

REVIEWS &  
REFLECTIONS

**THE REGULATION OF SYNTHETIC BIOLOGY:  
COMMENTS TO THE PRESIDENTIAL COMMISSION  
FOR THE STUDY OF BIOETHICAL ISSUES**

By Bruce Jennings

I have been writing and thinking about the cultural meaning and reception of biotechnology generally, including synthetic biology, for the past several months.<sup>1</sup> I would like to share the following comments with the Commission.

Policy and regulation in the area of synthetic biology—as in most areas of technology and science policy and governance—will focus primarily on public safety and harm issues. Secondly, it will focus on discrimination and equity issues if it seems to put some group at risk of social harm, or if it seems to benefit one sector of society unduly and yet be developed at public expense.

These issues are fundamental and important. For example, the potential to weaponize the products of synthetic biology poses a particularly important concern. I also think that synthetic biology promises to be a kind of garage technology that will pose some especially difficult challenges for the post-World War II paradigm of science policy as a whole, which has relied on definable and controllable sites of research and application. I trust that the Commission will address these issues. Here I want to call your attention to a different set of issues that may not be so evident, but that I nonetheless think are crucial and merit your careful attention and analysis.

In my work in bioethics and biotechnology, my concern has been with the worldview associated with and exemplified in synthetic biology—or, more precisely, in the elite representation and the social reception of synthetic biology. (Of course, that public representation and social reception is not always an accurate or complete account of what the science/technology actually is or does, as experts see it, but this

public face of synthetic biology has enormous influence in its own right.)

My tack is to explore the source and shape of social concerns about biotechnology, especially from the vantage point of how this science and technology teaches us to think about natural systems, the relationship between humans and nature, and ourselves and our communities. Does it make us see ourselves as (in Aldo Leopold's words) "plain citizens of the biotic community"? Or as appropriators of meaningless raw biotic material? Does it teach us to see ourselves as civic trustees and stewards of a fragile and increasingly fragmented web of life? Or does it teach us to see ourselves as fabricators, improvers, exploiters, and engineers of a world that is imperfect precisely because it is very complex, fragile, and prone to eluding our deliberate control?

My general thesis is that biotechnology and synthetic biology do indeed convey civic and moral lessons—they have to, the notion of value neutrality in technology is a myth—and that the lessons they teach are the wrong ones. Not wrong necessarily in terms of the direct effects of the science within its still limited biological and operational range—I have nothing against growing microorganisms that can serve as clean fuel, or that can mitigate the environmental damage of oil spills—but wrong in terms of the indirect influence they have, in the ways in which the civic education offered by this science undermines the task of developing an alternative to the human appropriation, manipulation, and "engineering" of nature and of life. For it is an alternative vision and set of values—this change of worldview, this cultural evolution—that we must seek if we are to take seriously our goals of sustainability, resilience, and social justice. Green engineering fixes for specific problems will not get us there. (And besides, who can assure us that the technological outcomes of synthetic biology will all be green?)

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Another way to put this is that synthetic biology is a technology that may temporarily solve some *problems in our lives*, but it is also a cultural formation that will contribute, almost certainly, to the further distortion of the *patterns of our lives*. The sensibility that synthetic biology reflects will further impede our achievement of a crucial recognition for our future: I refer to the recognition that human beings are embodied, embedded, “natured” creatures, necessarily and fundamentally. We are not the engineers of life.

Now, are considerations such as this relevant and appropriate to policy-making in a pluralistic democracy? I would say yes, and all the more so because we are a democracy, or at least aspire to be such. Policy to govern science and technology that focuses exclusively on how the technology may harm us and that totally ignores considerations about how the meaning and culture of that technology may shape us is inadequate, one-eyed policy. Arguably, the civic and moral shaping of cultural meaning and worldviews are more important in a democracy than in other modes of governance. The frame used in the report of an earlier Presidential Commission on bioethics, *Splicing Life*, would discount and dismiss cultural concerns of the kind I am raising by saying that they really amount to a version of a religious objection to biotechnology.<sup>2</sup> This religious objection holds that synthetic biology is morally inappropriate because it is a form of “playing God.” That is to say, it is a kind of human trespass into the sacred and a kind of sinful human arrogance. This criticism, defenders to biotechnology point out, is based on special metaphysical or theological beliefs that are out of place in the discourse of public policy analysis.

