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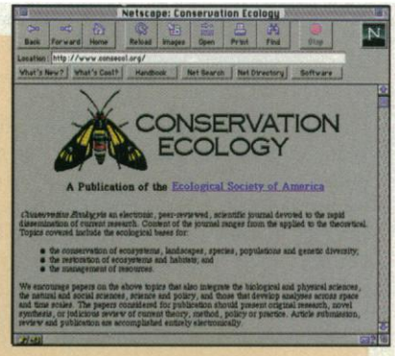
LETTERS

Web ways

The advent of electronic publishing raises a host of issues that are discussed by this week's writers. Peer review—How might it change? Could it be bypassed altogether? Should it be? Equity—What is the cost of publication and of archiving? Who should pay? Indexing—How should information be organized? (At right, the home page of a new, on-line journal in development.) Webs of a different sort (spider) are described by one author as not so tough after all when compared with mighty man-made fibers. Two authors discuss developments in particle physics. And according to a young investigator, female and male crayfish alike exhibit dominance behavior.



Electronic Publishing

The Special News Report "Electronic preprints point the way to 'author empowerment' " by Gary Taubes (9 Feb., p. 767) presents the thesis of Paul Ginsparg that publishing on the Internet is "unbelievably efficient" and that articles "can be offered virtually free to all comers." Ginsparg is also quoted as saying that it is a "bizzare misconception that the publishers add so much essential 'added-value' that we should all be willing to pay big bucks for it." Ginsparg is said to be referring to the high cost of low-volume, peer-reviewed professional journals.

The article states that the e-print archives "cost the National Science Foundation [NSF], which now funds it, 1.5 cents per electronic transaction." This obliquely refers to the fact that Ginsparg and his colleagues are the recipients of a $1.1-million NSF grant for "support of the e-print archives." The Ginsparg grant (NSF grant PHY 9413208) covers the continued maintenance of the archives and development of software appropriate for electronic document dissemination; it also states that "a refereeing mechanism could in fact be easily implemented for the e-print archives in the form of either a filter prior to electronic distribution, or a review ex facto by volunteer readers and/or selected reviewers."

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The real problem faced by scientists attempting to use the Internet is one of librarianship: It is very difficult to systematically locate information. Most "indices" found on the World Wide Web are either vague and redundant collections of "cool" sites or are what scholars in the humanities call "concordances," indexing every word in all or part of a document. As anyone who has used one knows, a concordance is a frustratingly inefficient way to obtain information.

What is needed, almost everyone agrees, is a hierarchical subject index that would make information as easy to find as the books in a traditional library. (Actually, such an index should be superior to the library catalogue: Whereas libraries, owning a single copy of most books, attempt to place every title they collect in one-to-one correspondence with a "call number," electronic indices can list a document under as many headings as fit the subject matter.)

Recently, we attempted to set up a prototype for the kind of index needed to make the Web a more valuable scientific resource. The Net Advance of Physics (http://web.mit.edu/~redingtn/www/netadv/) is a master hierarchical index of on-line review articles in physics. Eventually we hope to expand it to include the entire content of the physics e-print archives. Net Advance is a free service to the scientific community

from TIPTOP (The Internet Pilot To Physics), an international physics information cooperative.

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Bob Kelly, of the American Physical Society, is quoted by Taubes as calling for putting the entire scientific publication process on-line from submission, through review, to publication. A journal designed to do that is now being created. *Conservation Ecology* (http://www.consecol.org), is the newest journal of the Ecological Society of America. Content of the journal will range from the applied to the theoretical, including the ecological bases for the conservation of ecosystems, landscapes, species, populations, and genetic diversity; the restoration of ecosystems and habitats; and the management of resources.

One of the innovations of this journal is a semiautomated submission and review system. By creating an all-electronic system that will replace many routine secretarial and clerical functions, we will substantially reduce the time from submission to publication and sharply reduce costs. The system is generic; it can be used by anyone who wishes to create an electronic journal. Once development of the software is complete, we hope to be able to make it available to other scientific societies.

