out e-mail, and keeping files. LISTSERV is now used on hundreds (170 at last count) of computers around the world, and a number of copy-cat programs with some similar features are used at many other sites. Whichever program is used, these listservers are given the task of maintaining multiple electronic mailing lists, handling all membership requests (subscriptions and cancellation of subscriptions, and so on). Many list owners collect monthly logs of all messages sent to the list, and some also provide files of other information. Eric Thomas's LISTSERV program does this automatically, and listservers running this program can send *back issue* logs and other files on request.

The author of one of the other listserver programs has unfortunately chosen to enhance his own reputation by using the same name as Eric Thomas's program. This causes great confusion, as the other program does not perform nearly as many functions as LISTSERV does. Whenever known, those mailing lists *not* using Eric Thomas's LISTSERV code are listed in the Appendix, Assorted Mailing Lists Using LISTSERV, with a **K**. E-mail subscription requests for these lists must have blank Subject lines and no appended signature text.

Mailing lists run by non-LISTSERV listservers are listed in section 2.4, Other Mailing Lists, together with mailing lists run by hand. Other listservers include **mailbase** and **MAILSERV**, both written for Bitnet nodes in Europe. For documents about using mailbase, send e-mail to mailbase@mailbase.ac.uk with the text

`send mailbase user-guide` *for the lengthly User's Guide*
`send mailbase user-card` *for a short version of the Guide*

You can get an extensive topical directory of academic mailing lists, compiled by Diane Kovacs, dkovacs@KENTVM.kent.edu: send e-mail to listserv@KENTVM.kent.edu with the text

```
get acadlist readme
```

Charles Bailey posts a directory, Library-Oriented Lists and Electronic Serials, to the newsgroup bit.listserv.pacs-l on a regular basis.

Mailing list etiquette:

- Whenever possible, Bitnet users should use the Bitnet address of a list and its listserver; Internet users should use the Internet address.
- Keep a record of your subscriptions, and a copy of any instructions that you receive with your subscription.
- Remember to unsubscribe or otherwise turn off your subscriptions before your e-mail address changes or you go away on vacation.
- Avoid sending articles to more than one mailing list.
- Be concise or, if your article is more than a few hundred lines long, warn your readers in the Subject line.

A note for users on JANET nodes (in the United Kingdom): you may be able to get subscriptions to Bitnet listserver mailing lists via listserv@earn-relay.ac.uk. Send e-mail to that address with the text

```
info ?
```

for more information. This saves electronic transmission costs by having a single subscription propagated across the Atlantic Ocean, and then re-distributing it to multiple subscribers in the U.K. and elsewhere in Europe.

2.2.6 Commands

Being computer programs, with nothing else to do, listservers just sit and wait for e-mail to arrive, read it, and perform the appropriate task, usually immediately. They respond only to a small set of commands. A summary (Thomas 1993) of these commands can be retrieved by sending the message `send listserv refcard` to any listserver. The main listserver is listserv@BITNIC.educom.edu, but there are many listservers around the world. Specificially, there is one on each computer for which a mailing list is mentioned in the Appendix. Most listservers maintain more than one mailing list.

To subscribe to any of these mailing lists, send e-mail to the listserver at the same address. For example, subscriptions to the Smithsonian Institution's biological conservation list, CONSLINK, may be obtained by sending the message

```
subscribe conslink <Your Name>
```

to listserv@SIVM.si.edu. To turn off mail from a list temporarily (e.g., while you are away on vacation), send the message

```
set <listname> nomail
```

and to unsubscribe permanently (e.g., because your e-mail address is about to change), send the message

```
unsubscribe <listname>
```

Send subscription and other administrative requests to the listserver, not the list; e-mail messages sent directly to the mailing list will (generally) be sent to all the list subscribers. Only the listserver can process subscription requests, and the listserver only knows about requests that it receives directly.

LISTSERV programs of version 1.7f and higher have a very useful feature that lets you receive a daily digest (actually a concatenation, with a table of contents) instead of many individual articles. Send e-mail to the apropriate listserver with the message:

```
set <listname> digest
```

2.2.7 Archives

In addition to handling the membership requests for particular mailing lists, most listservers also archive all messages sent to each list in monthly log files. These files, along with other items contributed by list subscribers, are archived by the listserver and can be retrieved by e-mail. Listserv@SIVM.si.edu keeps an archive of various lists of conservation organizations and field stations, several newsletters, and a large collection of bibliographic references relating to biological conservation. Listserv@UMDD.umd.edu keeps an archive of job openings and conference announcements submitted to the Ecological Society of America.

Commands for retrieving files from listserver archives are described in the listserver command reference guide (Thomas 1993), and include:

`help`	to get generally useful information
`review <listname>`	to get the list of subscribers
`index <listname>`	to get the list of archived files
`get listserv refcard`	to get a short summary of commands
`get listfaq memo`	to get an FAQ about listservers

Sending the message `info` to a listserver will result in a list of information guides including:

REFcard	(LISTSERV REFCARD)	Command reference card
FAQ	(LISTFAQ MEMO)	Frequently Asked Questions
PResent	(LISTPRES MEMO)	Presentation of LISTSERV for new users
GENintro	(LISTSERV MEMO)	General information about Revised LISTSERV
KEYwords	(LISTKEYW MEMO)	Description of list header keywords
AFD	(LISTAFD MEMO)	Description of Automatic File Distribution
FILEs	(LISTFILE MEMO)	Description of the file-server functions
LPunch	(LISTLPUN MEMO)	Description of the LISTSERV-Punch file fmt.
JOB	(LISTJOB MEMO)	Description of the Command Jobs feature
DISTribute	(LISTDIST MEMO)	Description of Relayed File Distribution
COORDinat	(LISTCOOR MEMO)	Information about Listserv Coordination
FILEOwner	(LISTFOWN MEMO)	Information guide for file owners
DATABASE	(LISTDB MEMO)	Description of the database functions
UDD	(LISTUDD MEMO)	User Directory Database User's Guide
UDDADMIN	(LISTUDDA MEMO)	UDD Administrator's Guide

To get any one of these, send the message `info <keyword>` where `<keyword>` is, for instance, `REFcard` or `FAQ`. Only the portion in capitals is required.

2.2.8 Gateways to Usenet

Some of the listserver mailing lists in the Appendix below are also Usenet newsgroups:

Listserver	**Usenet Group**
biosph-l@UBVM.cc.buffalo.edu	bit.listserv.biosph-l
devel-l@AUVM.american.edu	bit.listserv.devel-l
ethology@FINHUTC.hut.fi	bit.listserv.ethology
geograph@SEARN.sunet.su	bit.listserv.geograph
medforum@ARIZVM1.ccit.arizona.edu	bit.listserv.medforum (custom gate)
uigis-l@UBVM.cc.buffalo.edu	bit.listserv.uigis-l
vpiej-l@VTVM1.cc.vt.edu	bit.listserv.vpiej-l
gis-l@UBVM.cc.buffalo.edu	comp.infosystems.gis
sas-l@UGA.cc.uga.edu	comp.soft-sys.sas
spssx-l@UGA.cc.uga.edu	comp.soft-sys.spss
dynsys@gibbs.oit.unc.edu	comp.theory.dynamic-sys
wisenet@UICVM.uic.edu	info.wisenet
scifaq-l@YALEVM.cis.yale.edu	sci.answers (gate & group→list only)
ecolog-l@UMDD.umd.edu	sci.bio.ecology
biotech@UMDD.umd.edu	sci.bio.technology
stat-l@vm1.mcgill.ca	sci.stat.consult
edstat-l@jse.stat.ncsu.edu	sci.stat.edu

American University has established itself as the clearing house and semi-official keeper of automated gateways between listserver mailing lists and Usenet newsgroups. Questions about the procedure for establishing a gateway for any mailing list or newsgroup may be posted to the Usenet newsgroup bit.admin or sent to news-admin@AUVM.american.edu. A FAQ on this topic appears regularly in the bit.admin newsgroup.

2.3 Other Mailing Lists

Remember to save any instructions you receive about unsubscribing from a mailing list. Mailing lists that do not use listserv-style commands for subscribing and unsubscribing include:

Topic or name — Mailing list address
Subscription instructions

Arabidopsis thal. database announcements — aatdb-info@weeds.mgh.harvard.edu
Contact Mike Cherry, curator@weeds.mgh.harvard.edu.

Artificial life digest — alife@cognet.ucla.edu
Send all subscription requests to alife-request@cognet.ucla.edu.

Biological Anthropology, Primatology — humbio@acc.fau.edu
Send `subscribe humbio <Your Name>` to mailserv@acc.fau.edu.

