nature biotechnology
VOLUME 19 JANUARY 2001

Slippery slopes?

Once upon a time, or at least we like to imagine, the formal academic research paper served as a forum for free exchange of scientific data and ideas. There were no restraints on access to data or methodology. There were no page constraints or color charges for papers. Materials could be obtained freely, and data were a collective commodity. Scientists squabbled over the need for lead authorship on seminal papers. Peer review worked efficiently and fairly, and editors were beacons of lucidity. Splashy science was passed over for papers of demonstrable historical merit. Monetary considerations and competitiveness were deemed secondary to peer esteem. The word paradigm actually meant something (and was never coupled with shift).

Okay, so maybe this is an overly rose-colored vista. Yet it nonetheless is grounded in a demonstrably real terra firma. But, to quote a popular song of those bygone days, "The times they are a-changing." Biological research is no longer motivated exclusively by scholastic concerns. Commercial considerations have affected the publishing habits of biologists, and if current trends continue, the next years could see the completion of an almost unrecognizable transformation from the idyllic viewpoint above. Secrecy and delays in the publication and dissemination of data are increasing. Financial conflicts are encroaching on the peer review process. Tortuous material transfer agreements are slowing the validation and development of research findings. Science by press release is compromising the validity of results later submitted for publication, and by many journals, including this one, is grounds for rejection. Peer esteem and intellectual envy have been replaced by Wall Street, and scientific publication is increasingly viewed as an opportunity to raise stock valuation.

Last month, more ground appears to have been conceded. In a public statement, *Science* announced it is departing from the tradition of depositing published sequences in GenBank/EMBL/DNA Database of Japan and allowing a company to retain control of access to the sequence described in a submitted paper. This troubling situation has arisen because Celera Genomics has stipulated that it will only brook publication of its human genome sequence if the data are retained exclusively on the company's website. Celera has also insisted that users will be limited to downloading no more than 1 megabyte of data, and that those seeking larger downloads need submit a letter from their institution promising not to redistribute the data. Industry scientists will be subject to even more stringent restrictions.

Not surprisingly, researchers are crying foul. One UK geneticist, Michael Ashburner, the research coordinator at the European Bioinformatics Institute—one of the centers responsible for maintaining GenBank—has issued an open letter denouncing *Science*, claiming that the journal is custom-tailoring its policies for Celera's benefit and encouraging the fragmentation of genetic data resources. Other scientists, such as John Sulston, believe that the arrangement could restrict dissemination of the genome data, suppress competition, encumber bioinformatics research in tiresome legal negotiation, and hamper the development of better-annotated versions of the sequence. *Science* has responded by stating that the existing principle that DNA must be publicly released has been "fully upheld" because Celera has agreed "to make the entire sequence available free of charge."

From Celera's point of view, it is easy to see why it would want to avoid lodging its data in the public arena: competitors could take the fruits of their labors for nothing, reannotate them, and then resell the entire human genome sequence at a premium. And as has been noted over and over again, the central issue is that the real value (scientific and otherwise) lies not in the sequence itself, but in the functional annotation added on top of it. Because Celera is refusing to allow researchers who are not subscribers to obtain the whole genome and annotate it using their own (possibly superior) software, their conditions of access could delay progress in making sense out of the Babel of sequence.

But in the long term, does it matter? After all, even restricted access to Celera's whole genome assembly will be a tangible asset to researchers once it is freely available. And ultimately, the issue of access will become moot as the competitive advantage of Celera's sequence is reduced once the public project reaches 10 × coverage of the genome through its own efforts over the next two years.

And does it matter (really) that Celera stands to benefit from a publication that would provide J. Craig Venter and his team with accreditation that they have actually accomplished what they have been claiming since March of last year; provide Celera's head with a measure of vindication against his critics; and of course smooth the road for the black-tie spread in Stockholm?

The key issue is that while Celera has a duty to protect the interests of its stakeholders, *Science* also has a duty to protect its stakeholders—academic researchers—and uphold accepted scientific publication practices.

A precedent has now been set. Will other companies submitting papers now insist on hosting the data on their own, rather than public, web sites? If so, will *Science* and other journals now be required to host a copy of all these databases in escrow, as for Celera, to ensure that no changes occur in the ability of the public to have full access?

One could argue that Celera's insistence on placing restrictions on data access should have precluded it from taking the credit that still goes with a prestige journal publication. And one might with equal validity argue that on the "half a loaf is better than none" principle, even restricted free public access to the "full" genome sequence is significantly preferable to subscribing to a company database. Preferable to both, however, would be not to have the argument at all. Sadly, the time for that has long passed. ///