

# BIOLOGY ON THE INTERNET

A STUDENT'S GUIDE  
1997 - 1998



ANDREW T. STULL

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# Preface

Change! I wrote the first edition of this manual at 7:22 p.m. on July 23, 1995. It is now 2:04 p.m. on January 31, 1997 and a great deal about the World Wide Web and the world at large has changed. Dealing with change is a basic requirement for surviving in our modern world, and anticipating change may even make you rich. Our world is louder, faster, and more complex than the ones experienced by earlier generations. In terms of information transfer, we might be described as a techno-generation; our parents, as a paper-generation. In the past year and a half, the World Wide Web changed at an extraordinary rate, and it will probably continue to do so; our online future is likely to be chaotic but exciting. Prepare to revel in the difference that tomorrow will bring.

Reading this manual won't teach you all there is to know about the World Wide Web, but it will help you to teach yourself. In the future you will need to find information for yourself rather than relying solely on others, who may bear outdated knowledge. If you are successful, your skills in "cruising" the Internet will allow you to deal with perpetual change. By the end of this manual, you should be comfortable and resourceful in navigating the complexity of the Internet, from its back eddies to its thriving thoroughfares.

This manual has four chapters. In the Introduction, *O Brave New World*, I will describe the origin of and the innovations behind the Internet. In Chapter 1, *What's Under the Hood*, we will explain the use of a Web browser and describe how you can obtain a connection to the Internet. The boxed and end-of-chapter exercises will give you practice in using your browser, as well as, expose you to some of the wonderful places on the Internet.

In Chapter Two, *Hit the Road Jack*, you'll learn more about how to use your browser in order to cruise the endless byways of the Internet. Also, you will be introduced to resources and strategies for information searching. The boxed and end-of-chapter exercises will reinforce your navigational skills and give you practice at searching for some of the great biology resources available to you on the Internet.

In Chapter Three, *Doing Your Own Tune-Up*, you will learn about how to fine tune and customize your Web browser to make it more responsive to your needs. Also, you will find yourself changing from an observer into an enthusiastic Internet participant. The boxed and end-of-chapter exercises will help you reach out and make contact with others on the Internet.

In Chapter Four, *Hot Rodding*, you will move into the fast lane of Web publishing. We'll discuss the ins and outs of Web design, HTML editing software, and the nuts and bolts of putting together your own Web server.

Finally, in the Appendices a glossary of gearhead terms and a template for making your cruise more scenic are provided.

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# Contents

<b>Preface</b>	<u>Change!</u> . . . . .	v
<b>Introduction</b>	<u>O'Brave New World: Brief Internet History</u> . . . . .	1
<b>Chapter 1</b>	<u>What's Under the Hood?</u> The Basics . . . . .	5
1.1	Gasoline and motor oil                      Connecting. . . . .	5
1.2	What your mechanic never told you      Organizing . . . . .	10
Activity:	<i>The Starting Line</i> . . . . .	13
<b>Chapter 2</b>	<u>Hit the Road Jack: Navigating The Net</u> . . . . .	15
2.1	Cruising the net                              Browsing . . . . .	15
2.2	Understanding the traffic signs              Navigating . . . . .	18
2.3	Asking for directions                        Searching. . . . .	21
Activity:	<i>Great Cyberspace Hunt</i> . . . . .	25
<b>Chapter 3</b>	<u>Doing Your Own Tune-up: Getting Your Message Out</u> . 27	
3.1	Fuzzy dice and seat covers                  Customizing. . . . .	27
3.2	Horns, radios, and turn signals              Communicating . 32	
3.3	Turbo chargers                                Extending . . . . .	40
Activity:	<i>A Talk-about Tour</i> . . . . .	43
<b>Chapter 4</b>	<u>Hot Rodding: Advanced Techniques</u> . . . . .	45
4.1	There's no place like home                  Designing . . . . .	45
4.2	Opening your own shop                        Serving . . . . .	56
Activity:	<i>Make Yourself at Home!</i> . . . . .	60
<b>Appendix</b>		
I	It's News to Me                                Biology Newsgroups . . . . .	61
II	Stepping Out                                  Homepage Template. . . . .	62
<b>Glossary</b>	It's all Greek to Me . . . . .	65

