Introducing our AUTHORS

Image courtesy of Marie-Lyn Hecht.

Marie-Lyn Hecht

Current position: Max Planck Institute of Colloids and Interfaces, Dept. of Biomolecular Systems, Ph.D. student with Prof. Peter H. Seeberger
Education: ETH Zurich, M.Sc. ETH in Biochemistry, 2006
Nonscientific interests: Hiking, traveling, yoga, and Japanese cuisine

My research interest has been focused on elucidating the role of carbohydrates in cell-signaling processes at a molecular level. To date, little is known about the exact functions of these macromolecules in signaling pathways. This is mainly due to the lack of pure and well-defined oligosaccharides that could previously be obtained only by isolation. With a library of synthetic heparins and inositol phosphoglycans (IPGs), however, detailed structure−activity relationships could be established. Hence, structural patterns and particular functionalities on the oligosaccharides, essential for the execution of their presumed biological function, were identified for various signaling processes. In this paper, I established a set of *in vitro* and *in vivo* assays to test IPGs for their insulin-mimetic activity. I am excited to work in an interdisciplinary environment that allows me to interact with chemists to design sophisticated tools for the elucidation of the vast biological roles of carbohydrates. After receiving my Ph.D. I will pursue my postdoctoral studies at Harvard Medical School where I wish to investigate the role of carbohydrates in tumorigenesis of brain cancer. (Read Hecht's article, DOI: 10.1021/cb1002152)

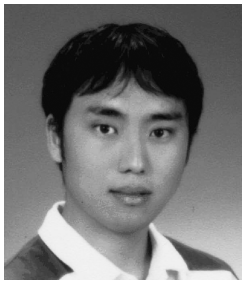

Image courtesy of Jungjoon Lee.

Jungjoon Lee

Education: University of Cambridge, 2001−2005, Advisor, Professor Carol V Robinson FRS; Stanford University 2005−present, current Advisor, Professor Jianghong Rao
Nonscientific interests: Swimming, golf, fencing, and reading literature

This paper is about our current effort on developing techniques to trace the local concentration of the biomolecule called RNA within the live cell. We synthesized a small molecule probe that becomes fluorescent if it binds to a specific RNA sequence, which was fished out from a random RNA pool using a special technique called "SELEX". We are still in the process of optimizing the probe to work *in vivo*. Once developed, the live cell RNA imaging probe will have a huge impact on both academia and industry. For the academic world, it will allow biologists to understand how cells regulate RNA both spatially and temporally. These new findings will allow new opportunities for biotech and pharmaceutical companies. (Read Lee's article, DOI: 10.1021/cb1001894)

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Image courtesy of Hyelim Yu.

Kyung Hyun Lee

Current position: Stanford University, Department of Radiology and Molecular Imaging Program at Stanford (MIPS), Postdoctoral Scholar with Prof. Jianghong Rao
Education: Dankook University, Seoul, Korea, B.S. and M.S. in molecular biology with Prof. Sunjoo Jeong, 2000 and 2002; Korea University, Seoul, Korea, Ph.D. in biochemistry with Prof. Jaehoon Yu and Prof. Yong Keun Park (Joint program with Korea Institute of Science and Technology, Seoul, Korea), 2009
Nonscientific interests: Asian history, soccer, tennis, traveling, and reading

My research has focused on the development of RNA aptamers as tools to understand biological systems including "RNA world" and the development of specific RNA-targeting molecules in terms of the cellular RNAs (e.g., mRNA, rRNA, micro RNA) as promising drug targets for therapeutics. Now, I'm trying to develop the RNA aptamer-based *in vivo* RNA imaging system with Prof. Jianghong Rao and colleagues. The study of RNA world is a challenging area, which has many mysteries to be uncovered by researchers. Current *in vivo* RNA imaging systems are not sufficient for study of RNA biology and that causes limitations when going into deep parts of RNA world. Therefore, more advanced and efficient *in vivo* RNA imaging systems must be achieved ahead of exploring RNA world more deeply. RNA tagging systems employing RNA aptamer-fluorescence dye pairs could be one of many promising systems to visualize the cellular RNAs *in vivo*, as green fluorescent protein (GFP) tagging systems work in protein study. I hope to develop useful RNA imaging systems, and then I'd like to equip my systems for exploring into the RNA world in the near future. This work is one of recent efforts to develop useful RNA imaging systems. (Read Lee's article, DOI: 10.1021/cb1001894)

Image courtesy of Pamela Rodriguez.

Pamela Rodriguez

Current position: Columbia University, Department of Chemistry, recently defended my doctoral dissertation with Professor Dalibor Sames
Education: Florida Institute of Technology, B.S. in Chemistry and Biochemistry, 2005; Columbia University, Ph.D. in Chemistry, fall of 2010
Nonscientific interests: Cooking, reading, and traveling

My research in the Sames laboratory has focused on the development of small fluorescent molecules for the study of metabolic pathways and synaptic transmission. The work presented in this paper describes a novel approach for the study of metabolic fluxes in intact cells. Via a two-substrate competition between the physiological substrate and the fluorogenic substrate, we were able to study the activity of the enzyme 5α-reductase, a key enzyme in the testosterone metabolic pathway, by fluorimetry and fluorescence microscopy. My most current work in the Sames group involves the use of optical tracers for the study of dopamine neurotransmission. (Read Rodriguez's article, DOI: 10.1021/cb100196n)

Image courtesy of Yegor Smurnyy.

