ACS SyntheticBiology
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HANNES BEYER

Hannes Beyer

Current Position. Graduate student at the University of Freiburg in the lab of Prof. Dr. Matias Zurbriggen and Prof. Dr. Wilfried Weber.

Education. Diploma in Biology obtained from the University of Freiburg, Germany (2012).

Nonscientific Interests. Outdoor activities, sports, herpetology and photography. I like exploring nature near and far and to take pictures of all conditions. After work I enjoy hiking, walking and meeting friends.

My research is dedicated to the principles of optogenetics in synthetic biology. Here I like the challenge of interfacing *in vitro* light-responsive switches with material sciences and animal systems. The work here describes the employment of a plant red/far red-light photoreceptor in mammalian cells and zebrafish to regulate protein localization. However, recent lessons learned from the light-mediated spatiotemporal control of biological activities in cellular systems remain yet to be transferred to develop meaningful in vitro applications. A field of high interest! (Read Beyer's article; DOI: 10.1021/acssynbio.5b00004).

JEF BOEKE

Susanne Boeke

Current Position. Director, Institute for Systems Genetics, NYU Langone Medical Center.

Education. Postdoctoral fellow at MIT/Whitehead Institute. Advisor: Gerry Fink. Ph.D. from Rockefeller University. Advisor: Peter Model. A.B. in Biochemistry, Bowdoin College, Brunswick ME.

Nonscientific Interests. Together with two science professional friends made in grad school, I started a bluegrass/Celtic fusion trio called the Southern Blots. The Blots are known for their innovative vocal arrangements and three part harmonies. I play the dobro, Sidney Strickland plays rhythm guitar, and Douglas Daly plays the mandolin and pennywhistle.

There are many ways to splice gene parts together to assemble expression cassettes (referred to as transcription units or TUs in this paper). What is described here is a very standardized assembly method for building such constructs that is highly efficient and entirely systematic and automatable. It uses plasmid minipreps as starting material and does not employ PCR amplification, which means the likelihood of an unwanted mutation creeping into the end construct is orders of magnitude less likely. Also, no oligonucleotides need to be designed as primers. Libraries of parts made according to this scheme are readily interchangeable. (Read Boeke's article; DOI: 10.1021/sb500372z).

KATHLEEN A. CURRAN

Kevin Curran

Current Position. Scientist, Amyris Inc.

Education. Ph.D. Chemical Engineering, The University of Texas at Austin (2014). Advisor: Hal Alper; B.S.E. Chemical Engineering, University of Notre Dame (2007).

Nonscientific Interests. Ceramic arts and cooking.

In my Ph.D. work, I was interested in predictably and rationally altering gene expression in eukaryotes. In this paper, we demonstrate that synthetic, rationally designed terminators can alter transcript levels and corresponding protein levels in yeast. This is a step toward computationally designing synthetic expression cassettes. This capability would move us away from the tedious "guess-and-check" method of assembling functional heterologous pathways and circuits to designing and building them *de novo* with synthetic parts. (Read Curran's article; DOI: 10.1021/sb5003357).

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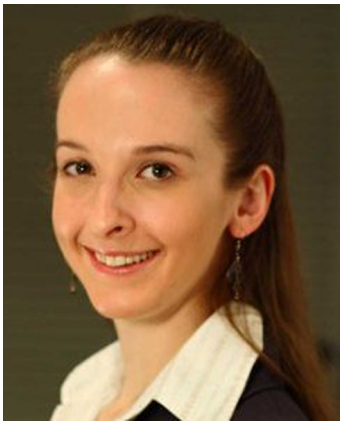
DAWN ERIKSEN



Prashun Gorai

Current Position. Metabolic Engineer at GreenLight Biosciences, Medford MA.

Education. Ph.D. in Chemical Engineering from University of Illinois, Urbana−Champaign. Advisor: Dr. Huimin Zhao. B.S. in Chemical Engineering and Biochemistry from the University of Massachusetts − Amherst. Advisor: Dr. Lianhong Sun.

Nonscientific Interests. Scuba diving, rock climbing, bird watching, quilting, and reading.

My overarching interest is to be a part of the scientific community that can revolutionize industrial chemical production to be sustainable and independent of petrochemicals. My Ph.D. work focused on strategies to optimize biosynthetic pathways for biofuel production in *S. cerevisiae*. Some of my previous work involved developing novel tools to engineer multiple proteins of a biosynthetic pathway simultaneously. The work featured in this issue of *ACS Synthetic Biology* explored an orthogonal route for fatty acid synthesis, reducing the metabolic burden. These new strategies to improve chemical production supplement the fabulous toolbox scientists are generating to develop microbes as robust industrial chemical factories. (Read Eriksen's article; DOI: 10.1021/sb500319p).