## Introduction

# O' Brave New World

This thing that we now call the Internet has been evolving ever since it was first developed over twenty-five years ago. Many people have compared the Internet to a living creature because of the way it grows and changes. You may find its history quite interesting. Also, the reasons for its creation and growth are helpful in understanding the nature, terminology, and culture of the people who have adopted the Internet as home.

In the late 50s and early 60s, scientists and engineers realized the importance of sharing information and communicating through their computers. Many different groups attempted to develop computer language that would enable computers to exchange information with one another, or *network*. Most were successful. But ironically, all of these networks used different languages—people on different networks still had difficulty communicating with one another. It was like the Tower of Babel all over again.

The Internet was born as the solution to this problem. The U.S. government paid for the development of a common network language, called a *protocol*, which was eventually shared freely. Over time, many formerly isolated networks from all over the world adopted this language. Thus, the best description of the Internet is that it is not a network, but a network of networks. However, the Internet is independent of governments and regulation—there is no Central Internet Agency. Change is spurred by the common needs of the people that use the Internet.

Admittedly, this type of network system isn't the most graceful—but it works. If you saw a diagram of this great big computer network, you might find it resembles a spider's web. On this web, information can travel between any two points along any one of many possible paths.

Originally, the chief purpose of the Internet was to provide a distribution system for scientific exchange and research. Gradually, however, the Internet also became a digital post office, enabling people to send mail and transfer computer files electronically. Although the Internet is still used extensively by scientists, the commercial sector is currently the most powerful force behind its growth.

Historically, as technology changed, the speed with which information could be transferred and the way we viewed information changed. In 1991, an important new user interface was developed at the University of Minnesota: the *Gopher*. *Gopher* is a visually-oriented search tool for the Internet that allows users to locate information found on other computers. Because of *Gopher*, and other, more sophisticated *graphical user interfaces*

developed since 1991, it is now possible to search through vast stores of information on computers all over the world. Once the desired information is found, it can be easily downloaded to the user's computer. Amazing if you think about it! You could be on your computer in Toledo, Ohio, and view information from Hamburg, Germany; Mexico City; or Tokyo, Japan without even realizing it. Wham! And no airline tickets!

In 1992, researchers in Switzerland helped to create a new format for information exchange that led to the explosive growth of the World Wide Web (WWW). Information on the Web is posted as a "page" that may contain text, images, sounds, and even movies. The organization of a page is much like any printed page in a book. However, web pages make use of *hypermedia*. Hypermedia involves the use of words and images as links, or connecting points, between different texts, images, sounds, or movies on other computers throughout the world. *Hypertext* web pages contain links only to other text documents.

However, the introduction of the Web created a dilemma: It was a great place to go, but there was no easy way to get there (kind of like the moon in the 60s.) We still lacked a convenient software program that would allow users to access the Web easily. In 1993, a program called *Mosaic* was developed by the National Center for Supercomputing Applications (NCSA). It allowed the user to browse Web pages as well as use other Internet resources such as electronic mail (e-mail).

After this browser was released, the Web has begun to grow faster than the speed of light. In 1991, around 700,000 people were using the Internet. After *Mosaic* came out, users increased to around 1.7 million. The release of another innovative browser, *Netscape*, took place when users were estimated at 3.2 million (July 1994). Since then, the growth hasn't slowed much—conservative estimates suggest that over 10 million people have access to the Internet; radical reports place the number at 100 million.

Today the Internet is changing at staggering rates and becoming more readily available to the average person. Just listen to the computer jargon in the popular media. When was the last time you saw a movie, heard a radio commercial, or read a magazine without encountering something about the Internet? As I write this sentence my radio station is talking about B. B. King's new Web tour and virtual concert on the Internet.