Biological timing and circadian rhythms — cbt-general@virginia.edu
cbt-general-request@@virginia.edu

Biologia y Evolucion (in Spanish) — biologia@athena.mit.edu
biologia-request@athena.mit.edu

Biology information systems — biogopher@bch.umontreal.ca
Contact Tim Littlejohn, tim@bch.umontreal.ca

Bulletin for bryologists — bryonet@uni-duisburg.de
Send e-mail to the owner, Jan-Peter Frahm, hh216fr@uni-duisburg.de.

Cytometry discussion — cytometry@flowcyt.cyto.purdue.edu
cyto-request@flowcyt.cyto.purdue.edu

Dendrome forest tree genome mapping digest Send all subscription requests and submissions to the editor, dendrome@s27w007.pswfs.gov.

Dinosaurs and other archosaurs — dinosaur@donald.wichitaks.ncr.com
Send e-mail to dinosaur-request@donald.wichitaks.ncr.com.

Discover Insight Biosym Users' Group — dibug@comp.bioz.unibas.ch
Send e-mail to dibug-request@comp.bioz.unibas.ch.

Ecologia (in Spanish) — ecologia@athena.mit.edu
Send e-mail to ecologia-request@athena.mit.edu

Entomology discussion — ent-list@um.cc.umich.edu
Send e-mail to the owner, Mark O'Brien, hcfb@um.cc.umich.edu.

Environmentalists digest env-link@andrew.cmu.edu Send e-mail to the owner, Josh Knaur, env-link+forms@andrew.cmu.edu.

Experimental Petrology — exp-pet@s100.es.llnl.gov
Send e-mail with the text `subscribe exp-pet` on the first line of the body (not the Subject line) to majordomo@s100.es.llnl.gov. For more information, contact Henry Shaw (shaw4@llnl.gov) or James Brenan (james_brenan@esciqm.es.llnl.gov).

Fish and Wildlife Biology — wildnet@access.usask.ca
Send e-mail to wildnet-request@access.usask.ca for subscription requests, etc. Wildnet is also distributed via Usenet in the sci.bio.ecology newsgroup (a.k.a. the ECOLOG-L mailing list).

Forestry discussion forest@lists.funet.fi
Send e-mail to forest-request@lists.funet.fi

Genstat statistics package discussion genstat@ib.rl.ac.uk
Send `subscribe genstat <Your Name>` to listral@ib.rl.ac.uk.

GIS digest
Send all subscription requests and submissions to the editor, rrl@leicester.ac.uk.

GIS Users in the United Kingdom geocal@leicester.ac.uk
Send `subscribe geocal <Your Name>` to vmsserv@leicester.ac.uk.

"Green" travel and tourism discussion [unknown]
Send e-mail to Marcus Endicott (mendicott@igc.apc.org), asking for a subscription to the green.travel mailing list.

Killifish, Cyprinodontidae killie@mejac.palo-alto.ca.us
Send e-mail to killie-request@mejac.palo-alto.ca.us

MINITAB list minitab@mailbase.ac.uk
Send `join minitab <Your Name>` to mailbase@mailbase.ac.uk.

Neotropical birds discussion avifauna@rcp.pe
Contact phillips@cipa.ec (Roberto Phillips)

Neural networks digest neuron-request@cattel.psych.upenn.edu
Send requests and all submissions to the above address. Back issues of the digest are available via anonymous FTP on cattell.psych.upenn.edu.

Orchids orchids@scuacc.SCU.edu
Send `subscribe orchids <Your Name>` to mailserv@scuacc.SCU.edu.

Peptide Libraries pep-libs@net.bio.net
Send `help` to biosci-server@net.bio.net for subscription information.

Plant hormones discussion list plant-hormones@mailbase.ac.uk
Send `join plant-hormones <Your Name>` to mailbase@mailbase.ac.uk.

Plant Taxonomy plant-taxonomy@mailbase.ac.uk Send `join plant-taxonomy <Your Name>` to mailbase@mailbase.ac.uk.

Primate discussion primate-talk@primate.wisc.edu
Send e-mail to the owner, primate-talk-request@primate.wisc.edu.

Prion Research Digest [unknown]
Send e-mail to prion-request@stolaf.edu.

RNA rna@net.bio.net
Send `help` to biosci-server@net.bio.net for subscription information.

The S statistics package s-news@utstat.toronto.edu
Send e-mail to s-news-request@utstat.toronto.edu.

SANET-MG Sustainable Agriculture Network sanet-mg@twosocks.ces.ncsu.edu
Send e-mail with the text `subscribe sanet-mg` or `send guide` or `send catalog` to almanac@twosocks.ces.ncsu.edu.

Simulated Annealing Mailing List (ANNEAL) [unknown]
Send e-mail with the text `subscribe anneal` to majordomo@sti.com.

Society for Mathematical Biology Digest smbnet@fconvx.ncifcrf.gov
Send e-mail with the text `subscribe smbnet <Your Name>` and/or `help` to listserv@fconvx.ncifcrf.gov. Back issues of the digest are available via anonymous FTP on fconvx.ncifcrf.gov in smb/digest/. The editor is apparently Ray Mejia.

SRS development and advanced usage team srs-team@comp.bioz.unibas.ch
Send e-mail subscription requests to srs-request@comp.bioz.unibas.ch.

Yeast Artificial Chromosomes yac@net.bio.net
Send `help` to biosci-server@net.bio.net for subscription information.

Young Scientists' Network ysn@zoyd.ee.washington.edu
Send e-mail to ysn-request@zoyd.ee.washington.edu with the Subject (not text) `subscribe` or `send info`.

Volcano list
Send all subscription requests and submissions to the editor, Jon Fink, aijhf@ASUACAD (via Bitnet) or aijhf@asuvm.inre.asu.edu.

Note, any mailing lists you may discover at net.bio.net or daresbury.ac.uk that are not explicitly mentioned in this FAQ are not mentioned *because* they are actually gated lists for the bionet.* newsgroups. See section 2.2.2, Special Usenet Hierarchies and Gated Mailing Lists, for instructions about subscribing to any bionet.* newsgroup via e-mail.

There is a 6-part FAQ in news.answers (da Silva 1993) that includes brief descriptions of the charter of each mailing list. This FAQ is stored in FAQ archives in the directory /mailing-lists/.

A very long (1.2 megabytes) list of lists is available via anonymous FTP from ftp.nisc.sri.com in netinfo/interest-groups or (in compressed form) netinfo/interest-groups.Z. It can also be obtained via e-mail by sending the message `send netinfo/interest-groups` to mail-server@nisc.sri.com. There is a printed, indexed version, titled *Internet: Mailing Lists*, that can be purchased from Prentice Hall. However, this list is up-dated through submissions, and thus is incomplete and not very correct.

2.4 Newsletters

Many of the mailing lists mentioned in the above section are actually digests, where readers' queries and comments are condensed into a single large document that is distributed periodically. Yet another variation on this theme is electronic newsletters. Those not listed elsewhere in this guide include:

- Animal Behavior Society Newsletter. Editor James C. Ha, jcha@u.washington.edu.
- Bean Bag: Leguminosae Research Newsletter, edited by Charles R. Gunn and Joseph H. Kirkbride, Jr., jkirkbride@asrr.arsusda.gov. Available via gopher and anonymous FTP from huh.harvard.edu.
- Botanical Electronic News (BEN), edited by Adolf Ceska, Canada. Available via gopher and anonymous FTP from huh.harvard.edu, and the wildnet mailing list.
- The Chlamydomonas Newsletter. E-mail subscriptions are available from Mike Adams, adams@ecsuc.ctstateu.edu. You can also get this newsletter via gopher from gopher.duke.edu and via anonymous FTP from acpub.duke.edu in pub/chlamy/.
- Climate/Ecosystem Dynamics (CED). E-mail subscriptions are available from Daniel Pommert, daniel@lternet.washington.edu, gopher access available via lternet.edu.

- Environmental Resources Information Network (ERIN) Newsletter, Australia Available via gopher and anonymous FTP from huh.harvard.edu, and via the ERIN gopher on kaos.erin.gov.au.
- Flora Online. A journal for collections-oriented botanists published by the Clinton Herbarium, Buffalo Museum of Science, New York USA. Editor Richard H. Zander, visbms@UBVMS.bitnet. Available via gopher and anonymous FTP from huh.harvard.edu.
- LTER Data Management Bulletin (DATABITS). Available via gopher on lternet.edu.
- STARNET Echinoderm Newsletter. Send e-mail to the editor, Win Hide, whide@matrix.bchs.uh.edu.
- Titnet. Notices of interest to researchers of Paridae and other hole- nesting birds. Send e-mail to J. Hailman, jhailman@macc.wisc.edu WISCMACC on Bitnet), with your name and address (postal and e-mail), what species you study and what types of studies you do.

