

2010 : April 2010 - Fast Breaking Papers : James J. Collins on Synthetic Gene Networks

Fast Breaking Papers - 2010

April 2010



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

* Boston Univ, Howard Hughes Med Inst, Boston, MA 02215 USA.

* Boston Univ, Howard Hughes Med Inst, Boston, MA 02215 USA.

* Boston Univ, Dept Biomed Engrn, Ctr BioDynam, Boston, MA 02215 USA.

* Boston Univ, Ctr Adv Biotechnol, Boston, MA 02215 USA.

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.

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.

"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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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.

James J. Collins, Ph.D.

Investigator

Howard Hughes Medical Institute

and William F. Warren Distinguished Professor, University Professor

Professor of Biomedical Engineering

Co-Director

Center for BioDynamics

Boston University

Boston, MA, USA

[Web](#)

and Core Founding Faculty Member

Wyss Institute for Biologically Inspired Engineering


Harvard University

Cambridge, MA, USA

[Web](#)

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

 PDF

[back to top](#) 

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