But this frame of response, which defenders of biotechnology have been using against critics for many years now, is totally inadequate for capturing the significance of the concerns I am trying to articulate here. Religious notions of the right relationship be-

tween humans and the creation certainly are one basis for concerns about biotic or ecological citizenship, trusteeship, and stewardship; but they are not the only basis, and it does not follow that these concerns are “religious” or metaphysical arguments. To think so is to overlook the ways in which these concerns are in fact grounded in the best science we have today as regards such fields as ecology, conservation biology, and geophysical fluid dynamics. To be a synthetic biologist is not to usurp the place of God (theologically a very bizarre notion, when you think about it), but it may well be to manipulate life in ways that are of dubious wisdom from a social and a scientific point of view.

To this one might respond: “Synthetic biology works, doesn’t it?” Is the fact that something “works” the final determinant of its scientific legitimacy? I don’t think so, any more than it is the final determinant of ethical legitimacy. Synthetic biologists have hit upon a level of genomic and biological functioning (at very elemental and small levels) that they can seemingly control rather impressively. So synthetic biology does “work” in a sense and therefore represents scientific discovery of a new truth in the biological sciences. Any yet, despite this, I have a feeling that synthetic biology’s manipulations are profoundly out of step with the current best thinking in biology in that they seek to dispense with, rather than to understand, the complexity and holistic properties of biological systems at all levels.<sup>3</sup>

☞ The sensibility that synthetic biology reflects will further impede our achievement of a crucial recognition ...that human beings are embodied, embedded, “natured” creatures, necessarily and fundamentally. We are not the engineers of life

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I acknowledge that these reflections do not entail a set of specific and particular regulations concerning the future conduct of synthetic biology. But perhaps it is only one part of the task of the Presidential Commission to suggest regulation; another part of that task may be to warn against misplaced technological promise and subtle misdirection.

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### NOTES

<sup>1</sup> B. Jennings, "Enlightenment and Enchantment: Technology and Moral Limits," *Technology in Society* 32 (2010): 25-30; B. Jennings, "Interpreting the Social Meaning of Biotechnology," *Minding Nature*, 3, no. 2 (August 2010): 45-47; B. Jennings, "Bioscience and the Liberationist Romance," *Hastings Center Report* 40, no. 4 (2010): 16-20.

<sup>2</sup> President's Commission for the Study of Ethical Problems in Medicine and in Biomedical and Behavioral Research, *Splicing Life* (Washington, DC: U.S. Government Printing Office, 1983).

<sup>3</sup> D. Noble, *The Music of Life: Biology beyond Genes*, (New York: Oxford University Press, 2006).

### CHN BOOKSHELF

A regular feature calling attention to important books and articles that CHN staff, board, and collaborating scholars are reading and recommend. *Quot libros, quam breve tempus.*

W. N. Adger, J. Paavola, S. Huq, and M. J. Mace, eds. *Fairness in Adaptation to Climate Change*. (MIT Press, 2006).

M. T. Brown, *Civilizing the Economy: A New Economics of Provision*. (Cambridge University Press, 2010).

Denis Dutton, *The Art Instinct: Beauty, Pleasure, and Human Evolution*. (Bloomsbury Press, 2009).

N. Scott Momaday, *The Man Made of Words*. (St. Martin's Press, 1997).

K. M. Sayre, *Unearthed: The Economic Roots of Our Environmental Crisis*. (University of Notre Dame Press, 2010).