The paper journal The Scientist is available via anonymous FTP on ds.internic.net, in pub/the-scientist, and gopher on gopher.gdb.org.

Michael Strangelove, 441495@acadvm1.UOTTAWA.ca has compiled a directory of electronic serials. To retrieve it, send e-mail with the text

```
get ejournl1 directry
get ejournl2 directry
```

to listserv@acadvm1.UOTTAWA.ca.

Chapter 3

Biological Information Archives

Many archives are mentioned throughout this section and elsewhere in this document. The access methods available for each archive are presented in section 3.5, List of Archives.

A number of people have begun to organize the many free biological information archives, databases and services on the Internet into well-organized menus using gopher servers. These include Don Gilbert's IUBio service on ftp.bio.indiana.edu and Mike Cherry's collection on weeds.mgh.harvard.edu in the United States, Rob Harper's *Finnish EMBnet BioBox* on gopher.csc.fi in Finland, and Reinhard Doelz's *Information servers in biology (gopher based)* on gopher.embnet.unibas.ch in Switzerland.

Yanoff (1993) is an excellent list of unusual and useful Internet services, a few of which are mentioned in this guide. Services listed include: an on-line dictionary, weather maps, a general weather report service, an archive of statistical programs and data sets, and various computers allowing public telnet sessions so that people who have Internet access but not Usenet can read and post Usenet articles.

Stern (1993b) offers an extensive list of anonymous FTP archives offering meteorological data.

Reinhard Doelz's Biocomputing Survival Guide (Doelz 1993) covers basic Unix and VMS commands and the GCG software.

3.1 Bibliographies

Many Internet archives have searchable bibliographic databases, complete with abstracts. Only a few are mentioned here.

A bibliography of 52,000 Drosophila research publications, dating from 1684 through this year, is offered on ftp.bio.indiana.edu.

The US Department of Energy (DOE) Climate Data bibliography and the NASA Global Change Data Directory are archived on ridgisd.er.usgs.gov. The North American Benthological Society (NABS) offers a bibliography of recent literature in benthic biology on gopher.nd.edu. The Long-Term Ecological Research (LTER) program has put a bibliographic database and catalog of data sets on lternet.edu. (The actual data is not available on-line.) Check gopher.genethon.fr for bibliographies of sequence analysis and human genome research papers.

The U.S. Department of Agriculture (USDA) Extension Service offers the Research Results Database (RRDB), containing brief summaries of recent research from the USDA's Agricultural Research Service (ARS) and Economic Research Service (ERS), by e-mail. For details, send the e-mail message "send guide" to almanac@esusda.gov. To receive notices of new RRDB titles, send the message "subscribe usda.rrdb".

The U.S. Environmental Protection Agency (EPA) National Library on-line database can be accessed for bibliographic searches via anonymous telnet to epaibm.rtpnc.epa.gov. A collection of GIS-related bibliographies is available on bastet.sbs.ohio-state.edu.

Various Usenet newsgroups and mailing lists provide the tables of contents (TOCs) for current issues of a few journals of interest to biologists. Tom Schneider distributes Unix AWK scripts for converting many of these TOCs into BibTeX-style bibliography records: these scripts are posted in the Usenet newsgroup bionet.journals.note.

The journal TOCs available in bionet.journals.contents include:

- Anatomy and Embryology
- Applied Microbiology and Biotechnology
- Applied and Environmental Microbiology
- Binary
- Biotechniques
- CABIOS
- Cell and Tissue Research
- Chromosoma
- Current Genetics
- EMBO Journal
- Environmental Physiology
- European Journal of Biochemistry
- European Journal of Physiology
- Experimental Brain Research
- Histochemistry
- Human Genetics
- IEEE Engineering in Medicine and Biology
- Immunogenetics
- Journal of Bacteriology
- Journal of Biological Chemistry
- Journal of Comparative Physiology B: Biochemical, Systemic, and

- The Journal of Membrane Biology
- Journal of Molecular Evolution
- Journal of Virology
- MGG - Molecular and General Genetics
- Mammalian Genome
- Microbial Releases
- Molecular Microbiology
- Molecular and Cellular Biology
- Nucleic Acids Research
- Photosynthetica
- Plant Cell Reports
- Planta
- Protein Science
- Roux's Archives of Developmental Biology
- Theoretical and Applied Genetics

Preston Hardison (dh@u.washington.edu¿)archives many documents relating to the CONS-BIO mailing list via anonymous FTP on ftp.u.washington.edu, in the directory pub/user-supported/consbio/.

The CONSLINK listserver mailing list keeps a large bibliography of conservation biology research papers on its archive (see section 2.4.2, Archives, for instructions on accessing list-server archives).

The American Physiological Society offers TOCs for the following journals via gopher on gopher.uth.tmc.edu (port 3300):

- Advances in Physiology Education
- American Journal of Physiology (6 consolidated journals)
- Journal of Applied Physiology
- Journal of Neurophysiology
- News in Physiological Sciences
- Physiological Reviews
- The Physiologist

Other publishers supporting Internet access to information about their publications include:

Publisher	Address	Access
Addison-Wesley	world.std.com	ftp
O'Reilly & Associates	gopher.ora.com	gopher
Kluwer Academic Publishers	world.std.com	ftp

There is a bibliography on the Internet itself available via anonymous FTP on gandalf.iat.unc.edu, file guides/irg-14.txt, and via gopher on sunsite.unc.edu, path UNC-info; IAT.

3.2 Directories

Searchable directories of scientists and research projects currently funded by the U.S. National Institutes of Health (NIH), National Science Foundation (NSF), Department of Agriculture (USDA), and genome researchers funded by several other departments, together with several topical directories, are available via gopher on gopher.gdb.org. Searches on researcher name, location, and field of interest are supported.

A directory of 2000+ people who read the bionet.* newsgroups is available via gopher and anonymous FTP from net.bio.net; you can add yourself to the directory via gopher or e-mail (see instructions on the archive). A directory of researchers using Artificial Intelligence in Molecular Biology (AIMB) is maintained at the National Library of Medicine. To be included, send e-mail to Larry Hunter, hunter@work.nlm.nih.gov.

Several directories of ecologists and plant biologists are kept on huh.harvard.edu, which is accessible via gopher and anonymous FTP. A directory of tropical biologists is kept in the Ecology and Evolution section of the gopher/anonymous FTP archive on sunsite.unc.edu. Richard Thorington keeps a list of mammalogists who use e-mail. To get yourself on the list (required to receive copies of it), send e-mail to mnhvz049@SIVM (via Bitnet) or mnhvz049@SIVM.si.edu.

3.3 Software

Several archives specializing in software for biologists are accessible via gopher and anonymous FTP. Some of these are listed in section 3.5, List of Archives. The first such archive in South America is the Brazilian Medical Informatics archive, ccsun.unicamp.br. The IUBio archive on ftp.bio.indiana.edu probably has the best collection in the United States. Botanists will appreciate the TAXACOM archive on huh.harvard.edu.

Also, wuarchive.wustl.edu has an excellent collection of educational software, especially for teaching mathematics at the college and university levels. The National Center for Supercomputing Applications has developed a collection of outstanding software tools for electronic communications and image analysis, and makes it publicly available on zaphod.ncsa.uiuc.edu. Many of the latest add-on tools for the popular LaTeX text formatting system are archived on sun.soe.clarkson.edu, while sumex-aim.stanford.edu has a huge archive of Macintosh software, and nic.ddn.mil keeps the important Internet RFC (Request for Comments) documents.

Jan-Peter Frahm has made available via e-mail*A Guide to Botanical Software for MS-DOS Computers*. The software is shareware or in the public domain. For a copy, write him at hh216fr@duc220.uni-duisburg.de. Bionet.software is a good place to look for information about specific software programs with applications to biology. There are many Usenet groups devoted to discussion of software, particularly freeware and shareware. The well-known, huge anonymous FTP repositories of software are all mentioned in various published guides to the Internet (Kehoe 1992, Krol 1992, Lane and Summerhill 1992, LaQuey and Ryer 1992, Tennant et al. 1993), and are part of the common knowledge of many Usenet newsgroups.

