Fast Breaking Papers - 2010

April 2010

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James J. Collins talks with *ScienceWatch.com* and answers a few questions about this month's Fast Breaking Paper Paper in the field of Biology & Biochemistry.

Article Title: Diversity-based, model-guided construction of synthetic gene networks with predicted functions
Authors: Ellis, T;Wang, X;**Collins, JJ**
Journal: NAT BIOTECHNOL, Volume: 27, Issue: 5, Page: 465-471, Year: MAY 2009
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SW: Why do you think your paper is highly cited?

We think our paper is highly cited because it addresses an outstanding, important problem in the emerging field of synthetic biology.

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

We developed an innovative methodology that enables one to design and construct synthetic gene networks with predictable functions, without the need for post-hoc tweaking.

Our approach couples libraries of diversified components (synthesized with randomized non-essential sequence) with *in silico* modeling to guide predictable gene network construction.

We used our approach to create synthetic gene networks that can act as predictable timers, and we utilized these networks to control the timing of yeast sedimentation. In doing so, we illustrated how the plug-and-play nature of our methodology can be readily applied to problems in biotechnology.

"Developments in synthetic biology will increasingly impact our society, leading to more effective means to treat diseases, create novel materials, and address our growing energy demands."

SW: Would you summarize the significance of your paper in layman's terms?

Our study serves to fast-track design and construction efforts in synthetic biology.

Prior to our study, the basic task of assembling a predictable gene network from biomolecular parts was far from straightforward, usually requiring significant molecular biology expertise and many months of post-hoc tweaking before a synthetic network with acceptable behavior could be realized.

SW: How did you become involved in this research, and were there any problems along the way?

We have been involved in the field of synthetic biology since its inception. We were motivated to address the above problem because we were frustrated with the extended trial-and-error efforts needed to create synthetic gene networks that function as desired.

SW: Where do you see your research leading in the future?

We are currently working on developing additional, innovative methodologies and resources that can serve to fast-track efforts in synthetic biology. Additionally, we are using these technologies to create novel synthetic gene networks with a diverse array of functions and characteristics.

SW: Do you foresee any social or political implications for you research?

Developments in synthetic biology will increasingly impact our society, leading to more effective means to treat diseases, create novel materials, and address our growing energy demands.

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KEYWORDS: SACCHAROMYCES-CEREVISIAE; MAMMALIAN-CELLS; ESCHERICHIA-COLI; FEEDFORWARD LOOP; EXPRESSION; PROMOTER; CIRCUIT; YEAST; SWITCH; BACTERIOPHAGE.

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