



Peter A. Singer: Built From Scratch

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Last week, a team of scientists at the J. Craig Venter Institute, including Venter himself and Nobel laureate Hamilton Smith, announced they had synthesized, for the first time, a full bacterial genome—that is, all the genes in an organism. Venter is the genomic industry bad-boy who famously competed against the publicly funded Human Genome Project in a race to map our genetic code. Now, he is moving beyond reading the “book of life.” He is actually writing it.

This discovery is the biological equivalent of baking a cake from scratch. The scientists started with the DNA letters of the genetic code, asked companies to produce strings of DNA from the letters and then used these strings to build the whole genome of the bacterium. They used a method called synthetic genomics, which is like putting together Lego blocks — except the blocks are, in this case, Deoxyribonucleic acid. The potential benefits of this work, while still some years off, are extraordinary. They include designing bacteria that make environmentally friendly fuel for your car, or that produce drugs and vaccines.

Legitimate concerns have been raised about the perils of creating—and patenting—life. Alarmists have even called for a moratorium on further research of this type. But the sky is not falling, and Venter’s advance should be celebrated, not vilified.

The scientists did not create life—yet: Though members of Venter’s group created the bacterial genome, they did not put it into a cell and activate it (although they plan to do so in 2008). There is no significant ethical difference between what they have done and the practice of modifying the existing DNA of a bacterium, which has become routine in research labs.

It’s the uses to which these techniques are put—not the techniques themselves—that should be the focus of ethical scrutiny. In this respect, it is important to note that no responsible scientist would support creating human life with synthetic genomics (nor is this anywhere near technically feasible); just as no one—with the exception of a few Raelians in space suits—supports the reproductive cloning of human beings.

Nor do I see ethical problem arising from the institute’s treatment of the process as its own intellectual property. My colleague Richard Gold from McGill University, one of Canada’s foremost IP experts, looked at the 2006 U.S. patent application filed by the Venter Institute. He notes the patent is limited to only the one bacterium used in the research. It’s possible that other patents, which have yet to be disclosed, have been filed, and that these might be broader. The desirability of permitting corporations such patents will need to be debated. But it is important to note that the commercial rewards that arise

from patenting research are precisely what is needed to drive innovation and, ultimately, produce benefits for consumers.

Casual observers might worry that this sort of research could lead to an epidemic of man-made pathogens. But in fact, the Venter group switched off the gene that makes the bacterium infectious, and added a watermark so the DNA could be traced. To its credit, the Venter group collaborated with security experts to publish a report last fall identifying ways to mitigate the security risks posed by synthetic genomics. Their recommendations: screen the DNA strings produced by companies, control the sale of DNA synthesizer machines and educate scientists about dangers of misuse.

Several years ago, I was on a U.S. National Academies panel that studied the future of the life sciences and its implications for security. In our 2006 report, our first recommendation was to “endorse and affirm policies and practices that, to the maximum extent possible, promote the free and open exchange of information in the life sciences.” The same science that might help the bad guys make weapons will help the good guys make defences, such as vaccines, against both man-made and naturally occurring infectious threats. On balance, the benefits brought to society by such advances in science outweigh the risks.

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