3.4 Data

The wealth of data available on the Internet is staggering, but it is also widely dispersed and often difficult to track down. Rather than compile a list of data sets and pointers to their locations, this guide gives a list of locations with only a name or phrase to suggest what data may be found there (see section 3.5, List of Archives). Many Usenet FAQs (see section 4, Useful and Important FAQs) and other Internet documents mentioned in this guide attempt to list available databases, but many more are known only by word-of-mouth. The Usenet newsgroup sci.answers (also a mailing list; see section 2.4.3, Gateways to Usenet) carries many lists that are updated frequently.

3.4.1 Repositories

Various genome and other cooperative projects are now well established on the Internet, with large, highly organized databases that support ever more powerful and complex interactive or batch search queries. Most now support WAIS and gopher search access, and are listed in section 3.5, List of Archives. The future utility of these repositories depends on the donation of data by individual researchers. Questions, as well as data submissions and corrections, can be sent to the relevant administrators via e-mail (after Garavelli 1992):

Database	**Address of administrator**
AAtDB (Arabidopsis thaliana)	curator@weeds.mgh.harvard.edu
ACEDB (Caenorhabditis elegans)	rd@mrc-lmba.cam.ac.uk and mieg@kaa.cnrs-mop.fr
Brookhaven	pdb@chm.chm.bnl.gov
DDBJ	
enquiries	ddbj@ddbj.nig.ac.jp
data submissions	ddbjsub@ddbj.nig.ac.jp
updates, publication notices	ddbjupdt@ddbj.nig.ac.jp
EDEX and **JARS** (Forest Ecology)	goforest@gopher.yale.edu
EMBL	
problems, feedback	nethelp@embl-heidelberg.de
software submissions, queries	software@embl-heidelberg.de
Data Library enquiries	datalib@embl-heidelberg.de
Data Library submissions	datasubs@embl-heidelberg.de
FlyBase (Drosophila)	flybase@morgan.harvard.edu
Inst. of Forest Genetics DB (IFGDB)	ifgdb@s27w007.pswfs.gov
GDB	help@gdb.org
GenBank	
enquiries	info@ncbi.nlm.nih.gov
data submissions	gb-sub@ncbi.nlm.nih.gov
updates, publication notices	update@ncbi.nlm.nih.gov
Entrez questions	entrez@ncbi.nlm.nih.gov
BLAST Email server	blast@ncbi.nlm.nih.gov
RETRIEVE Email server	retrieve@ncbi.nlm.nih.gov
EST reports Email server	est_report@ncbi.nlm.nih.gov
Microbial Strains Data Net. (MSDN)	msdn@bdt.ftpt.br and msdn@phx.cam.ac.uk
NCBI	repository@ncbi.nlm.nih.gov
PIR	fileserv@nbrf.georgetown.edu
SWISS-PROT	bairoch@cmu.unige.ch

LiMB, the Listing of Molecular Biology databases (Keen et al. 1992) describes most of these databases, and many more, including the names, regular mail addresses and telephone numbers of their keepers. To get the current version of LiMB by e-mail, send the text `limb-data` to bioserve@life.lanl.gov. For information only, send `limb-info`. LiMB is available in hardcopy or on floppy disk: contact limb@life.lanl.gov.

3.4.2 Search Engines

Help files can be obtained from any of the GenBank e-mail servers listed in the previous section by sending the word `help` in the Subject line or body of an e-mail message to the server in question.

The European Molecular Biology Laboratory (EMBL) supports various types of searches via e-mail. For more information, send the text `help` in e-mail to any one of these servers:

EMBL File Server	NetServ@EMBL-Heidelberg.DE
FASTA	FASTA@EMBL-Heidelberg.DE
Quicksearch	Quick@EMBL-Heidelberg.DE
Swiss-Prot MPsrch	Blitz@EMBL-Heidelberg.DE

The BLOCKS database can be searched via e-mail. For a help file, send a blank e-mail message to blocks@howard.fhcrc.org, with the word `help` in the Subject line.

The GenMark e-mail sequence search engine was updated in the summer of 1993. For instructions and new feature descriptions, send e-mail to genmark@ford.gatech.edu with the word `instructions` in the Subject line or body of the letter. Or contact M. Borodovsky (mb56@prism.gatech.edu) or J. McIninch (gt1619a@prism.gatech.edu).

See also Henikoff (1993).

The Sequence Retrival System (SRS) program for VAX VMS computer systems is available via anonymous FTP on the EMBnet node biomed.uio.no (Norway) or genetics.upenn.edu (USA).

Three U.S. herbaria now provide e-mail search support of:

- Type specimens of the mint family from the Harvard Herbaria, comprising 1100 records.
- The complete herbarium catalog of Michigan State University, Kellog Biological Station Herbarium, an NSF LTER site, consisting of 6000 specimen records.
- The Flora of Mt. Kinabalu; 16,300 specimen records of all vascular plant collections from the mountain.

E-mail addresses for sending queries are:

Harvard Mint Types	herbdata@huh.harvard.edu
Kellogg Herbarium	herbdata%kbs.decnet@clvax1.cl.msu.edu
Flora of Mt. Kinabalu	herbdata@herbarium.bpp.msu.edu

Send the message `help` to receive a usage guide, and if you think there might be difficulties with your return address, send that as well by adding a line with the text `replyaddress=` followed by your prefered e-mail address.

Anyone who does a lot of field work will appreciate the Geographic Name Server, which can provide the latitude and longitude, and the elevation of most places in the United States: all cities and counties are covered, as well as some national parks and some geographical features (mountains, rivers, lakes, etc.). Telnet to martini.eecs.umich.edu, port 3000 (no username needed) and type `help` for instructions.

3.5 List of Archives

Computer sites supporting some sort of public access, and of some interest to biologists are listed here, together with means of access.

- e e-mail file requests (see notes this section for e-mail addresses).
- E e-mail search requests (see notes this section).
- f anonymous FTP (see section 3.6.3, Anonymous FTP by E-mail, if you cannot use FTP).
- g gopher server
- G gopher server plus WAIS index searches
- t public telnet access
- T public telnet access plus e-mail returns of search results
- W WAIS server plus WAIS index searches

Internet node name	**Topic/Agency**	**Access method**
ftp.bio.indiana.edu (IN USA)	IUBIO Genbank, FlyBase	fG
ncbi.nlm.nih.gov (MD USA)	NCBI	f
ftp.embl-heidelberg.de (Germany)	EMBL Data Library	Efg
coli.polytechnique.fr (France)	EMBLnet	G
ftp.bchs.uh.edu (TX USA)	Genbank, PIR	fG
helix.nih.gov (MD USA)	Genbank, PDB, PIR etc.	G
ncifcrf.gov (MD USA)	Biol. Information Theory	f
finsun.csc.fi (Finland)	Prosite, Rebase-Enzyme	G
pdb.pdb.bnl.gov (NY USA)	Protein Data Bank	G
ftp.tigr.org	Inst. for Genomic Rsch.	f
golgi.harvard.edu (MA USA)		f
megasun.bch.umontreal.ca	Molecular evolution	G
nic.funet.fi (Finland)		
gopher.csc.fi (Finland)		
nic.switch.ch (Switzerland)	EMBnet	fG W [10]
rdp.life.uiuc.edu	Ribosomal DB Project	f
world.std.com	A major entry-point	fG
sunsite.unc.edu (NC USA)	Many subjects	EfGt [4]
gopher.ciesin.org	Earth Sciences	G
locus.nalusda.go (USA)	Nat. Agri. Library	G
s27w007.pswfs.gov (USA)	Forest Genetics	G
biomed.uio.no (Norway)	Genome data	T
gopher.embnet.unibas.ch (Switzer.)		
biox.embnet.unibas.ch (Switzerland)	Genome data	G
gopher.gdb.org (MD USA)	GDB Genome Data Bank	G

