

## The global library.

I recall walking into a large university library as a new college student, and was amazed at all of the books and journals with their promise of treasures of knowledge, in contrast to the small library in my home town. I learned much about science in that large library. Now I find a computer network, the Internet, and a doorway into it, called Internet Gopher, is opening up a world-wide library of knowledge in a manner similar to finding that university library in my youth.

Where can you quickly find information on a gene sequence needed for your research? Where can you quickly search through biomedical journal titles or abstracts? Where can you get up-to-date research funding information? Where can you pick up tips on new laboratory methods and reagents?

You might say that journals in your local biosciences library are brimming with this information. But can you find answers in your library easily and quickly? Can you search through hundreds of journal issues that you haven't read? Computers are good at sifting through such information quickly.

Some of you, or your library or computer center, have computers with compact disks full of journal abstracts and gene sequence data, and software for searching these. These are quite useful. But there are can also be pitfalls with having your own electronic library: Is it expensive and time consuming to maintain? Is it only a month out of date, or six months? Does it cover all areas that you need?

There is also a third answer for the

computer-using bioscientist: Use services on the Internet, the network that links computers around this world. There are now many information services for biosciences available through this network of networks, and with a computer on your desktop that has an Internet connection, you can reach them all easily and quickly. These services are generally free and up-to-date with current information.

Gene sequence data is now frequently published only in the electronic databanks such as GenBank and the EMBL databank. All that you need to retrieve any of this data quickly and easily is a few Internet skills. Several of the genome projects, for plant, fly, worm, microbe and human, are getting their findings out to scientists rapidly through Internet services.

A doorway to this world-wide library is as close as a computer on your desktop or lap. It is time to open the door and look outside. There are actually several doors, if we can extend this metaphor, and once you look outside you may need directions to the bioscience libraries. The first door you should learn about is Internet Gopher. Even though quite new, Gopher is an easy to use and feature rich method for using remote network services. It is also one of the best methods for learning more about the Internet, its other doorways and libraries.

# BioGophers, by gosh.

Internet Gopher is named after a mammal common in North America, in part because of the creature's active tunneling habits, but perhaps more because its inventors hail from University of Minnesota, where the school mascot is said gopher. Internet Gopher was first developed to answer that University's needs for a campus-wide information service. It was designed for people using diverse computer models, with a range of computer skills, including little to none, who would use it to browse through campus information, to read about events or computer manuals or classic literature, or to search for phone numbers and addresses. This flexible gopher did the job so well that the Minnesota group offered it to others around the world, who picked it up quickly and applied it to every sort of network information service from news and phone books to library catalogs, to literature and art, to biology and sciences.

Those gopher servers which specialize in biosciences (*biogophers*) are found in many countries around the world. One of the nice things about how Internet Gopher works is that I don't have to tell you where to find each of the biogophers. All you need to do is use a gopher *client* program and browse through the various entries it offers you. You will find a tunnel into one of the biogophers, and from that one you can find tunnels into the other biogophers.

Some of the biology resources now available at biogophers include:

- Gene and protein sequence databanks (GenBank, EMBL, PIR and others)
- Protein structural coordinate databank (Brookhaven PDB)
- Arabidopsis, *C. elegans*, *Drosophila*, microbial and human genome databases
- Public software for the biosciences (IUBio archive)
- Biology (BioSci) network news archive

- U.S. NIH, NSF and other funding agency information
- Medical informatics
- American Physiological Society information
- Biology systematics, taxonomy, organismal and ecology data
- Library catalogs around the world

Many of the large databanks like GenBank, EMBL, and PIR are indexed for searching by key words. You need only ask for those sequences of interest to you. These services will return a list of entries matching your key words in a second or two. Much of the data at these resources is updated daily or weekly.

If you want to bypass the fun of hunting down a biogopher, you can point your gopher client at my IUBio gopher, first open in February 1992, on the Internet address [ftp.bio.indiana.edu](ftp://ftp.bio.indiana.edu). Or you might try Reinhard Doelz's biogopher at Biozentrum der Universitaet Basel, at address <bioftp.unibas.ch>. Or try Jaime Prilusky's at Weizmann Institute of Science, at address <sunbcd.weizmann.ac.il>. Or Gyorgy Simon's and Sandor Pongor's at the ICGEBnet gopher in Trieste, at address <genes.icgeb.trieste.it>, among others.

# An Internet starter kit.

While the Internet started several years back in the US as a network of university and government computers, it has grown rapidly to encompass computers in many countries. As a bioscientist, your time and training is better spent on things bioscientific than on many of the details of computer networks. Some of the details are needed to get you going, though, like learning to use a card catalog in the library. A good printed introduction to Internet services is available in the book *Zen and the Art of the Internet: A Beginners Guide to the Internet*, by Brendan Kehoe (Prentice Hall, 1992). This is the second edition -- the first was published electronically on the Internet.

For now, rely on computer experts in your institution to fill in details that are missing here. Find a nearby computer that has an Internet connection. Ask the computer or its keepers if it knows gopher. If the computer requires you to type commands, like MS-DOS, Unix, or VMS systems, you can try typing *gopher*. If it is a graphic window, icon-based computer like a Macintosh or X-Windows, you can look for a gopher program icon. Mac programs include GopherApp and TurboGopher. On a graphic interface computer, you need only use a mouse to point and click at gopher items, and on the character systems, you use arrow keys to select items.

Should you not find gopher on your computer, and if you have access to, and familiarity with an FTP (file transfer) program, you can use ftp to boombox.micro.umn.edu. Log in with username *anonymous*, and use your e-mail address as a password. Look in the directory /pub/gopher. There are free clients for the many computer systems, including Macintosh, MS-DOS, Unix, and VMS-Vax.

If no Internet Gopher client is available and FTP is out of your grasp, but your computer has a Telnet program, then you can still use gopher, though in a rougher form, through a remote computer. You may use Telnet to one of the following computers, which will then let you use gopher.

<b>Telnet to</b>	<b>Login as</b>	<b>Area</b>
consultant.micro.umn.edu		gopher
North America		
gopher.uiuc.edu	gopher	North America
panda.uiowa.edu	panda	North America
gopher.sunet.se	gopher	Europe
info.anu.edu.au	info	Australia
gopher.chalmers.se	gopher	Sweden
tolten.puc.cl	gopher	South America
ecnet.ec	gopher	Ecuador

Use the site closest to you to minimize network time lag. If gopher through telnet seems useful to you, then you probably want to work to get the fuller gopher client available.

Don Gilbert  
GilbertD@Bio.Indiana.Edu  
Biocomputing office, Indiana University,  
Bloomington, IN 47405 USA  
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