Today, you have access to animation, video clips, audio files, and even virtual reality worlds. Imagine all the new ways we will be able to view tomorrow's digital world.

For those of you who already have some Web experience, here are a couple of Web addresses discussing the history and growth of the Internet. Simply type the address into your Web browser exactly as it appears below. If you are relatively new to the Internet, you can refer to Chapter 1 to learn more about Web browsers and Internet addresses.

**BBN Timeline**

BBN includes an Internet history timeline. It places the important Internet events in context with other historical events and throws in plenty of social commentary to give you perspective.

Address: [http://www.bbn.com/customer\\_connection/timeline.htm](http://www.bbn.com/customer_connection/timeline.htm)

**Hobbes' Internet Timeline**

Hobbes' site offers a great deal about the Internet, the people who use it, and online culture.

Address: <http://info.isoc.org/guest/zakon/Internet/History/HIT.html>

**Netizens: On the History and Impact of Usenet and the Internet**

This is a comprehensive collection of essays about the history, nature, and impact of the Internet.

Address: <http://www.columbia.edu/~hauben/netbook/>

If you are just beginning to learn about the Internet, you might want to visit these sites later on.



# Chapter 1

## What's Under The Hood?

Many of you reading this manual have a lot of experience with computers, while others have little or none. In the first section of this chapter, I will briefly describe the basic computer setup you'll need, how to use a modem, and choose an Internet Service Provider (ISP). Many of you may be lucky enough to have computers on your campus that are set up to allow Internet access. In case you don't, I'll list the minimum in terms of systems, connections, and services that you'll need for the Internet. There are a staggering number of computers, software, and connections that you can use to get onto the Internet.

In the second section of this chapter, I will explain some of the idiosyncrasies of the Internet and describe the general features of most Internet browser software. A popular Web browser, *Netscape Navigator*, is used to illustrate discussions. Another popular browser is *Internet Explorer* from *Microsoft*. Both are free to students. I don't advocate any particular browser; you will probably want to try various browsers and make up your own mind. Although our illustrations focus on Navigator, fear not; both browsers share many of the same features and once you've learned the basic techniques, it's easy to switch back and forth.

### Section 1.1

#### **Gasoline and motor oil**

What is the difference between a Viper and a Geo? Okay, it might seem like a silly question, but give it some consideration. The main difference is in price (the Viper is much more expensive). But if we consider how well each of these cars meets our basic need for transportation, the two cars are the very similar. The same goes for computers and networks. The simple no-frills stuff will save you money while taking you where you want to go; the high-gloss stuff will transform your cash into dash and make your Internet browsing a little more enjoyable.

To get started, you'll need a *computer*, a *modem*, an *Internet connection*, and *browser software*. The descriptions that follow will help you understand each component and its function as you set up your own Internet access.

#### The Computer

Be careful how you approach this issue if you ask someone for advice on which computer platform to buy. Many people have strong opinions about the differences between Macintosh and PC-compatible systems. The best advice that I can give to you is test them

both at a computer store. Choose the one that you can pay for and are most comfortable using. After all, it won't do you any good if you don't enjoy using it.

These are the minimum system configurations that you'll need.

#### *Macintosh*

68030  
System 7.0  
256 color monitor  
16 MB of RAM  
8 MB of free disk space for  
browser software

#### *PC-Compatible*

Intel 486  
Windows 3.1  
VGA monitor  
16 MB of RAM  
8 MB of free disk space for  
browser software

A new innovation is the Network Computer, or NC. An NC is a computer without all of the things that you would expect in a computer: word processing, drawing, graphing, and number crunching. Because these features may be helpful to your education, you should consider the purchase of an NC carefully. Similar products will allow you to connect your television directly to the Internet. *WebTV* is currently the most popular, but I suspect that you'll see many different brands in the near future. The advantage to such products is that they are much cheaper than a full blown computer and you don't have to be a computer genius to use them.