weeds.mgh.harvard.edu (MA USA)	Arabidopsis, C. elegans	G
mendel.agron.iastate.edu (IA USA)	Soy genome	G
greengenes.cit.cornell.edu (NY USA)	Triticeae genome	G
teosinte.agron.missouri.edu (USA)	Maize genome	G
gopher.duke.edu (NC USA)	Chlamydomonas	G[2]
picea.cfnr.colostate.edu (CO USA)		f
poplar1.cfr.washington.edu (WA USA)	Populus genetics	f
esusda.gov (USA)	USDA Extension Service	G
infoserver.ciesin.org	CIESIN Global Change	G
mobot.org (MO USA)	Missouri Bot. Garden	f
life.anu.edu.au (Australia)	Bioinformatics	fG
igc.org (CA USA)	EcoNet	f
gopher.yale.edu (CT USA)	Ecol. Data EXchange	g
lternet.edu (WA USA)	LTERnet	G
spider.ento.csiro.au (Australia)	Entomology	f
gopher.uth.tmc.edu (port 3300)	Physiology	G
envirolink.hss.cmu.edu (DE USA)	Environment	GT [6]
ecosys.drdr.virginia.edu (VA USA)	Ecosystems	GT
sparc.ecology.uga.edu (GA USA)	Ecology, Coweeta LTER	G
ngdc1.ngdc.noaa.gov (USA)	Paleoclimatology f	[1]
huh.harvard.edu (MA USA)	Harvard Univ. Herbaria	fG
simsc.si.edu (DC USA)	Smithsonian Inst.	f [3]
ucmp1.berkeley.edu (CA USA)	Vertebrate museum	G
bdt.ftpt.br (Brazil)	Biodiversity	fG
coli.polytechnique.fr (France)	Molecular evolution	G
fconvx.ncifcrf.gov (MD USA)	Mathematical Biology	f
cheops.anu.edu.au	Radiocarbon Abstracts	fG W
bluehen.ags.udel.edu (DE USA)	Entomology	G
minerva.forestry.umn.edu (MN USA)	Forestry	G
ucsbuxa.ucsb.edu (CA USA)	Biology	G
evolution.genetics.washington.edu	Evolution	f
evolution.bchs.uh.edu (TX USA)	Evolution	f
martini.eecs.umich.edu (MI USA)	Geographic Name Server	t [7]
wigeo.wu-wien.ac.at(Austria)	Geography	G
geogopher.ucdavis.edu (CA USA)	Geology	G
isdres.er.usgs.gov (VA USA)	US Geological Survey	f
pippin.memst.edu	CERI Earthquake Center	G
cdiac.esd.ornl.gov	CDIAC	f
saturn.soils.umn.edu (MN USA)	Geology	G
kiawe.soest.hawaii.edu (HA USA)	Generic Mapping Tools	f
tycho.usno.navy.mil	U.S. Naval Observatory	t [8]
nssdca.gsfc.nasa.gov	NSSDC On-Line Service	t [9]
granta.uchicago.edu (IL USA)	Physics Resources	G
xyz.lanl.gov (NM USA)	LANL Nonlinear Science	G
mentor.lanl.gov (NM USA)	LANL Physics	G
info.mcs.anl.gov (IL USA)	Argonne National Lab.	f
stis.nsf.gov (DC USA)	Nat. Science Foundation	fG
rtfm.mit.edu (MA USA)	Usenet FAQ repository	ef [5]
jse.stat.ncsu.edu (NC USA)	Journal of Stat. Educ.	fG
ftp.sas.com (NC USA)	SAS-related information	f
zaphod.ncsa.uiuc.edu (IN USA)	Supercomputing	f
lupulus.ssc.gov	Young Scientists Net.	f
ksuvxa.kent.edu	Directory of lists	f
sun.soe.clarkson.edu	LaTeX tools	f

Notes:

1. info@mail.ngdc.noaa.gov;
2. chlamy@acpub.duke.edu;
3. david@simsc.si.edu;
4. info@sunsite.unc.edu, telnet username **swais** for WAIS seaches, telnet username **gopher** for plain gopher access;
5. see section 3.6.2, Anonymous FTP, and section 3.6.3, Anonymous FTP by E-mail;
6. Telnet username **gopher**, password **envirolink**;
7. Use port 3000, no username, `help` gets instructions;
8. Telnet username **ads**.
9. Telnet username **nodis**.
10. Anonymous FTP from within Switzerland only.

3.6 Access Tools

All Internet tools share the quirk that they are actually three things: a **server** or **daemon** program that runs all the time on a host computer and accepts requests to connect over the Internet, a **client** program that people use to connect to or access these servers, and a standard protocol that allows many different versions of clients and servers to talk to one another without difficulty.

Most of the recently published books about the Internet describe these tools in detail. Kehoe (1992), the first to appear, was offered first in a free electronic version over the Internet; it is still available from many anonymous FTP archives around the world, in a directory named something like pub/zen/. Krol (1992) has received excellent reviews. See the bibliography for other books.

A new item: the EARN Association has published a Guide to Network Resource Tools (May 3, 1993), which is available via e-mail from listserv@EARNCC.bitnet, by sending the message `get nettools ps` for a PostScript version or `get nettools memo` for a plain text version. The guide covers almost every tool mentioned here, including example.

A few host computers mentioned in this guide allow the public to telnet to the host, and then use the host computer to access servers via gopher, WAIS or the Web. These arrangements are offered as a courtesy to those people who do not have the necessary client software on their own computers, and want to try these tools before going to the trouble of installing the client software themselves. Although licensing has been discussed for some of these tools (namely, certain versions of gopher), at present they are all free, and several are explicitly in the public domain or carry free GNU licenses.

3.6.1 Telnet

Telnet allows someone using a computer with full Internet access to access another computer over the Internet and login there, assuming he or she has login privileges on that computer as well. Anonymous telnet sessions are generally not permitted, but occasionally usernames are created with restricted privileges, for use by the Internet public. Several of these are listed in section 3.5, List of Archives, and in Yanoff (1993).

3.6.2 Anonymous FTP

FTP stands for file transfer protocol, and is the name of a program used for file transfers between computers with full Internet access, assuming you have privileges on both the local and remote computers. Anonymous FTP is a common practice whereby anyone on the Internet may transfer files from (and sometimes to) a remote system with the userid **anonymous** and an arbitrary password. By convention, anonymous FTP users provide their e-mail addresses when asked for a password. This is useful to those archive managers who must justify to their bosses the time spent providing this free (but not cheap) service. Some sites restrict when transfers may be made from their archives, and most prefer that large transfers be made only during off-hours (relative to that site).

To receive a short guide to using anonymous FTP, send e-mail with the text `help` to info@sunsite.unc.edu.

3.6.3 Anonymous FTP by E-mail

Bitnet does not support telnet or FTP sessions, but many Bitnet nodes are also full Internet sites, and so do support telnet and FTP. For those who only have access to computers on Bitnet, Princeton University offers a file transfer service by e-mail. Bitftp@PUCC.bitnet will send a help file in response to the message "help". There is an identical server in Germany: Bitftp@DEARN from within Bitnet/EARN or bitftp@vm.gmd.de from the Internet. This server should be used only for FTP requests involving transfers within Europe.

If you have neither full Internet access nor an account on a Bitnet node, you can still get files from anonymous FTP archives by e-mail courtesy of any one of these servers (pick the one "nearest" you):

```
ftpmail@decwrl.dec.com
ftpmail@src.doc.ic.ac.uk
ftpmail@cs.uow.edu.au
ftpmail@grasp.insa-lyon.fr
```

which will send instructions in response to the word "help" followed by "quit" on separate lines of an e-mail message.

Also, you can retrieve formal Usenet FAQs via e-mail from the Usenet FAQ repository, rtfm.mit.edu: to get a help file, a list of all the FAQs stored there, and the latest version of this guide, send e-mail to mail-server@rtfm.mit.edu with the text

```
help
index
send usenet/news.answers/biology/guide
```

3.6.4 Gopher

Gopher is a user-interface program that makes FTP and other types of connections for computer users when they select an item in a menu. It is an easy way to get stuff off the Internet without having to know where the stuff lives. Gopher is free, and there are nice versions for most types of computers, especially Unix workstations and Macs. It was invented at the University of Minnesota; current versions can be retrieved via anonymous FTP from boombox.micro.umn.edu. The name is a clever pun on the *go-for* person who runs errands for people, and on the burrowing rodent, which pops down a *hole* in the Internet and comes back up who-knows-where. Bionet.general, bionet.software, and bionet.users.addresses are good places to learn more about biology- related gopher services. Comp.infosystems.gopher is the newsgroup for gopher-related issues in general. The FAQ for this group is stored on rtfm.mit.edu in the file pub/usenet/news.answers/gopher-faq. There is an entire chapter on gopher in Krol (1992).

3.6.5 Archie

Archie helps people locate items (documents, software, etc.) in thousands of anonymous FTP archives around the world. Archie clients for many types of computer, and documentation, can be retrieved via anonymous FTP from any archie server (see below) in the /pub/archie/doc/ directory, or by e-mail from archie-admin@ans.net.

Archie can be used via e-mail, by sending e-mail with a list of commands to archie@ans.net. For details, send the command `help`. Due to the very high demand for this service, requests should be made via e-mail or clients rather than telnet-ing to an archie server. Please try to use archie only outside of working hours, make your query as specific as possible, and use the archie server nearest you: archie.au in Australia; archie.funet.fi in Finland; archie.th-darmstadt.de in Germany; archie.doc.ic.ac.uk in Great Britain; archie.cs.huji.ac.il in Israel; archie.kuis.kyoto-u.ac.jp and archie.wide.ad.jp in Japan; archie.sogang.ac.kr in Korea; archie.nz in New Zealand; archie.luth.se in Sweden; archie.ncu.edu.tw in Taiwan; archie.ans.net, archie.rutgers.edu, archie.sura.net and archie.unl.net in the United States.