KATHRIN HERBST

Kathrin Herbst

Current Position. Searching for new opportunities.

Education. Ph.D. in Biology, Ruperto Carola University of Heidelberg, Germany; Department for Toxicology and Genetics, Karlsruhe Institute of Technology, Germany and candidate of BIF-IGS (BioInterfaces Graduate School). Advisor: Prof. Uwe Strähle; M.Sc. Biology, Leibniz Research Centre for Working Environment and Human Factors (IfADo). Advisor: Dr. Peter H. Roos; B.A. Biology and English, Ruhr-University of Bochum, Germany.

Nonscientific Interests. As a former artistic gymnast, anything sports: running, cycling, canoeing, climbing, skating, body skills and power yoga. Apart from that I enjoy exploring new countries, cultures and cuisine without following the typical touristic stream as well as discovering new and nice places in the surroundings.

I am generally interested in engineering and fabricating tools that can be applied to answer important questions in biological systems. In my Ph.D. work I focused on the establishment of molecular tools to specifically modulate cis-regulatory elements in zebrafish. Both synthetic customized *TALEN* as well as the *CRISPR* based system were shown to allow for targeted mutation of enhancer elements. Furthermore, customized synthetic transcription factors (TALEs fused to regulatory domains) were shown to be functional in zebrafish embryos. In this article a plant-derived red light sensitive expression system was adapted for the use in zebrafish embryos showing that the activation of gene expression can be rendered conditional by the red light-induced translocation of a transcription factor. In the future a modified TAL activator based two-component expression system that integrates a DNA-binding domain of a tailored unique specificity and the light controlled expression system might allow for modulating enhancer expression *in vivo* in a precise spatial and temporal manner to better understand complex gene regulation during vertebrate development. (Read Herbst's article; DOI: 10.1021/acssynbio.5b00004).

VICTOR HOLMES

Elva Huang

Current Position. Senior Scientist at Amyris, biology group, leading strain development for multiple products.

Education. Postdoctoral work at U.C. Berkeley in Environmental Engineering. Worked with Lisa Alvarez-Cohen on microbial degradation of chlorinated solvents. Ph.D. from U.C. Berkeley (2001) in Biochemistry and Molecular Biology. Worked with Nick Cozzarelli on DNA recombination and DNA compaction. S.B. from MIT (1995) in Biology. Worked with Harvey Lodish on Erythropoietin signaling.

Nonscientific Interests. Bicycling, singing, juggling, and parenting.

My career is a meandering path toward easing the interactions between humankind and the planet. I'm excited about synthetic biology because I believe it may provide tools our species can use to mitigate the negative aspects of our global impact—from cleaning up toxic waste to consuming cleaner, low-impact fuels. Over the past 10 years I've been delighted to see the field build momentum and grow a critical mass of advocates and practitioners. The work described here is one more tool reducing synthetic biology from cutting edge research to practice, and I sincerely hope what we've done can help other groups or inspire

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researchers to go even further. (Read Holmes' article; DOI: 10.1021/sb500362n).

SAMUEL JUILLOT

Samuel Juillot

Current Position. Ph.D. Candidate, Spemann Graduate School of Biology and Medicine, Department of Biology, University of Freiburg, Germany. Advisor: Jr Prof. Winfried Römer.

Education. M.Sc. in Biotechnologies, SupBiotech Paris, France (2012). M.Sc. in Synthetic Biology, University of Evry Val d'Essonne, France (2012).

Nonscientific Interests. Climbing, rollerblade, circus, magic.

My research is focused on developing and utilizing new optogenetic tools, mainly for controlling the localization of proteins within different compartment of cells. This paper represents a significant step in that direction, providing us with a new way to control by two different wavelengths the nuclear import and export of proteins, like transcription factors. Currently, I am working on a better characterization of the nuclear transport mechanism by doing reconstitution of the system with isolated nuclei and purified proteins. I am generally interested in engineering biological tools that can then be applied to answer fundamental biological questions, in particular the use of optogenetics in neurobiology. In the future I hope to continue working toward the goal of expanding the toolbox of synthetic systems for a direct use in fundamental biology. (Read Juillot́s article; DOI: 10.1021/acssynbio.5b00004).