### The Modem

So—you probably want to know why you need a modem if you already have a computer. A modem is a device that MODulates and DEModulates—that is, it translates a computer signal into a telephone signal, and vice versa. Although computers and telephones were set up to speak different “languages,” you can use a modem to translate between your computer and another computer across your telephone line. Modems come in different “sizes,” so don't just go out and buy the cheapest one on sale. Definitely don't buy one from a garage sale unless you really know what you're doing. Because modem technology changes so quickly, older equipment may be useful only as a doorstop. The number one thing that you need to know about a modem is its speed of transmission. Modem speeds are referred to in units called baud (a bit is a basic unit of digital information and a baud is the speed of transmitting 1 bit in 1 second). At one time a modem speed of 2600 baud was considered adequate. However, the minimum speed requirements have been steadily increasing as users demand more information at faster rates. You should purchase a modem with a speed of at least 28,800 baud (28.8k baud). With a typical 28.8k baud modem you can expect that it will take a few seconds to transfer a typical Web page. However, keep in mind that manufacturers will continue to introduce newer and faster modems as pages become more complex and slower to load, and as users demand faster speeds.

You also need to make sure that your modem will work with your computer's operating system. Generally, this isn't a big deal, as all modems are basically the same and top manufacturers produce software for all of the major operating systems. Just remember to read the box to make sure the software you need is included. Unfortunately, explaining how to install the modem software would require more pages than my editor will allow. Not to worry. Included with the software is an installation manual and a phone number to a help desk. If you run into trouble, don't hesitate to try both. As for which brand of modem to purchase, I can only tell you to buy what you can afford. Your internet service provider or your campus computer administrator may recommend a particular brand of modem. Take this suggestion seriously, as the technicians within your ISP or campus are probably more familiar with the recommended modem and will be able to help you with ease if problems arise.

The word *modem* may also refer to a device that allows you to connect your computer or television to a service line. By the time this guide is published, you will undoubtedly hear of things called ISDN modems and cable modems. An ISDN modem is a classic misnomer because the ISDN signal is already understood by computers and isn't modulated and doesn't need to be demodulated. The cable modem refers to a box that connects between your cable TV line (not your telephone line) and your computer or television.

### The Internet Connection

If you're lucky, your campus has already recognized the importance of the Internet as a teaching and learning tool. If the equipment is set up on-campus, then you may already have access to the Internet, or more specifically, to the Web. Otherwise, many resources exist to help you set up a connection from home.

Some campuses, although lacking a walk-in lab, have made arrangements for students to dial into the campus computer system and connect to the Internet with a modem. If this is the case, then check with one of the campus computer assistants or the campus computer hack. Advice from a hack may be extremely useful—he or she could be an excellent source of information.

Another option is to subscribe to a company such as *America Online*, *Compuserve*, *Prodigy*, *Microsoft Network*, or one of the many independent “mom and pop” companies currently offering monthly access to the Internet. It is a buyer's market and you should shop around. Test drive everything before you buy. This will save you a great deal of frustration. Here are a few things to consider when choosing an internet service provider.

***Does the ISP have a local number for your area?*** You need to call the provider each time you access the Internet. Paying a toll call every time you do so will cost you a ton of money if you use the Internet regularly.

***Can their system handle a large number of simultaneous connections?*** Ask them how many users they can handle at one time and how many subscribers they have. Although they may have a reasonable price and a local number, it doesn't mean much if you can't get on to use it. If after you subscribe you find that you are never able to connect or that the only available access is late at night or early in the morning, then find a new ISP.

***Do they offer SLIP/PPP connections?*** This is the type of connection that you'll need if you want to use a graphical browser like Navigator or Internet Explorer. Some ISP's only offer shell accounts. Shell accounts require you to type in each command as you would with DOS. It is somewhat like driving a horse and buggy when everyone else has an automobile.