3.6.6 Veronica

Veronica is a very easy rodent-oriented net-wide index to computerized archives. Veronica's name is a play on the concepts of both gopher and archie. (Remember the comic book couple Archie and Veronica? Veronica does for gopher what archie does for anonymous FTP.) Veronica searches through hundreds of gopher holes looking for anything that matches a keyword supplied by the user, and assembles a list of gopher servers that contain items of interest. Note: veronica checks *titles* of gopher items only, not their contents.

There is a veronica database specifically for biology resources in the gopher server on gopher.gdb.org, under menu item `Search Databases at Hopkins...`. Its name is BOING, or Bio Oriented INternet Gophers.

At present, there are no veronica clients; veronica is a gopher tool. An informal veronica FAQ is posted regularly in comp.infosystems.gopher and archived on veronica.scs.unr.edu as veronica/veronica-faq.

3.6.7 Wide Area Information Servers (WAIS)

The idea behind WAIS is to make anonymous FTP archives more accessible by indexing their contents for easy searching and browsing. The client's user interface is simple, but the concept is so powerful that nearly everyone with an anonymous FTP archive has spent part of 1992 and 1993 building WAIS indices of all available material (software, data, documents and other information). In the course of all this effort an enormous amount of information that has been available for years or even decades has suddenly become publicly available for the first time all in the past year. WAIS servers are often used as back-end engines for gopher servers. Gopher archives are built by hand, but WAIS bundles and organizes related items automatically, and thus greatly extends the functionality of gopher.

Good WAIS client programs for the Mac (WAIStation) and PC (PCWAIS) are available on the anonymous FTP archive at think.com. If your computer has full Internet access, you can try out WAIS on a Unix system, courtesy of Thinking Machines Corp., by telnetting to quake.think.com. Use the username **wais** and give your e-mail address as the password. See the newsgroup comp.infosystems.wais for more details, or see the WAIS FAQ (section 4, Useful and Important FAQs).

3.6.8 World-Wide Web (WWW)

WWW is yet another tool for gathering useful information from the Internet. It was invented at the European Particle Physics Laboratory (CERN), Switzerland. WWW looks like a document that users can open and read, but selecting certain words via mouse or keyboard causes other documents to be retrieved and opened for inspection. The most powerful aspect of WWW at present is the ease with which seamless, attractive on-line documentation can be created, that is easy to find and browse, no matter where on the Internet the actual documents are. You can try WWW, courtesy of CERN: telnet to info.cern.ch (no username needed).

Chapter 4

Useful and Important FAQs

You will learn a great deal about the Internet and what it has to offer if you read some of these FAQs. If you still want to know more, browse around in Usenet. Also, a number of books have been published recently that give a very thorough guide to the Internet; see the bibliography and check your local academic bookstore or university library.

The files below are stored in pub/usenet/news.answers/ in the anonymous FTP archive on rtfm.mit.edu, and are posted frequently to the Usenet newsgroups news.answers, comp.answers and sci.answers, as appropriate. See sections 3.6.2 and 3.6.3 for help retrieving these FAQs via FTP or e-mail. See section 2.3.3, Usenet FAQs about Usenet, for other titles.

Most if not all of these FAQs are available via gopher on gopher.gdb.org.

Title	**Archive filename**
General resources	
Gopher [FAQ]	gopher-faq
comp.infosystems.wais FAQ	wais-faq/getting-started
WAIS FAQ	wais-faq/sources
FAQ: College Email Addresses	college-email/part[1-3]
FAQ: How to find people's E-mail addresses	finding-addresses
FAQ: International E-mail accessibility	mail/country-codes
How to Get Information about Networks	network-info/part1
Public Dialup Internet Access List	pdial
Updated Internet Services List	internet-services
Mailing Lists Available in Usenet	bit/gatelist
How to find sources	finding-sources
Anonymous FTP List - FAQ	ftp-list/faq
Anonymous FTP List - Sites	ftp-list/sites[1-3]
Mail Archive Server (MAS) software list	mas-software

Scientific resources	
A Biologist's Guide to Internet Resources	biology/guide/part[1-6]
Biological Information Theory and Chowder Society	biology/info-theory
Computer Science Technical Report Archive Sites	techreport-sites/list
Computer Graphics Resource Listing	graphics/resources-list/part[1-3]
FAQ in comp.ai.neural-nets	neural-net-faq
Hitch-Hiker's Guide to Evolutionary Computation (FAQ in comp.ai.genetic)	ai-faq/genetic/part[1-3]
Mailing lists and newsgroups for meteorology	weather/groups
sci.lang FAQ	sci-lang-faq
Sources of Meteorological Data FAQ	weather/data/part[1-2]
Space FAQ	space/* [15 parts]

Amos Bairoch has assembled a very useful list of Molecular Biology Archives and Mailservers which is available on many FTP sites, and in the Usenet newsgroup bionet.announce.

Paul Hengen keeps the *FAQ list*, a file of useful molecular biology tips and tricks, for bionet.molbio.methds-reagnts. The FAQ list is available via anonymous FTP from ncifcrf.gov as the file pub/methods/FAQlist.

Virgil Sealy and Lisa Nyman have written an FAQ for comp.infosystems.gis (and the gated GIS-L mailing list). You can also get this FAQ by sending e-mail to gis-faq-request@abraxas.adelphi.edu (no message necessary), or you can get it via anonymous FTP from dg-rtp.dg.com in the file /gis/faq. Bill Thoen has written *Internet Resources for GIS/CARTO/Earth Science*, which is available via anonymous FTP from csn.org in the COGS/ directory.

Ken Boschert keeps The Electronic Zoo, a list of mailing lists, archives, and dial-up BBS systems that have something to do with animals (including humans). The most recent version can be retrieved via anonymous FTP from wuarchive.wustl.edu in /doc/techreports/wustl.edu/compmed/elec_zoo.txt. The list has many items not mentioned in this guide.

Lee Hancock keeps Internet/Bitnet Health Sciences Resources, a document that can be retrieved via anonymous FTP from ftp.sura.net, in the pub/nic/ directory, file name medical.resources.<version>. In the same directory is Wilfred Drew's Not Just Cows, a guide to Internet resources in agriculture and related sciences; get the file named agricultural.list.

4.1 What's an FAQ and where can I get one?

There are now hundreds of Internet documents, including this one, written expressly to answer frequently asked questions. They are often refered to in the Usenet community as FAQs. You will find them in the Usenet newsgroup news.answers (and subsets in sci.answers, comp.answers, and news.answers.newusers). The Usenet FAQ repository is an anonymous FTP archive on rtfm.mit.edu (RTFM stands for Read The ¡bleep¿ Manual), in the directory pub/usenet/news.answers/. See sections 3.6.2 and 3.6.3 for details on anonymous FTP, including instructions for retrieving any Usenet FAQ via e-mail.

4.2 Does anyone have an e-mail address for X?

Please, don't ask this in a newsgroup or mailing list. It's rude!

The quickest, most efficient way to answer this is to call or write to X directly. If anyone can help you with this, it's X. To date, most biologists don't have e-mail addresses, or if they do, they don't read their e-mail very often, so you really are better off contacting them directly. If you must try to find this information via the computer networks, please start by reading Kamens (1993a) or Lamb (1993) or the relevant section of one of the books listed in the bibliography. Also, you can check for the latest strategy in bionet.users.addresses. But wait, there's more: many gopher servers listed in this guide have searchable directories of biologists (see section 3.2, Directories).

4.3 How to find a good graduate program?

Go talk to the undergraduate or graduate advisor in your department, if you're a college student. Start browsing through the scientific journals, and the new book stack in the library. Ask your favorite professors for advice. Sadly, the Internet can not be all things to all people, and questions about how to pick graduate programs generally do not get satisfactory replies.

One way you can use the Internet to explore graduate programs is by browsing through campus information directories via gopher.

4.4 Where can I get old newsgroup/mailing list articles?

All the biology-related Usenet newsgroups (since 1991) are archived for searching via gopher, WAIS, and anonymous FTP on ftp.bio.indiana.edu, in the directory /usenet/bionet/. The bionet newsgroups (some dating back to 1987) are archived for WAIS and anonymous FTP on net.bio.net. Browse through gopher land for additional Usenet newsgroup archives.

