

# SCIENTIFIC AMERICAN

# guide to science on the internet

## from astronomy to zoology

a complete resource  
to the best science web sites,  
complete with screenshots!

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The Visible Human Project

The Visible Human Data Set

Applications

Further Information

## an internet travel guide

by **EDWARD RENEHAN**  
author of **SCIENCE ON THE WEB**

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### Artificial Intelligence Resources

These are some Internet resources that may be useful to AI researchers. If you have something you would like added to this list, please contact me.

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Health Information Library Services

[AI Archives for News Groups and Mailing Lists](#)  
archive sites for some of the AI newsgroups and mailing lists

[AI Bibliographies](#)  
searchable bibliographic databases of AI literature

[AI Books](#)  
descriptions of books and online information companies whose main business involves AI

[AI Conferences](#)  
CFPs (calls for papers) for most upcoming AI conferences

[AI Employment Opportunities](#)  
AI jobs posted by employers

[Frequently Asked Questions](#) about AI

[AI Journals](#)  
Information on various AI journals

### The Visible Human Project

#### Overview

The Visible Human Project is a partnership of the NLM and a 1996 Long-Range Plan. It is the creation of complex, anatomically realistic, three-dimensional representations of the normal male and female human bodies. The anatomy of transverse CT, MR and retrospective images of representative male and female individuals has been completed. The next step is to create a set of millimeter intervals, the female is one-third of a millimeter intervals.

The long-term goal of the Visible Human Project is to produce a system of knowledge structures that will transparently link visual knowledge forms to symbolic knowledge formats such as the names of body parts.

#### Further Information

- A Description of the Visible Human Project
- The Visible Human Project
- [Visible Human Project](#) - primary contact site for the Project, the University of Colorado Denver
- [The Visible Human Project](#) - with their collaboration at NLM.
- [A summary of the Visible Human Project](#) by Edward Renehan
- [The Visible Human Project](#) - one of five finalists in 1996, Medicine category of the 1996 Long-Range Plan
- [The Visible Human Project](#) - website According to the Visible Human Project by Michael J....

# SCIENTIFIC AMERICAN GUIDE TO SCIENCE ON THE INTERNET

ED RENEHAN



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AN INTERNET  
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Robert Silverberg, Editor

*Are We Alone in the Cosmos?*  
*The Search for Alien Contact in the New Millennium*<sup>\*</sup>  
Ben Bova and Byron Preiss, Editors

*The New Dinosaurs*  
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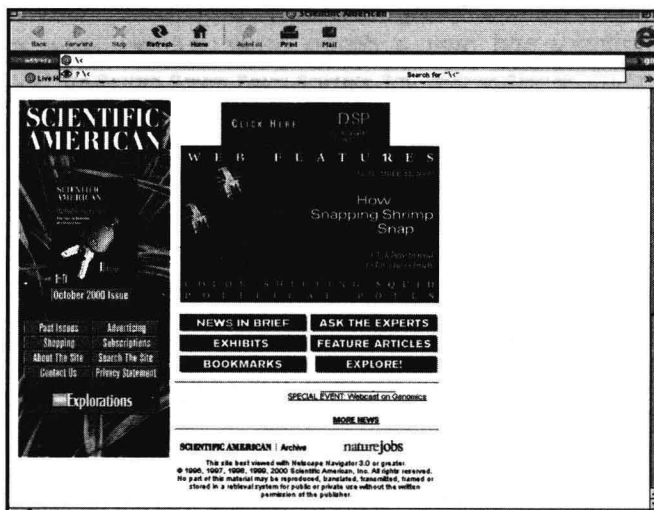


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—○ INTRODUCTION:

**What is the Internet?**



*Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it.*

—Dr. Samuel Johnson

The Internet. It seems so fundamental to our lives. Looking back over the last few—in fact, very few—years, we wonder how we ever lived without its numerous, readily-available resources just as we wonder how we ever lived without desktop computers themselves, digital notebooks, and cellular phones.

Of course, most scientists have been on familiar terms with the Internet for quite some time. The fabled network of networks was, after all, first created by scientists themselves with scientists in mind. Up until a few years ago, the Internet was used almost exclusively by engineers, scientists, academics and students as a vehicle for sharing information and research. In 1985 the Internet boasted only 1,961 host computers and numbered its users in the tens of thousands. But as many scientists know only too well, the once-pristine electronic frontier of the Internet has now been overrun by new settlers. In fact, the Internet has doubled in size every ten months for the past ten years. Today the number of Internet users increases by a more than two million new logins each month.

Along with vast numbers of “lay” Internet users have come vast numbers of purveyors of all sorts of information: the new gold of the electronic frontier toward which so many settlers rush. Scientific information certainly continues to have its place in the newly settled territories of the Internet. And scientific resources continue to grow in number. However, scientific information on the Net no longer constitutes the majority share. Scientific information plays second fiddle to financial information, religious information, erotic information, political information, literary information, and so on.