***Do they have a reasonable monthly subscription fee?*** Cheapest is not always best. The added features and the staffing support are important points to consider when choosing a service. Some internet service providers offer you unlimited monthly connect time at a flat fee and others offer you a per hour fee with additional hours being extra. You will need to guesstimate your expected usage and purchase accordingly. Ask if there is a fee to upgrade your service if you find that you need more time. If you have a roommate, then consider upgrading the service and splitting the cost. This may actually save you money.

***Does your ISP include the Internet browser software in the price?*** You'll find that not all do. Most ISP's have an agreement with either Netscape or Microsoft to bundle their browser software. The provided software may also be partially configured to work on the ISP's system, so you'll be much farther along by using it and the technicians will be better able to help you with a problem.

***Is the ISP a regional or local company?*** This may not be important to everyone, but some of you may go home during holidays and vacation. If the ISP covers a wider area, then you can still check your e-mail and cruise the Net when you are away from school.

***Do they have a help line in case you need technical assistance to set up your connection?*** Call the help line before you subscribe and make sure you get a real person. Although you may be asked to leave your name and number, you should expect to get a return call within 24 hours minimum. If they don't return your call within this time period, then the service is probably understaffed or poorly managed.

***Does the ISP offer both newsgroup and e-mail access in addition to a connection to the Web?*** This is usually standard but there are always exceptions; it is better to ask up front.

***Does it cost you extra for additional e-mail addresses?*** If you have a roommate, then you may find that it is more affordable to split the cost of a subscription and pay for an additional e-mail account.

***Will your ISP add newsgroups at your request?*** Most ISP's subscribe to a small fraction of the available newsgroups and you may find that they don't include some of the basic, science-oriented groups that your instructors may recommend. It shouldn't cost anything for the ISP to add these groups to their list.

***Does the ISP offer you space for your own Web page?*** Often, one of the features offered in the basic package is the option of constructing and posting your own page. The ISP usually sets a memory usage limit that affects the total size of the page and its traffic flow (that is, the number of people viewing the site).

The most important thing to remember when using an ISP is to expect courteous and prompt service. If you don't like what you are paying for, then cancel and go somewhere else. There are plenty of competitors willing to offer you better service.

### The Browser Software

A descriptive name for software such as *Navigator* or *Internet Explorer* is *browser*, as that is what most people do with it. It is used to browse or wander, sometimes aimlessly, through the Internet.

Many Web browsers are on the market today, and new ones frequently enter the race to capture your dollar.

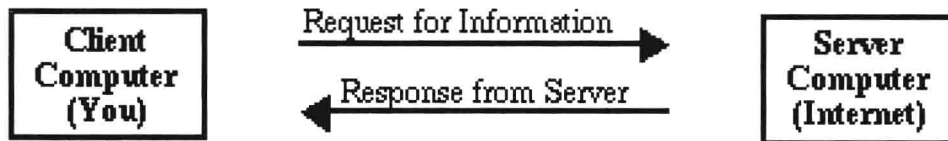
All browsers have advantages and disadvantages. You should evaluate several and choose the one that you're most comfortable with. (However, when choosing a browser, remember that seeing over the dashboard is all that is really important. Don't get wrapped up in features that you'll never use.) Browsers are typically very cheap, if not simply free, for educational use. *Navigator*, *Explorer*, and many of the other browsers are FREE for student use! So, don't be afraid to look at several. At the end of the chapter you will find several Web addresses that offer such software. Of course, if you purchase it at the store, you also get a user's manual, which you don't get with the free, educational-use copy.

Now, if you have all of these basic elements and they've been put together correctly, you should be ready to surf. If you still haven't put all of the pieces together, then jump to the activity (*The Starting Line*) at the end of the chapter for a step-by-step approach. The rest of this manual is devoted to explaining some problems you might encounter as you explore the many strange and wonderful places on the Internet. As you explore, you will become more comfortable and better able to utilize the Internet for both education and entertainment.