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As a footnote to Taubes' articles, readers might like to note the following. Having pioneered electronic physics journals with *Classical and Quantum Gravity* in 1994 and *Physics Express Letters (PEL)* in 1995, the Institute of Physics now has the full text of all its 31 journals, plus *PEL*, on-line at http://www.iop.org. Headers are in HTML (Hypertext Markup Language) and full text in PDF (Portable Document Format) and Postscript. The electronic version of a journal can be accessed by any member of any institution that subscribes to the paper version, at no extra charge to the individual or the institution. *PEL* is available by separate subscription, as it has no direct print equivalent as an independent journal.

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Taubes writes, "One stopgap for traditional publishers is to put articles on-line as soon as they've been accepted, rather than bundling them with others as an entire issue." Such a measure was proposed almost 30 years ago in the pages of *Science*. In "The future of scientific articles" by W. S. Brown, J. R. Pierce, and J. F. Traub (1 Dec. 1967, p. 1153), we wrote

> We propose a change in the form of journal distribution, made possible by the advent of large high-speed computers. . . . We propose that journals stop binding papers into issues and, instead, distribute to each subscriber a stream of papers, abstracts, and titles specially selected to meet his personal and perhaps frequently changing desires.

However, we did not anticipate the World Wide Web.

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■

Strength of Spider Silk

In the Perspective by David A. Tirrell "Putting a new spin on spider silk" (5 Jan., p. 39) (*1*) and in This Week in Science in the same issue (p. 9), comments are made about the "superior" and "unmatched" strength and toughness of spider silk. These comments have romantic interest, but they are not correct according to numbers published elsewhere. The following table, although not comprehensive, makes the point.

Material	Tensile strength (GPa)	Energy to break (J/m^3)
Spider silk (*1*)	1	10
Kelvar (*1*)	4	3
Spectra (*2*)	5	8
Fused silica (*3*)	14	220
Graphite (*4*)	20	15
Silicon (*4*)	16	2
Beryllium oxide (*4*)	25	26

The *lowest* tensile strength on this list is that of spider silk. The toughness (energy to break) of the silk is more competitive, but it is no match for the mighty fused silica. Furthermore, the chemical and thermal stabilities of spider silk are mediocre compared with the rest of the list. Finally, silica fiber is much, much cheaper to produce than commercial quantities of spider silk. So let's put the romance aside and pay some attention to the "video tape."

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References and Notes

1. D. A. Tirell, *Science* **271**, 39 (1996).
2. S. Kavesh, Allied-Signal Corp., private communication. Spectra is a highly oriented polyethylene commercial fiber.
3. W. B. Hillig, in *Modern Aspects of the Vitreous State* (Butterworths, Washington, DC, 1962), p. 186.
4. A. Kelly and N. H. Macmillan, *Strong Solids* (Clarendon, Oxford, UK, 1986), p. 391.

■

"New Physics"?

James Glanz (Research News, 9 Feb., p. 758) heralds the recent experimental results of the Collider Detector at Fermilab (CDF) group as evidence for "new physics." The opinions as to what this "new physics" may be seem divided. Some hope that the observed deviations are the signal for the long sought "super-symmetry." Others think they are a sign that the quark itself may be composed of something (preons). Still others are postulating "cousins" of the Z particle.

A less dramatic explanation of the observed deviations exists: the Standard Model is correct, but its properties are different from what theoretical physicists have thought. Most theoretical predictions in the Standard Model come from a technique called perturbation theory (PT). While PT has produced incredibly accurate predictions in electro-weak interactions, there are good reasons to believe that in the theory describing strong interactions, quantum chromodynamics (QCD), PT may lead to incorrect predictions (*1*).

An important prediction of PT is the way the strong coupling constant, $\alpha_s(Q)$, is supposed to run with the energy, Q. QCD is supposed to include the property called "asymptotic freedom": as Q increases, α_s is supposed to go to zero in a special manner. In 1992 (*2*), we predicted that α_s would decrease less fast than expected with Q and, in fact, never go to zero. Three months later, the European electron-positron col-