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[Prev](#) | [Table of Contents](#) | [Next](#)

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• NEWS FOCUS

Bermuda Rules: Community Spirit, With Teeth

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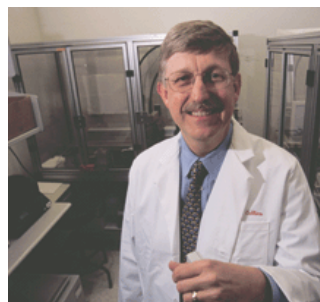
The "Bermuda Rules" may sound like standards for lawn tennis, but in fact they are guidelines for releasing human sequence data. Established in February 1996 at a Bermuda meeting of heads of the biggest labs in the publicly funded genome project, the rules instruct competitors in this cutthroat field to give away the fruits of their research for free. "The whole raison d'être for the communal effort was to get useful tools into the hands of the scientific community as rapidly as possible," says Francis Collins, director of the U.S. National Human Genome Research Institute in Bethesda, Maryland. But the rules also offer another benefit: They discourage the patenting of genes by sequencing labs, an activity executives of big pharmaceutical companies seem to despise as much as some academics do. The insistence on quick, unconditional release of data also lies at the heart of the dispute between publicly funded genome scientists and the private company that has just produced a draft version of the human genome, Celera Genomics of Rockville, Maryland.

At the 1996 Bermuda gathering sponsored by the Wellcome Trust, a British charity that funds large-scale sequencing at the Sanger Centre in Hinxton, U.K., scientists agreed to two principles. First, they pledged to share the results of sequencing "as soon as possible," releasing all stretches of DNA longer than 1000 units. Second, they pledged to submit these data within 24 hours to the public database known as GenBank. The goal, according to a memo issued at the time, was to "prevent ... centers from establishing a privileged position in the exploitation and control of human sequence information."

The Bermuda policy, which replaced a 1992 U.S. understanding that such data should be made public within 6 months, has had a significant impact on the field. For example, Collins claims, it has already enabled the identification of more than 30 disease genes. Both Collins and Ari Patrinos, director of the U.S. Department of Energy's office that funds genome research, backed the Bermuda push for openness. "We felt it would strengthen international cooperation," Patrinos says. "Scientists are by their very nature hoarders. They're chewing on the data all the time, and they never think they're ready" to let go, he adds. By adopting this formal mechanism, members of the consortium assured each other that no one would be squirreling away caches of data or quietly patenting genes. The policy also delivered a clear symbolic message, Patrinos says: "We all believe that the genome belongs to everybody."

When sequencers met in Bermuda again in 1997, they reaffirmed their pledge and added an explicit directive against patenting newly discovered DNA. Failure to cooperate, U.S. officials made clear, could be a black mark in future grant reviews. Although the message seemed to challenge private DNA databases by undermining their claims to exclusivity, large pharmaceutical firms welcomed it, because they would benefit if there were fewer patent holders to buy off.

Alan Williamson, a former executive at Merck, the pharmaceutical giant in Whitehouse Station, New Jersey, embraced the policy enthusiastically. "Putting data out immediately was a good thing," he says, because it encouraged the sharing of research tools without letting legal contracts get in the way. But he wishes sponsors of this research had taken active steps to make it difficult for others to patent and sell this genetic information—for example, by filing their own noncommercial patent claims that might block other claimants. Biomedical



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Care to share? NIH's Francis Collins is a strong advocate of rapid data release.

CREDIT: RICK KOZAK

companies, he argues, should compete on the commercially difficult work—developing drugs—not on profiting from research tools such as DNA databases.

Indeed, Merck was so certain that this was the right approach that beginning in 1994, the company poured tens of millions of dollars into creating a nonprofit database of gene fragments known as expressed sequence tags (ESTs). The Merck Gene Index, as it is called, was designed to counter privately owned genetic databases and a surge in gene patenting led by such companies as Human Genome Sciences in Rockville, Maryland, and Incyte Pharmaceuticals in Palo Alto, California. These companies sell genetic information, patent uses for newly discovered genes, and seek to obtain royalties for the use of their patents—by big pharmaceutical firms and all other users. Merck also contributed to a free database of mouse ESTs, which are useful in identifying human disease genes.

In a similar defensive move, 10 companies joined with the Wellcome Trust in 1999 to create a nonprofit database of human genetic variations garnered from the genome, known as single-nucleotide polymorphisms (SNPs). SNP maps may be extremely valuable someday in identifying disease genes and standardizing gene-based medical therapy, and several companies had already begun to gather them in private collections.

Quarreling over the principles of the Bermuda Rules broke out again when Celera announced that it would sequence the entire human genome. Its business plan, according to president J. Craig Venter, is to collect and process genomic data more efficiently than research outfits can do for themselves. The company would appear to have no incentive to give information away, but Venter grabbed headlines in 1998 when he declared that he would finish a rough draft of the genome earlier than the publicly funded effort and give everyone free access to Celera's sequence. Ever since then, Venter and the advocates of the Bermuda Rules have been arguing about what "free access" means.

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