## Section 1.2

### What your mechanic never told you

The software that you'll use to access the Net is commonly called a Client or a Web browser. It functions according to an information exchange model called the Client-Server model (Figure 1). In this way, a client (your Web browser software) communicates with a server (a computer with Web server software) on the Internet to exchange information. When referring to the Web, the information that your browser receives from the server is called a page.



**Figure 1.** The Client requests information from the server. The requested information is displayed on the client computer.

So, what really appears on these Web pages? The best way to find out is to see for yourself. If you can, sit down in front of a computer, start your browser software, and connect to the Internet. Your browser is probably already set to start at a specific page. This start page is often referred to as a *homepage*. Web pages usually include both text and images. Some also use sounds and videos. A basic rule of the road is that anything that can be saved or recorded onto a computer can be distributed on the Internet through a Web page. The use of different information types is called multimedia.

When you choose a page it will be sent to your computer. After the requested information has been sent by the server, your computer will display it for you.

### Soapbox Racers

Sometimes the Internet is not quite as responsive as you'd like. Here is an analogy that might help you understand the workings of the Internet a little better. Did you ever build a soapbox racer when you were a little kid? They are not as popular now but you can still find a derby if you look hard enough (Here's a Web address if you want to get started in soapbox racing: <http://pages.prodigy.com/SOAPBOX/> - I'll explain how to use this later.). Imagine this : You hear about a derby and get together with some friends to build a soapbox racer. Everyone brings something (a rope, a board, some nails, spare bike parts, etc.). With these scavenged parts, you begin to prepare your racer for the big soapbox derby. When the big day comes and you arrive at the race, you realize that the other racers were made from spare parts and scrap too. Although they all look somewhat alike, they are also still quite different.

Well, think about it. The Internet is like a soapbox derby. It is made up of hundreds of networks patched together. Every once in a while a wheel falls off during a race.

### Traffic Jams and Construction Work

So, why is the Internet so slow sometimes? Think of the Internet as a big spider web. If you're the spider and you're trying to get to a fly stuck in the web, you usually have more than one path to get there. Some paths are more direct than others, but there are choices. Like a spider web, sometimes a small section of the Internet drops out of the "Web" and traffic has to be rerouted. This obviously causes increased traffic on the remaining strands, which in turn increases your waiting time.

### Local or Long Haul

You need to also remember that the Internet mimics the real world. Distance is a factor in determining how long it takes to access a Web page. Generally, loading a page from a machine across town is usually much faster than loading a page from across the nation or across the world.

### Time Zones and Tuna Sandwiches

The world works on different time zones and the Internet does too. Now, let's talk about lunch. Most people in the Western world take lunch around noon, and a many of them check their e-mail or browse the Web as well. So, you can usually expect Internet traffic to be slow during that time. Let's now consider the distance factor. There is a three hour time difference between the East and West Coast of North America, so the lunch rush lasts about four hours. Your location will determine if you are on the lead, middle, or tail end of the rush. Plan accordingly.

### The Parking Lot

Surfing the Web can be like shopping during the holidays. You either arrive early or park a few miles away. Here's the connection: A transaction occurs between your computer and another when you load a Web page for viewing. You require a document (a Web page) from somewhere on the Internet (a server). Obviously, a slow connection to the Internet on the client side may cause delays. But consider what is happening on the server end of the transaction. Small, slow servers will take longer to serve Web pages than large, fast servers. Now think about the holiday rush: Although there is normally adequate parking, a holiday sale and a limited number of parking spaces can add hours to your shopping. It should not be difficult to see how large, fast servers can be rapidly overloaded if they are hosting a really interesting Web site.

When *Microsoft* released an updated version of *Internet Explorer*, over twenty state-of-the-art machines went down because of excessive demand. Basically, *Microsoft's* parking lot wasn't big enough for the shopping rush.