On the “plus” side, the information resources of the Internet seem to increase at almost as fast a rate as do the number of Internet users. The steadily growing profusion of information options—including information options related to the sciences—is wonderful. It is also utterly confusing.

## WHAT IN THE WORLD IS THE WORD WIDE WEB?

The most popular aspect of the Internet is, of course, the World Wide Web. The “Web”—as it is familiarly called—provides access to virtually all those computers (servers) on the Internet that offer hypermedia-based information and documentation.

Hypermedia is a technology that presents and relates information by using nonlinear, nonsequential links rather than linear sequences. (Less formally put, hypermedia and hypertext enable users to navigate both the World Wide Web and the documents on it with point-and-click ease. To navigate, one “clicks” on words, phrases, and icons in a document, which provide links that enable you to jump at will to a new location in the document, or even to a new document altogether.) In short, the Web is a uniquely intuitive and information-rich environment.

Additionally, the Web is hospitable to graphic images, photographs, audio, and even full-motion video. Thus the Web has a multimedia capability that is of great value to scientists and those interested in science. Astronomers can view full-color space images on-line. Oceanographers can access real-time “remote sensor” data from key oceanographic sites around the world 24 hours a day. Students of chaos theory on the East Coast can connect and watch fractal trees generate on a minicomputer in Los Angeles. And paleontologists can get audio and image clips of Stephen Jay Gould giving a series of lectures at Harvard.

An additional perk of Web technology is that the Web provides easy tools for inexpensive on-line publication. Combining global connectivity and individual empowerment, the Web enables anyone who has a computer and the proper Internet connection to become a multimedia publisher. With the right tools (most of them available as free downloads from sites highlighted in this book) and a little effort, you can easily translate scientific papers into electronic Web documents (also known as “pages” or “sites”) that the entire world can access. The same goes for reports, calls for papers, conference proceedings, announcements, course catalogs, etc. For more on this see the section later in this chapter entitled “A Few Web Fundamentals/General Web Resources.”

## WHERE DID THE WEB COME FROM?

Appropriately enough, the idea for the Web came from scientists—just as had the original idea for the Internet.

In 1989 Tim Berners-Lee, a physicist at the European Particle Physics Laboratory (CERN), proposed the concept of the Web as a system for transferring ideas and research among scientists in the high-energy-physics community.

Berners-Lee's original proposal defined a very simple implementation that used hypertext but did not include multimedia capabilities. Something very much like this was introduced on Steve Jobs's NeXT computer system in 1990. The NeXT implementation allowed users to create, edit, view, and transmit hypertext documents over the Internet. The system was demonstrated for CERN committees and attendees at the Hypertext '91 conference.

In 1992 CERN began publicizing the World Wide Web (WWW) project and encouraging the development of Web servers at laboratories and academic institutions around the world. At the same time, CERN promoted the development of WWW clients (browsers) for a range of computer systems including X Windows (Unix), the Apple Macintosh, and PC/Windows. (Today, the two most popular and useful of these browsers are Netscape Communicate and Microsoft Internet Explorer—both of which are available via free download on the Internet.)

## THE RAISON D'ÊTRE FOR THIS BOOK

Today there are literally millions of documents on the Web. Every subject known to humankind can be found here. But finding what you want amid this mountain of data can be more than time-consuming.

Even if you use one of the popular search-engines on the Web to isolate all Web sites containing information on a given topic such as comets (or thermodynamics, or lipids, or polychlorinated biphenyl's, etc.), you will still have to spend a fair amount of time browsing

through the many documents called up by your search in order to see which ones provide the richest information base.

One comet page, for example, may contain nothing more than a collection of 200-year-old observations of Comet Halley with no accompanying links, while another page will provide a cornucopia of information and resources on all aspects of the study of comets from ancient times right up to the present day, with a long list of related links, including an appropriate description of (and a link to) the limited Comet Halley page for those who want it.

Which of these two documents is more useful? Which would you prefer to spent time on? The latter document is the one you will find discussed in this book.

In writing this book I have endeavored to provide a guide to the most useful and informationally rich resources for scientists on the Web. I have scoured the various Web information options in a range of scientific disciplines and cut out the shallow and trivial in favor of the deep and meaningful. Thus, this book comprises a directory to the most ambitious science pages on the web, not only rich in links that leverage to the utmost the possibilities of hypertext but also rich in layers of vital, current data as represented in text, graphics, and audio.

## HOW CAN I CONNECT TO THE WEB?

Times was when only a privileged few could get on the Internet superhighway and drive. That's not so anymore. These days, there are more and more "on-ramps" for the highway, and tolls on the road are decreasing every day. Today you can speed around the Net and the Web or little more than the price of a subscription to the fruit-of-the-month club. Your connection options include permanent direct connections, dial-up connections to local hosts, and connection to the Web via a commercial on-line service.