CYRUS MODAVI

Robert Frawley

Current Position. Ph.D. student in the UC Berkeley/UCSF Graduate Program in Bioengineering. Current Advisor: Dr. John Dueber.

Education. B.S. in Bioengineering from the University of California, Berkeley (2012). Advisor: Dr. Lewis J. Feldman.

Nonscientific Interests. My favorite recreation activity is exploring new places with my camera to take pictures of all the wildlife and plants. Complementing this, I occasionally like to write short science fiction stories.

A central goal of my thesis is utilizing and engineering tailoring enzymes, such as glucosyltransferases, for metabolic engineering applications within *Saccharomyces cerevisiae*. Such enzymes are incredibly important for obtaining or altering the bioactivity and properties of many small metabolites. As such, a high-throughput method for enzyme profiling that couples genotype to phenotype is a powerful tool for identifying or characterizing enzyme activity. Moving forward, I hope to improve the DNA-Linked Enzyme Coupled Assay and apply the technology toward enzyme engineering goals. (Read Modavi's article; DOI: 10.1021/sb500341a).

CHRISTOPHER REEVES

Camilla Fonseca

Current Position. Senior Scientist, Metabolic Engineering, Amyris.

Education. Postdoctoral fellow, Washington State University, Pullman, Advisor: Prof. Thomas Okita. Ph.D. in Chemistry, University of California, San Diego, Advisor: Prof. Benjamin Volcani. B.A. in Biochemistry, University of California, Berkeley.

Nonscientific Interests. Guitar, hiking, biking, world exploration.

I have worked in the biotechnology industry for many years and have engineered many different microbes to produce many different products. From the days when autoradiograms were read manually to today's next-generation sequencing technologies, I have sought accurate DNA sequence data to ensure that my engineering was correctly executed. In this era of Synthetic Biology, the number of DNA "parts," DNA "assemblies," and engineered strains one can generate in a month has increased dramatically. Yet a cost-effective sequence verification of those DNA assemblies has been lacking until now. Here we describe such a method and show that even the most accurate DNA assembly methods introduce mutations that must be detected to avoid wasted time and erroneous data. (Read Reeves' article; DOI: 10.1021/sb500362n).

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THOMAS STEELE REYNOLDS

Brett Fiedler

Current Position. Ph.D. student in chemical and biological engineering at the University of Colorado. Advisor: Dr. Ryan Gill.

Education. M.S. in chemical engineering from the University of Colorado Boulder, 2014. Advisor: Dr. Ryan Gill. B.S. in chemical engineering from the University of Kansas, 2011

Nonscientific Interests. Scuba diving, craft beer, and my dogs Bean and Hops.

My current research is focused on redox cofactor balancing for product production in *Escherichia coli*. This paper was the result of considering how the biology of the cell can impact metabolic engineering efforts. It illustrates how recombination efforts for metabolic engineering projects can be confounded by chromosome copy number and shows the importance of ensuring genetic homogeneity in lab strains. (Read Reynolds' article; DOI: 10.1021/sb500338g).

ELAINE SHAPLAND

Kati Wu

Current Position. Scientist, leader of Automated Strain Engineering group.

Education. Ph.D. Microbiology, University of California, Berkeley. Identified a bacterial tyrosine phosphatase essential for membrane cleavage at cell division, with Dr. Kathleen Ryan. B.S. Biology and Environmental Sciences, Tufts University, Medford, Massachusetts.

Nonscientific Interests. Running, swimming and art. Oh wait—that was then... These days I enjoy playing with Legos, dancing to silly songs and reading books.

I've always enjoyed the process of making things, and making them better, whether it is perfecting recipes, running faster, or more recently creating a pipeline to generate the highest quality data for a very large number of plasmids. In the past few years at Amyris, we've been able to fine-tune our DNA construction and quality control pipelines so that we are able to speed the design-build-test-learn cycle of strain construction. These complex tasks must be carried out by a team of researchers working effectively together. One of my favorite activities is mentoring the team, teaching them all the technical details of each step in their workflow. High throughput molecular biology is my favorite team sport. (Read Shapland's article; DOI: 10.1021/sb500362n).

DAVID J. SUKOVICH

Andrew Chang

Current Position. Staff Research Associate IV, Dr. Adam Abate, Dept. of Bioengineering and Therapeutic Sciences, University of California San Francisco.

Education. Postdoctoral Scholar, Department of Biological Engineering, University of California Berkeley. Advisor: Dr. J. Christopher Anderson; Postdoctoral Associate, Department of Biological Engineering, Massachusetts Institute of Technology. Advisor: Dr. Christopher Voigt; Ph.D. Microbiology, University of Minnesota, (2010). Advisor: Dr. Lawrence P. Wackett; B.A. Biology, Carleton College (2004).

