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New Premise in Science: Get the Word Out Quickly, Online

By AMY HARMON

A group of prominent scientists is mounting an electronic challenge to the leading scientific journals, accusing them of holding back the progress of science by restricting online access to their articles so they can reap higher profits.

Supported by a \$9 million grant from the Gordon and Betty Moore Foundation, the scientists say that this week they will announce the creation of two peer-reviewed online journals on biology and medicine, with the goal of cornering the best scientific papers and immediately depositing them in the public domain.

By providing a highly visible alternative to what they view as an outmoded system of distributing information, the founders hope science itself will be transformed. The two journals are the first of what they envision as a vast electronic library in which no one has to pay dues or seek permission to read, copy or use the collective product of the world's academic research.

"The written record is the lifeblood of science," said Dr. Harold E. Varmus, a Nobel laureate in medicine and president of the Memorial Sloan-Kettering Cancer Center who is serving as the chairman of the new nonprofit publisher. "Our ability to build on the old to discover the new is all based on the way we disseminate our results."

By contrast, established journals like Science and Nature charge steep annual subscription fees and bar access to their online editions to nonsubscribers, although Science recently began providing free electronic access to articles a year after publication.

The new publishing venture, Public Library of Science, is an outgrowth of several years of friction between scientists and the journals over who should control access to scientific literature in the electronic age. For most scientists, who typically assign their copyright to the journals for no compensation, the main goal is to distribute their work as widely as possible.

Academic publishers argue that if they made the articles more widely available they would lose the subscription revenue they need to ensure the quality of the editorial process. Far from holding back science, they say, the journals have played a crucial role in its advancement as a trusted repository of significant discovery.

"We have very high standards, and it is somewhat costly," said Dr. Donald Kennedy, the editor of Science. "We're dealing in a market whether we like it or not."

Science estimates that 800,000 people read the magazine electronically now, compared with 140,000 readers of the print version. Given the number of downloads at universities like Harvard and Stanford, which buy site licenses for about \$5,000 a year, the magazine says people are reading articles for only a few cents each.

In many cases even such small per-article charges to access a digital database can make for substantial income. The Dutch-British conglomerate Reed Elsevier Group, the world's largest academic publisher, posted a 30 percent profit last year on its science publishing activities. Science took in \$34 million last year on advertising alone.

But supporters of the Public Library of Science say the point is not how much money the journals make, but their monopoly control over literature that should belong to the public.

"We would be perfectly happy for them to have huge profit margins providing that in exchange for all this money we're giving them we got to own the literature and the literature did not belong to them," said Dr. Michael B. Eisen, a biologist at Lawrence Berkeley National Laboratory and the University of California, and a founder of the Public Library of Science.

When scientists relied on print-and-paper journals to distribute their work, the Library's supporters argue, it made sense to charge for access, since each copy represented an additional expense. But they say that at a time when the Internet has reduced distribution costs to almost zero, a system that grants journals exclusive rights over distribution is no longer necessary.

By publishing on the Internet and forgoing any profits, the new venture says it is now possible to maintain a high-quality journal without charging subscription fees.

Instead, the new journals hope institutions that finance research will come to regard publishing as part of the cost. The journals will initially ask most authors to pay about \$1,500 per article, for exposure to a wider potential audience and a much faster turnaround time.

The library's founders agree that its success will depend largely on whether leading scholars are willing to forsake the certain status of publishing in the established journals to support the principle of science as a public resource. In a profession where publishing in a top journal is often crucial to success and grant money, that may be a difficult task.

"I'd be happy to forswear publishing in any of those journals, but I'm not in a position where I need a job," said Dr. Marc Kirschner, chairman of

the cell biology department at Harvard Medical School and a member of the electronic library's editorial board. "The difficulty will be getting over this hump from the point where people say, 'Why should I risk it?' to where they don't see it as a risk."

In that regard, the Howard Hughes Medical Institute — the nonprofit institute whose \$11 billion endowment makes it a leading supporter of medical research — has emerged as a powerful ally. Dr. Thomas R. Cech, the institute's president, has publicly endorsed the library's goals and promised to cover its investigators' extra costs of publishing in the new journals.

As for other researchers, "people will want to be associated with this because it is such a good deed," said another member of the library's editorial board, Dr. Nicholas R. Cozzarelli, editor of *The Proceedings of the National Academy of Sciences*.

Unfettered access to the literature, library supporters say, would eliminate unnecessary duplication and allow doctors in poor countries, scientists at budget-conscious institutions, high school students, cancer patients and anyone else who could not afford subscriptions to benefit from existing research and add to it.

Moreover, they say, the taxpayers, who spend nearly \$40 billion a year on biomedical research, should not have to pay again — or wait some unspecified period — to be able to search for and see the results themselves.

But Derk Haank, chairman of Elsevier Science, whose 1,500 journals include *Cell*, says such criticism is misguided. Elsevier, he says, is offering broader access to its electronic databases to the institutions that want it for far less than the cost of subscribing to dozens of paper journals. "It sounds very sympathetic to say this should be available to the public," he said. "But this kind of material is only used by experts."

Still, in addition to making data available to more people sooner, the electronic library's founders argue that the research itself becomes more valuable when it is not walled off by copyrights and Balkanized in separate electronic databases. They envision the sprouting of a kind of cyber neural network, where all of scientific knowledge can be searched, sorted and grafted with a fluidity that will speed discovery.

Under the library's editorial policy, any data can be integrated into new work as long as the original author is credited appropriately. The model is inspired by GenBank, the central repository of DNA sequences whose open access policy has driven much of the progress in genomics and biotechnology of the last decade.

The library's roots can be traced to Dr. Patrick O. Brown's frustration at the barriers to literature he needed for research at his genetics laboratory at the Stanford University School of Medicine in 1998. "The information I wanted was information scientists had published with the goal of making it available to all their colleagues," he said. "And I couldn't get it readily because of the way the system was organized."

Dr. Varmus, then director of the National Institutes for Health, talked with Dr. Brown in January 1999 and decided to pay for a Web site that would provide free access to peer-reviewed scientific literature. PubMedCentral (www.pubmedcentral.gov) was opened the next year.

By a year later, however, only a handful of journals had decided to participate in the government archive. In an effort to whip up enthusiasm, Drs. Varmus, Brown and Eisen began circulating an open letter to the journals, asking them to place their articles in a free online database.

The petition quickly garnered 30,000 signers around the world, including several Nobel laureates, who promised to publish their work only in journals that complied with their demand. But almost none did.

That is when Dr. Varmus and his colleagues became convinced that they needed to raise money to start their own publication. After being rejected by several traditional science research foundations, the scientists found a sympathetic ear at the Silicon Valley foundation whose benefactor, Dr. Gordon E. Moore, was the co-founder of Intel Corporation.

"Scientists are a conservative bunch," said Dr. Edward Penhoet, the foundation's senior director for science. "In the short term they'll still be publishing in *Cell* and other places. But in the long term, I think this has the potential to dramatically facilitate science."

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