From the Editor

The Method—Not the Meaning—of Life

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One of the tragedies of today's 24-hour news cycle is that the beauty and elegance of a novel scientific approach can get lost in a sea of hazy PR and over-generalized science reporting. While in some cases it can be minor, in others it can be distracting, and detrimental to the extent that the true scientific import is overlooked.

When a group of scientists from the J. Craig Venter Institute (JCVI) announced in late May 2010 that they had created the first cell with a synthetic genome (1), blogs and news outlets alike were buzzing about this new form of "synthetic life." The media furor that resulted quickly incited questions about the future of synthetic biology, its moral implications, and in general, what it means to create life.

Existentialist musings aside, what the JCVI team accomplished was nothing short of a methodological marvel. In order to synthesize and assemble 1.08 megabases of DNA from scratch and then insert it into a recipient cell, the team had to develop new approaches in cloning and gene transfer. This part of their work—that is, the technical wizardry needed to create such a genome—is where the beauty lies. The genome itself was a copy of the wild-type *Mycoplasma mycoides* genome, albeit with a few genes deleted and the addition of several watermark sequences to differentiate the synthetic cell from its wild-type counterpart. Phenotypically, though, they are basically identical.

This report, and what it might do for the field of synthetic biology, recalls the 1977 landmark paper by Frederick Sanger describing the process of DNA sequencing (2). That article laid the foundations for a revolution in genomics and medicine, a journey that continues to this day. It can be argued that the Sanger technique and its many variations have advanced our understanding of genomes and genetics more than any other. Will the JCVI approach to genome synthesis do the same for the nascent field of synthetic biology? Not only has the team provided a methodology for constructing wild-type copies of bacterial genomes, but an approach for deleting specific genes and examining their function in those bacterial genomes where genetic tools are lacking. Furthermore, the technique provides researchers the opportunity to test novel gene function within bacteria by inserting unique, foreign sequences.

In this same spirit, other researchers are developing simple tools to further expand the

field of synthetic biology. In this issue of *BioTechniques*, Carol Lim and Andrew Dixon report on an elegant new technique to study protein-protein interactions, which takes advantage of a protein switch: in one state, the fluorescent reporter protein is located in the cytoplasm of the cell, but when a ligand is introduced, the protein moves into the nucleus carrying with it any interacting protein partners.

Just as genomics started out slowly after the development of Sanger sequencing, it will take some years for synthetic biology to earn its chops, both in gaining understanding of how cellular components come together to function, and developing techniques to manipulate these components. While the field's consummation may be the creation of a synthetic cell or even synthetic life (or maybe a DNA-based computer or calculator in the shorter term), that time is not now, no matter how often the message appears on the internet or in newspapers around the globe.

Arguments over the ethical ramifications of creating life or bacteria with novel computer-designed genomes will happen now, however—and they should, given this announcement. But it should not be forgotten that what the JCVI team has truly produced is not synthetic life, but rather an innovative set of genetic tools. It is our current priority, then, to understand their potential and use them prudently. Methods do not always make the best PR stories, but they are the foundation for all good science. As always, post your thoughts and comments at our Molecular Biology Forums under "To the Editor" (<http://molecularbiology.forums.biotechniques.com>) or send an email directly to the editors (bioeditor@biotechniques.com).

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References

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