Most listserver mailing lists are archived on the computer where they are administered. To subscribe and get an index of log files on the listserver archive for the ECOLOG-L mailing list, for example, send e-mail to listserv@UMDD.umd.edu with the text:

```
subscribe ECOLOG-L Your Name
index ECOLOG-L
```

4.5 Where can I find biology-related job announcements?

The bionet.jobs newsgroup is a good place to start, but headhunters beware: read the frequently posted guidelines first.

You might also want to check sci.bio.ecology (a.k.a. the ECOLOG-L mailing list), which is sponsored by the Ecological Society of America and carries many job announcements. The ECOLOG-L list has a special file that you can order by e-mail from listserv@UMDD.umd.edu: send the text `get jobs job_lst`.

Most other newsgroups and mailing lists carry occasional job notices. The American Physiological Society offers job announcements appearing in their journals via gopher on gopher.uth.tmc.edu (port 3300).

4.6 Commercial Services

The three most common types of commercial services are (1) restricted-use computer accounts allowing Internet access (e-mail or full access) via modem from personal computers, (2) on-line bibliographic databases that can be searched via modem or over the Internet, and (3) access via modem or the Internet to private Usenet-style special-interest networks, but only e-mail access to the rest of the Internet. This third type of service is rapidly disappearing as vendors add full Internet access to keep their subscribers from going to another service vendor.

For the benefit of people without full Internet access (telnet and FTP in addition to e-mail), Peter Kaminski maintains a list of commercial access providers (Kaminski 1993). E-mail requests for this list can be sent to info-deli-server@netcom.com: use `send PDIAL` as the subject.

The best sources of information about Internet resources, for readers who do not have access to the Internet, are the books on the Internet listed in the bibliography, and many other published literature with the words **Internet**, **on-line** or **database** in the title. There are many such books available now, as publishers everywhere realize that money can be made on the new Electronic Frontier.

However, much of the information in these compendium books is out of date even before the book appears in print. Also, it is generally compiled by people who are not well acquainted with the materials, and thus poorly organized. Much of the information was gathered by soliciting data from administrators or suppliers of databases. This data, in current form, is best gathered directly from the source, via the Internet. The best strategy is to learn to cruise the Internet yourself, with the help of a a "tool" book such as Kehoe (1992) or Krol (1992; or if you can't find those at your local bookstore, some alternatives are Goldman 1992, Lane and Summerhill 1992, LaQuey and Ryer 1992, or Tennant et al. 1993) and learn where in the Internet to look periodically for notices about resources of interest to you.

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There exists a (mostly anonymous) cast of thousands who have made very large, even enormous voluntary contributions to the resources mentioned in this guide, and who are largely responsible for the thing we call the Internet in its broadest sense. They must all be very proud of what they have helped to create.

Bibliography

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Assorted LISTSERV Mailing Lists

Remember, do not send your subscription request to the list itself. See section 2.4, Listserver Mailing Lists, for subscription instructions.

A	The listserver maintains some files for this mailing list.
G	The mailing list has a gateway to a Usenet newsgroup.
K	The listserver is Anastasios Kotsikonas' program, which differs from the standard listserver of Eric Thomas.
M	A moderator decides whether submitted articles will be released to the mailing list.

Agriculture and Animal Husbandry

ag-econ@ERS.bitnet		Agricultural Economics and ERS Test List
ag-exp-l@vm1.nodak.edu		Agricultural Expert Systems
ageng-l@ibm.gwdg.de		Agricultural Engineering and Intel. Control
agric-l@UGA.cc.uga.edu		Agriculture Discussion
aqua-l@vm.UOGUELPH.ca		Aquaculture Discussion List
camel-l@SAKFU00.bitnet		Discussion Forum on Camel Research
dairy-l@UMDD.umd.edu		Dairy Discussion List
gardens@UKCC.uky.edu		Gardens List
hort-l@VTVM1.cc.vt.edu		Va Tech Horticulture Dept. Announcements
hortpgm@VTVM1.cc.vt.edu		Va Tech Horticulture Dept. Program
mgarden@WSUVM1.csc.wsu.edu		Master Gardeners
newcrops@vm.cc.purdue.edu		Discussion list for New Crops
spud@WSUVM1.csc.wsu.edu		Potato Research
rusag-l@UMDD.umd.edu		Russian Agriculture
vetcai-l@KSUVM.ksu.edu		Vet. Medicine Computer Assisted Instruction
vetlib-l@VTVM2.bitnet		Veterinary Medicine Library issues and info.
vetmed-l@UGA.cc.uga.edu		Veterinary Medicine (Peered)