### \* Permanent Direct Connections: Web Nirvana

Those of us affiliated with universities, research labs, and corporations—as well as those of us with direct connections often by our

cable television suppliers—are usually able to connect to the Internet via the fastest route possible: a TCP/IP (Transmission Control Protocol/Internet Protocol) network. Whether you are at your home cable modem, a corporate office, a university, or a public library, you are likely to have access to a PC hooked to such a network connection.

Permanent direct connections are clearly the vest and quickest way to travel to and across the Internet, as they allow fast data throughput capable of dealing swiftly with memory-fat Web graphics. Such high-speed access is vital for many applications related to scientific research and communications (such as video conferencing), which require extremely fast transmissions of large amounts of data.

#### \* Local Host Dial-Up Connections: The Next Best Thing

The next most attractive alternative is to use your computer's modem to dial-up to the network of an Internet service provider. These service providers are usually called local hosts. A local host computer runs with applications software that uses the TCP/IP protocols to communicate with other Internet. (Note that for web surfing a minimum modem speed of 28.8 bps [bits per second] is highly recommended.)

To communicate with the Web via your local host, you must use software that enables your computer to use the TCP/IP language to communicate over local telephone lines. Here you have two choices. The first is SLIP (Serial Line Internet Protocol) and the second and newer option is PPP (Point-to-Point Protocol). These low-cost alternatives provide full peer access to the Internet. The difference between the two is fundamental. SLIP does not provide error correction or data compression, but it still works well for home and small-business applications. PPP was specifically developed to rectify SLIP's error correcting weakness. PPP checks incoming data and asks the sending computer to retransmit when it detects an error in an IP packet. Thus, of the two protocols, I recommend PPP. It'll save you time and hassles.

There are hundreds of dial-up Internet providers across the country, many of them regional, and a number of them national. Among these are several that cost absolutely nothing, such as freeInternet.com (<http://www.freeinternet.com>).

Other popular options nationwide include Mindspring (<http://www.mindspring.net>), Earthlink (<http://www.earthlink.net/>), and MCI (<http://www.mci.net>). All of these outfits have proprietary SLIP or PPP

software packages, complete with browsers, that they'll be happy to send to you and with which you can connect to their services.

**\* Connection via Commercial On-line Services**

For the least-efficient, least-satisfying, though most thoroughly idiot-proof means of connecting to the Internet, check out major on-line services such as American On-line (<http://www.aol.com>), CompuServe (<http://www.compuserve.com>) and Prodigy (<http://www.prodigy.com>). Each offers easy-to-use proprietary software, but the easy software comes with trade-offs. Load times can often be very slow, depending on the volume of people on the network at any given time. Also, the proprietary browsers used by the services often leave something to be desired: images can come out looking pretty bad. However, depending on how much time you have and how important multimedia and other memory-intensive elements are to you, these on-line services can provide economical (and certainly simple) access to the Internet.

## WHAT TOOLS ARE AVAILABLE TO HELP ME USE THE INTERNET?

**\* Browser Tools**

As mentioned earlier, on-line services often provide their own browser software, as do many dial-up hosts. The best two items of browser software on the market however, are Netscape Communicator and Microsoft Internet Explorer. Most new PCs ship with one or both of these browsers preinstalled. But should you not have them, they are readily available as free downloads from the Internet.

To download Netscape Communicator go to

<http://home.netscape.com/comprod/mirror/index.html>

To download Microsoft Internet Explorer go to

<http://www.microsoft.com/windows/ie/default.htm>

**\* General Internet/Web Tutorials On-line**

A number of Web pages provide excellent hypertext tutorial instructions on the ins and outs of the Internet and the Web. Here is a quick listing of a few of the best:



How to Search the World Wide Web

<http://204.17.98.73/midlib/tutor.htm>

Learn the Net

<http://www.learnthenet.com/english/>

World Wide Web Tutorial

<http://www.educ.sfu.ca/tutorial/>

Yahoo Internet How-To

<http://howto.yahoo.com/>

## HTML EDITORS FOR CREATING YOUR OWN WEB DOCUMENTS AND PAGES

Many readers of this book will want not only to read what others have published on the Web, but also to do some Web publishing themselves.

The tool that you use to create hypertext documents for the World Wide Web is called HyperText Markup Language (HTML). If you want to create your own homepage, or render a document in a form readable on the Web, you need to get a good HTML editor and learn how to use it. This involves assigning document tags and working with basic text structures. You may also want to learn how to incorporate images into your HTML documents.

You'll be glad to hear that HTML is not all that hard to master. One of the best introductions to HTML is freely available on the Web itself:

Introduction to HTML

<http://www.cwru.edu/help/introHTML/toc.html>

Another very good alternative is:

HTMLelementary

<http://labrocca.com/htmlimentary/>

Before you can learn to use an HTML editor, however, you have to have one available on your platform. Many excellent HTML editors are available on the Web for Macintosh, Windows and UNIX machines. Here are some addresses where you'll find them available for download:

ANT HTML (PC Windows & Macintosh versions)

<http://telcommunications.com/ant/>