Nonscientific Interests. Visiting new countries. Spending quality time with friends and sharing experiences such as good food, art, and music.

Recently, my scientific focus has been dedicated toward the development of technologies that can be used to identify novel substrate-specificities of enzymes. Currently there are thousands of known and hypothetical enzymes in the public databases, but little is understood about their activities with nonpreferred substrates. My goal is to use our newly developed assays, such as the DNA-linked enzyme-coupled assay described in this publication, to find previously undocumented enzyme activities on novel chemicals. In particular, I am interested in finding enzymes that can modify small molecules to increase their potencies against biological agents. In the future, I would like to pursue the development of additional novel assays in order to probe the diverse uncharacterized enzymatic populations that have already been identified. (Read Sukovich's article; DOI: 10.1021/sb500341a).

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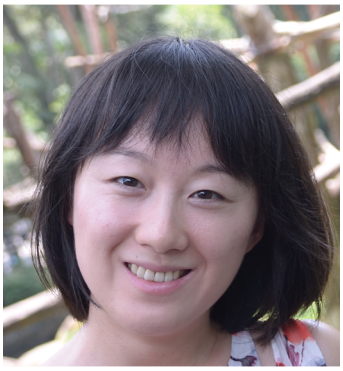
YUN YANG



Yun Yang

Current Position. Final year Ph.D., School of Chemical and Biomedical Engineering, Nanyang Technological University, Singapore. Advisors: Prof. Hao Song, Prof. Chueh Loo Poh, and Prof. Bin Cao.

Education. B.S. and M.S. in School of Life Sciences, Tsinghua University, China. Advisors: Prof. Guoqiang Chen, and Prof. Qiong Wu.

Nonscientific Interests. In my spare time, I love to take vacations by the sea, feel the sea wind, watch the sunrise and go diving.

I am interested in exploring microbial electrofermentation where the intracellular reducing pool is connected with extracellular electrodes. During my Ph.D., I tried to program the extracellular electron transfer (EET) rate of *Shewanella oneidensis* in bioelectrochemical systems using synthetic biology approaches. Flavins, the crucial electron shuttle of the EET pathway of *S. oneidensis*, were overproduced by introducing a synthetic flavin biosynthesis module from *Bacillus subtilis*, a natural flavin producer. This recombinant *S. oneidensis* strain boosted bioelectricity production ~13 times over its wild-type strain. Future work will involve generating synthetic membrane redox loops that enable inward current and microbial electrosynthesis in *S. oneidensis via* synthetic biology strategies. (Read Yang *et al.*'s article; DOI: 10.1021/sb500331x).

MATIAS ZURBRIGGEN

Mattias Zurbriggen

Current Position. Assistant Professor, Synthetic Biology, BIOSS and University of Freiburg, Germany (2012–2015). Full Professor, Synthetic Biology, CEPLAS and University of Düsseldorf, Germany (starting as of October 2015).

Education. Alexander von Humboldt Foundation Research Fellow, University of Freiburg, Germany. Advisor: Prof Wilfried Weber (2011–2012). Postdoctoral Fellow, National University of Rosario, IPK-Gatersleben, Germany, and John Innes Centre, Norwich, UK (2009–2011). Advisor: Prof Nestor Carrillo. Ph.D. Biology, National University of Rosario, Argentina and Leibniz-IPK Gatersleben, Germany (2009). National Research Council of Argentina, EMBO and DAAD fellow. Advisor: Prof. Nestor Carrillo.

Nonscientific Interests. Outdoor activities, music, traveling/exploring different countries and cultures.

My research perspective is to apply synthetic biology to control and quantitatively understand eukaryotic signaling processes and regulatory networks in a quantitative and spatiotemporally resolved manner. To this aim, I follow an interdisciplinary approach at the interface between plant and mammalian synthetic biology toward engineering synthetic signaling networks, biological sensors, and chemical and optical switches. In the present work we describe the development of a red light-inducible protein nuclear transport system functional in mammalian cells and zebrafish. This system constitutes the first red light dependent, phytochrome-based optogenetic tool applied *in vivo*. Moreover, beyond being a universally applicable tool in cell biology, our orthogonal system represents a novel concept for elucidating the mechanism of red light-perception in plants—a field still being controversially debated. (Read Zurbriggen's article; DOI: 10.1021/acssynbio.5b00004).

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