Anthropology and Archaeology

anct-ne@vm.byu.edu		Ancient Near Eastern Studies
anthro-l@UBVM.cc.buffalo.edu		General Anthropology Bulletin Board
arch-l@TAMVM1.tamu.edu		Archaeology List
humevo@GWUVM.gwu.edu	M	Human Evolutionary Research Discussion

```
indknow@UWAVM.u.washington.edu  Indigenous Knowledge List
native-l@TAMVM1.tamu.edu      Issues Pertaining to Aboriginal Peoples
pacarc-l@WSUVM1.csc.wsu.edu   Pacific Rim Archaeology Interest List
pan@GWUVM.gwu.edu             Physical Anthropology News List
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Biology

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bio-dost@TREARN.bitnet        Biologists in Turkey
bioesr-l@UMCVMB.bitnet        Biological applications of Electron Spin Res.
biomch-l@nic.surfnet.nl       Biomechanics and Movement Science
bnfnet-l@FINHUTC.hut.fi       Biological Nitrogen Fixation Forum
cp@opus.hpl.hp.com            Carnivorous Plants
entobr-l@BRUFMG.bitnet        Entomology in Brazil (in Portuguese)
entomo-l@vm.UOGUELPH.ca       Entomology Discussion List
ethology@FINHUTC.hut.fi     G Ethology
herb@TREARN.bitnet            Medicinal and Aromatic Plants Discussion
iapwild@vm1.nodak.edu         International Arctic Project Wildlife
l-etho@UQAM.bitnet            Ethologistes/Ethologists
iopi@life.anu.edu.au        M Int. Organization for Plant Information
iubs@life.anu.edu.au        M Int. Union of Biological Societies
lactacid@SEARN.sunet.se       Lactic Acid Bacteria Forum
micronet@vm.UOGUELPH.ca       Fungus and Root Interaction Discussion
rmbl-l@umdd.umd.edu           Rocky Mountain Biological Laboratory
socinsct@albany.edu           Social Insect Biology Research List
thphysio@FRMOP11.cnusc.fr     Thermal Physiology
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Biostatistics

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biomet-l@ALBNYDH2.bitnet      Bureau of Biometrics at Albany
bmdp-l@vm1.mcgill.ca          BMDP Software Users
edstat-l@jse.stat.ncsu.edu KG Journal of Statistics Education List
morphmet@CUNYVM.cuny.edu      Biological Morphometrics Mailing List
pstat-l@IRLEARN.ucd.ie        Discussion of Stats and Programming
qmlist@tbone.biol.scarolina.edu K Quantitative Morphology List
sas-l@UGA.cc.uga.edu G SAS Discussion (Peered)
saspac-l@UMSLVMA.umsl.edu     SAS Public Access Consortium
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dynsys@gibbs.oit.unc.edu   GK Ergodic Theory and Dynamical Systems
ecosys-l@vm.gmd.de            List for ecosystem theory and modeling
glosas-l@acadvm1.UOTTAWA.ca   GLObal Systems Analysis and Simulation List
inns-l@UMDD.umd.edu           International Neural Network Society
ndrg-l@WVNVM.wvnet.edu        Nonlinear Dynamics Research Group
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neural-n@ANDESCOL.uniandes.edu.co		Artificial Neural Networks Discussion

Conservation and Environmental Studies

apaspan@GWUVM.gwu.edu		APA Scientific Grassroots Network
aquifer@IBACSATA.bitnet		Pollution and grondwater recharge
aseh-l@TTUVM1.bitnet		American Soc. of Environmental Historians
cmts-l@cornell.edu		Chemical Management and Tracking Systems
consbio@UWAVM.u.washington.edu		Conservation Biology List
conslink@SIVM.si.edu		Discussion on Biological Conservation
cturtle@NERVM.nerdc.ufl.edu		Sea Turtle Biology and Conservation List
envst-l@BROWNVM.brown.edu		Environmental Studies Discussion List
icam-l@IRMFA001.bitnet		Integrated Coastal Area Management
itrdbfor@asuvm.inre.asu.edu		Dendrochronology Forum
laspau-l@HARVARDA.harvard.edu		Latin America Scholarship Program
natura-l@UCHCECVM.bitnet		Ecology and Envir. Protection in Chile
nciw-l@YALEVM.cis.yale.edu		Nutrient Cycling Issues - Worldwide
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Ecology

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biodiv-l@bdt.ftpt.ansp.br		Biodiversity networks
bird_rba@ARIZVM1.ccit.arizona.edu		National Birding Hotline Cooperative
birdband@ARIZVM1.ccit.arizona.edu		Bird Bander's Forum
birdchat@ARIZVM1.ccit.arizona.edu		National Birding Hotline (Chat Line)
birdcntr@ARIZVM1.ccit.arizona.edu		National Birding Hotline (Central)
birdeast@ARIZVM1.ccit.arizona.edu		National Birding Hotline (East)
birdwest@ARIZVM1.ccit.arizona.edu		National Birding Hotline (West)
birdtrip@ARIZVM1.ccit.arizona.edu		Special BIRDCHAT LOGO Project
ecolog-l@UMDD.umd.edu	G	Ecological Society of America
firenet@life.anu.edu.au		Discussion of fire in landscape ecology
ots-l@YALEVM.cis.yale.edu		Organization for Tropical Studies
polpal-l@vm.UOGUELPH.ca		Pollination and palynology list
sinoecol@MIAMIU.bitnet		Sino-Ecologists Club Overseas Forum
twsgis-l@vm1.nodak.edu		The Wildlife Society: GIS and Remote Sensing

Environmentalism and Technology Transfer

ae@JSUVM1.bitnet		Alternative Energy Discussion List
bpwsp-l@ALBNYDH2.bitnet		Bureau of Public Water Supply Protection
comdev@vm.ecs.rpi.edu		Communication & international development
devel-l@AUVM.american.edu	G	Technology Transfer in Int. Development
energy-l@TAUNIVM.tau.ac.il		Energy List
envbeh-l@POLYVM.bitnet		Forum on Environment and Human Behavior
hydrogen@URIACC.uri.edu		Hydrogen as an alternative fuel
intdev-l@URIACC.uri.edu		International development
meh2o-l@TAUNIVM.tau.ac.il		Middle East water
odp-l@TAMVM1.tamu.edu		Ocean Drilling Program Open Discussion

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pacific@BRUFPB.bitnet        Forum on Pacific Ocean and Islands
recycle@UMAB.bitnet          Recycling in Practice
sfer-l@UCF1VM.cc.ucf.edu     South Florida Environmental Reader
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climlist@OHSTVMA.acs.ohio-state.edu Climatology Distribution List
coastgis@IRLEARN.ucd.ie      Coastal GIS Distribution List
cpgis-l@UBVM.cc.buffalo.edu  Chinese Professionals GIS Use List
geoged@UKCC.bitnet           Geography Education List
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geograph@SEARN.sunet.se   G  Geography
geology@PTEARN.fc.ul.pt      Geology Discussion List
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ukgeg@UKCC.bitnet            Kentucky Universities Geography Discussion
vigis-l@UWAVM.u.washington.edu Virtual Reality and GIS
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hypbar-l@TECHNION.technion.ac.il HyperBaric & Diving Medicine List
marine-l@vm.UOGUELPH.ca      Marine Studies/Shipboard Education
marmam@uvvm.UVIC.ca          Marine Mammal E-Mail Discussion List
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Medicine and medical research

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babson@HARVARDA.harvard.edu		Discussions on Organizational Design of Acad.
biomed-l@vm1.mcgill.ca		Assoc. of Biomedical Communications Directors
biomed-l@NDSUVM1.bitnet		Biomedical Ethics
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clan@FRMOP11.cnusc.fr		Cancer Liaison and Action Network
cfs-med@NIHLIST.bitnet		Chronic Fatigue Syndrome/CFIDS medical list
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cromed-l@AEARN.bitnet		CROatian MEDical List
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jmedclub@BROWNVM.brown.edu		Medical Journal Discussion Club
lasmed-l@TAUNIVM.tau.ac.il		Laser Medicine
medcons@FINHUTC.hut.fi		Medical consulting and case descriptions
medforum@ARIZVM1.ccit.arizona.edu	M	Medical Students Discussion
medimage@POLYVM.bitnet		Medical Imaging Discussion List
medlib-l@UBVM.cc.buffalo.edu		Medical Libraries Discussion List
mednets@NDSUVM1.bitnet		Medical Telecommunications Networks
mednews@ASUACAD.bitnet	M	Health Info-Com Network (HICN) Newsletter
medphy-l@AWIIMC12.bitnet		EFOMP Medical Physics Information Services
medstu-l@UNMVMA.bitnet	M	Medical student discussion list
medsup-l@YALEVM.cis.yale.edu		Medical Support List
nnlm-sea@UMAB.bitnet		National Network Library of Medicine SEA
nutepi@DBOTUIM.bitnet		Nutritional Epidemiology Discussion List
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panet-l@YALEVM.cis.yale.edu		Medical Education and Health Information
smcdcme@WAYNEST1.bitnet		Continuing Medical Education Discussion List
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dis-l@IUBVM.ucs.indiana.edu		Drosophila workers to receive DIS Newsletter
ebcbbul@HDETUD1.tudelft.nl		Computers in Biotechnology, Rsch. and Edu.
ebcbcat@HDETUD1.tudelft.nl		Catalogue of 'Biotechnological' software
embinfo@IBACSATA.bitnet		EMBNet (European Molecular Biology Network)
emflds-l@UBVM.cc.buffalo.edu		Electromagnetics in Med., Sci. & Com.
forumbio@scf.fundp.ac.be		Forum on molecular biology
genetics@INDYCMS.iupui.edu		Clinical human genetics
lpn-l@BROWNVM.brown.edu		Laboratory Primate Newsletter List

nibnews@ccsun.unicamp.br		NIBNews (Biology and Medical Informatics)
rbmi@FRORS13.bitnet		Molecular Biology Research Group

Neurobiology

cogsci-l@vm1.yorku.ca		Cognitive Science Discussion Group
dasp-l@earn.cvut.cs		Digital Acoustic Signal Processing
ecovis-l@YALEVM.cis.yale.edu		Trends in the Ecology of Vision
neuchile@CUNYVM.cuny.edu		Chilean Neurosciences Discussion List
neuro-l@YALEVM.cis.yale.edu		Yale Neuroscience Program
neuro1-l@UICVM.uic.edu		Neuroscience Information Forum
neus582@UICVM.uic.edu		Methods in Modern Neuroscience
psyche-d@NKI.bitnet	M	Interdisciplinary Research on Consciousness
sbnc-l@BRUSPVM.bitnet		Brazilian Society of Neurosciences & Comp.

Taxonomy and Systematics

class-l@ccvm.sunysb.edu	Classification and phylogeny estimation
mollusca@ucmp1.berkeley.edu	Mollusc evolution, taxonomy, natural history
muse-l@HARVARDA.harvard.edu	Muse Software Discussion List
museum-l@UNMVMA.unm.edu	Museum discussion list
roots-l@vm1.nodak.edu	Genealogy list
taxacom@HARVARDA.harvard.edu	Taxonomic and systematic collections list

Teaching and Research

bibsoft@INDYCMS.iupui.edu		Discusssion of citation and bibliography
biocis-l@SIVM.si.edu		Biology Curriculum Innovation Study
biopi-l@KSUVM.ksu.edu		Secondary Biology Teacher List
conslt-l@IUBVM.ucs.indiana.edu		Research and Practice in Mentoring
darwin-l@ukanaix.cc.ukans.edu		History and Theory of the Historical Sciences
grants-l@JHUVM.hcf.jhu.edu		NSF Grants & Contracts
hpsst-l@QUCDN.queensu.ca		History and Philosophy of Science
job-list@FRORS12.bitnet		Job offers from EARN Institute members
methods@vm.ecs.rpi.edu		Research methodology
navigate@UBVM.cc.buffalo.edu	M	Navigating The Internet Workshop List
newedu-l@vm.usc.edu		New Paradigms in Education List
nihggc-l@UBVM.cc.buffalo.edu	M	NIH Grants and Contracts Distribution List
nsf-l@YALEVM.cis.yale.edu		NSF Information List
pcorps-l@CMUVM.bitnet	G	International Volunteers Discussion Group
scifaq-l@YALEVM.cis.yale.edu	G	Science FAQ List
scifraud@uacsc2.albany.edu		Discussion of Fraud in Science
vpiej-l@VTVM1.cc.vt.edu	G	Electronic journal discussions
wisenet@UICVM.uic.edu		Women In Science and Engineering NETwork