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From: To: CC:

Date:

2016/05/05 2:45 PM

Subject:

Re: Synthetic Biology - visions of the future SYNENERGENE Forum 24-25th June 2016

Amsterdam

I would like to understand this more fully myself, and the recent responses have prompted me to weigh in to try to gain that understanding from the group on this email thread. As I have mentioned previously in past conference calls, I struggle to see that what we are doing under the activities we now call Synthetic Biology is qualitatively any different from what we were doing when we were genetically engineering things. We now have more sophisticated and powerful tools, but to use an analogy, whether we are using a hand saw and hammer or a power saw and nail gun, we would be still doing carpentry. And if we say we are using engineering principles, what do we mean exactly, and are we saying we were not doing so when were doing genetic *engineering?* What type of thinking were we not doing then that we are doing now? So with respect to gene drive, those constructs that drive through a population seem to me to be just newer implementations of the knowledge and capabilities that have been developed in the fields of molecular biology and genetics, which have underpinned genetic engineering from the beginning. Whether transgene insertions that drive through a population (a characteristic of the gene combinations inserted into a genome through genetic engineering techniques) are or are not a part of Synthetic Biology depends on what we agree Synthetic Biology is or even if it is an area of scientific endeavor that deserves a new name at all. Right now, I am reminded of the fable about the blind men and the elephant.

On Thu, May 5, 2016 at 1:37 PM, wrote:

- > I loathe to get into the defining Synthetic Biology argument and I very
- > much fear that I might regret the contribution, but the lack of clear
- > definition is clearly problematic in this conversation. The question of
- > whether gene drives are synthetic biology does not have a simple answer a
- > synthetic gene drive is a tool that is a product of synthetic biology. It's
- > like many tools that are the product of an engineering process: it can be
- > used to engineer a new system or it can simply be used.
- > The logic behind this answer is that synthetic biology is defined as the
- > application of engineering principles (e.g. standardisation,
- > modularisation, modelling, predictive design and abstraction hierarchies
- > etc.) to biology and biotechnology. Synthetic biology is not limited to
- > making changes to genomes since you can apply engineering principles to
- > building with biological materials *in vitro* as well as in a cell. The
- > insertion into, or modification of DNA in living cells is, however, where
- > most of the community is working at present. Since we are not yet advanced
- > to a stage where we can consider ourselves as true engineers, synthetic
- > biology practitioners are mainly aiming to advance the science and
- > technologies to enable the engineering of biology to be as predictable (and

s.19(1)

> as easy/cheap/reliable/repeatable etc.) as possible. > While the successful invention of synthetic gene drive systems (and many > other new biotechnolgies) may have required the application of engineering > principles, it does not mean that the use of these tools in any other > process is synthetic biology by default: Synthetic gene drives can be used > in, for example, classical biology experiments 'to observe what might > happen. In most cases being discussed in this group, the aim is to use them > to use them to engineer a biological system as predictably as possible with > predictive modelling done in advance to make a specific, desired outcome as > certain possible. It's very hard to argue that this does not fall into the > above definition of synthetic biology. > Engineering Biology The Genome Analysis > Centre Norwich Science Park Norfolk, NR4 7UH, UK > <%2B44%20%280%291603%20450845>* > *From: * Friedman, Robert [rfriedman@jcvi.org] *Sent:* Thursday, May 05, 2016 5:24 PM > *To:* > *Cc:* > Louter.Jim [NCR]: Philip > Macdonald; > *Subject:* RE: Synthetic Biology – visions of the future SYNENERGENE > Forum 24-25th June 2016 Amsterdam > Hi all— > > Just a quick response to the query whether gene drives are a form of > synbio. I was surprised to read that all seven responders replied "no". I > guess that is technically correct, but perhaps misleading. Hints of the > "process vs product" debate here...

s.19(1)

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> In my view, synthetic biology is a process: a group of methods that can be
> used to genetically modify an organism. An organism with a gene drive is
> the product. The drive is a trait that can be engineered into an organism
> (and, in fact, is sometimes found in nature).
> Decades of prior gene drive research did not use what we now call
> synthetic biology techniques. (Nor were they particularly successful.)
> But in my view, the recent burst of activity to add a desired gene with the
> ability to drive through a population (using CRISPR or other modern
> systems) has relied on the synthetic biology techniques. A good review of
> the different types of gene drive systems is here:
> http://www.nature.com/nrg/journal/v17/n3/abs/nrg.2015.34.html Champer,
> Buchman, and Akbari, "Cheating evolution: gene drives to manipulate the
> fate of wild populations" Nature Reviews Genetics.
> J. Craig Venter Institute
> 4120 Capricorn Lane, La Jolla, CA 92037
> phone:
> cell phone:
> *From:*
> *Sent:* Sunday, May 01, 2016 1:08 AM
> *To:* Boet Glandorf
> *Cc:*
                                     Louter, Jim [NCR];
                                                                     Philip
> Macdonald:
> *Subject:* Re: Synthetic Biology – visions of the future SYNENERGENE
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> Forum 24-25th June 2016 Amsterdam
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>
> Hi
> Thanks for the alert – we have added it to the page on SynBio on the PRRI
> I take this opportunity to ask those who attended SBSTTA what the final
> outcome was on the discussion on SynBio. We heard that the discussions were
> quite heated at one point.
>
> I also take this opportunity to respond to a question I received what the
> feedback was on whether or not people consider gene drives as a form of
> Synbio. We received 7 responses, all saying that they did not consider gene
> drives as a form of SynBio.
 Wishing you all a great remainder of the Sunday!
 On 28 April 2016 at 13:55,
                                                                    wrote:
> FYI
> Kind regards
>
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> The Netherlands
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> Proclaimer RIVM http://www.rivm.nl/Proclaimer
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