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How Do You Stop a Synthetic-Biology Disaster?

New Commentary Calls for Research into the Ecological Risks of Synthetic Biology

WASHINGTON – Experts say at least $20 million to $30 million in government research is needed over the next decade to adequately identify and address the possible ecological risks of synthetic biology, an emerging area of research focused on the design and construction of new biological parts and systems, or modification of existing ones, to create new applications in areas ranging from energy to chemicals and pharmaceuticals.

Without key research into these risks and appropriate federal oversight, certain synthetic organisms might survive and flourish in natural environments, wreaking havoc on local ecosystems, according to a new Commentary piece in the journal *Nature* ("Four Steps to Stop a Synthetic-Biology Disaster," March 1).

The article -- written by Genya V. Dana, Todd Kuiken and David Rejeski of the Synthetic Biology Project at the Woodrow Wilson International Center for Scholars and Allison A. Snow of Ohio State University -- highlights the need to proactively address environmental risks so that the potential benefits of synthetic biology can be realized.

"No one yet understands the risks that synthetic organisms pose to the environment, what kinds of information are needed to support rigorous assessments, or who should collect such data," the authors write.

And while similar questions were raised about genetically modified crops, the products of synthetic biology "will be altered in more sophisticated and fundamental ways (such as elimination of metabolic pathways), making them potentially more difficult to regulate, manage and monitor."

The authors say it is imperative to start the research ahead of expected advancements in the field. "Synthetic biology has already moved out of the lab, propelled by significant public and private investments in organisms modified to produce chemicals, medicines and biofuels," they write. The global market for synthetic biology is expected to increase to $10.8 billion over the next four years.

The authors propose four areas that risk researchers, scientists, regulators and other key stakeholders should focus on in the near term: how the physiology of synthetic organisms is different from naturally occurring organisms; how "escaped" synthetic organisms might affect the environment; how synthetic organisms might evolve in the natural

environment; and consequences of synthetic organisms exchanging genetic materials with naturally occurring organisms.

The authors caution that this research will take time, and emphasize that such work should be integrated into the larger synthetic biology research agenda. “Public agencies must link basic and environmental risk research by co-funding projects and requiring grant recipients to work with environmental scientists from the start,” the article says.

The Wilson Center has already been encouraging dialogue between synthetic biologists and ecologists on the potential risks of synthetic biology. In July 2011, the Center held a workshop focused on bringing together engineers and ecologists to help identify key research areas needed to support future ecological risk assessments for synthetic biology applications. While this work continues, the authors stress the need for much more interdisciplinary research and discussion.

The call for research funding comes as federal agencies are determining how best to respond to a 2010 report on synthetic biology from the Presidential Commission for the Study of Bioethical Issues. The Wilson Center in February launched a scorecard to track the federal and non-federal response to the commission’s recommendations. The scorecard can be found here: http://www.synbioproject.org/scorecard/

The *Nature* Commentary can be found here (subscription required): http://www.nature.com/nature/journal/v483/n7387/full/483029a.html

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Synthetic Biology Project

The Synthetic Biology Project is an initiative of the Woodrow Wilson International Center for Scholars supported by a grant from the Alfred P. Sloan Foundation. The Project aims to foster informed public and policy discourse concerning the advancement of synthetic biology. For more information, visit: www.synbioproject.org

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