Yegor Smurnyy

Current position: Ph.D. student in Biological and Biomedical Sciences with Prof. Ulrike Eggert, Harvard Medical School and Dana-Farber Cancer Institute
Education: Moscow State University, Russia, B.S. in Chemistry, diploma thesis advisor Prof. Vladimir Polshakov
Nonscientific interests: Cooking, hiking, and cinema

We develop small molecule probes to study the dynamic process of cell division. Initial discovery of a molecule in a high-throughput screen is followed by target identification and *in vivo* validation, a challenging and exciting goal. In this paper, we characterize Binucleine 2, the first selective inhibitor of Drosophila Aurora B kinase. Most kinase inhibitors form hydrogen bonds with the "hinge" part of the ATP binding pocket and gain selectivity by utilizing adjacent hydrophobic regions. In a unique fashion, Binucleine 2's selectivity arises from the single hydrophobic interaction with a residue in the hinge region. After target identification, we used the new tool to show that Aurora B enzymatic activity is dispensable for cytokinesis and hypothesized that instead the kinase might have a structural role. (Read Smurnyy's article, DOI: 10.1021/cb1001685)

Introducing our AUTHORS

Image courtesy of Le Su.

Le Su

Current position: Shandong University, School of Chemistry and Chemical Engineering, Postdoctoral Researcher with Prof. BaoXiang Zhao
Education: Shandong University, School of Life Science, China, B.S. in Biology, 2004; Shandong University, School of Life Science, Ph.D. in Cell Biology under supervisor Prof. JunYing Miao, 2009
Nonscientific interests: Music, home improvement, and traveling

My research is focused on deciphering the cell signal pathway by using chemical small molecules that we synthesized ourselves. We found some new compounds that could modulate proliferation, differentiation, autophagy, or apoptosis in vascular endothelial cells, neural stem cells, and bone-marrow stromal cells. We discovered several new factors involved in the cellular processes by exploiting these small molecules. In this work, we report that a novel benzoxazine derivative (6-amino-2,3-dihydro-3-hydroxymethyl-1,4-benzoxazine; ABO) that is synthesized in our laboratory could induce bone-marrow stromal cell differentiation into vascular endothelial cells and elucidate the key role of Hmbox1 for the first time in this process. (Read Su's article, DOI: 10.1021/cb100153r)

Image courtesy of Nicolas Willand.

Nicolas Willand

Current position: University of Lille 2-University Lille Nord de France, Department of Organic Chemistry as Associate Professor and Inserm U761 Laboratory as Team Leader
Education: University of Lille 2, Department of Organic Chemistry, Ph.D. with Prof. André Tartar, 2003
Nonscientific interests: Music and art especially photography, traveling, and scuba diving

Inserm U761 Unit, directed by Pr. Benoit Deprez, is dedicated to drug design, discovery, and selection. Our project teams gather chemists and biologists that cooperate with scientists on the discovery and validation of novel targets. Our know-how is a combination of academic and industrial experience. It spans from medicinal chemistry, parallel synthesis, and library management to high-throughput screening bioanalysis and early DMPK. My research at U761 in collaboration with the A. Baulard team (Inserm U1019) focuses on the development of new strategies to treat tuberculosis. Our work aims to develop inhibitors of transcriptional regulators that control the bioactivation of known antituberculosis drugs such as ethionamide or isoniazid. We recently reported that inhibition of protein EthR with a small molecule (BDM31343) led to a 3-fold boost of the antimycobacterial efficacy of ethionamide both *in vitro* and *in vivo*. In our quest to optimize our inhibitors we report here the application of an *in situ* click chemistry approach to explore flexibility of the EthR binding domain that led to the discovery of a new accessible cavity. We are currently working on the development of a preclinical candidate as well as the optimization of new EthR inhibitor chemotypes, which display different risk profiles. (Read Willand's article, DOI: 10.1021/cb100177g)

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Image courtesy of Dominic Yee.

Dominic J. Yee

Current position: Vertex Pharmaceuticals, Scientist I in Formulation Development
Education: University of California at San Diego, Department of Chemistry and Biochemistry, B.S. in Biochemistry, 2001; Columbia University, Ph.D. in Chemistry with Prof. Dalibor Sames, 2006; University of California at San Diego, Department of Chemistry and Biochemistry, Postdoctoral Researcher with Nobel laureate Roger Tsien, 2006–2009
Nonscientific interests: Playing basketball, cooking, and volunteering

I am currently a research scientist at Vertex Pharmaceuticals in Cambridge, Massachusetts as well as a bioanalytical chemist with diverse knowledge and experience in drug screening, characterization, and formulation. My interests are in innovating molecules and methods to improve healthcare and medicine. I am also an advocate for translational research, improved education, and collaboration. Before entering the pharmaceutical industry, I was a postdoctoral research fellow with Nobel laureate Roger Y. Tsien, working on new strategies for directing therapeutic and imaging agent delivery to cancer and other diseased sites. Prior to that, I was instrumental in building the Sames molecular imaging program at Columbia University and in 2005 earned the ACS Medicinal Division Fellowship for my work developing novel fluorescent probes and assays for monitoring cellular oxidation and reduction processes. The work published in this issue describes an application of a probe I helped develop to afford information about the flux through 5α-reductase. (Read Yee's article, DOI: 10.1021/cb100196n)

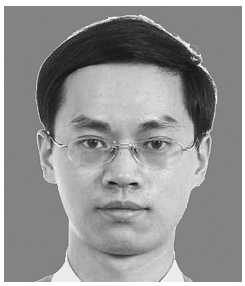

Image courtesy of Bifeng Yuan.

Bifeng Yuan

Current position: University of California at Riverside, Department of Chemistry, Postdoctoral Researcher with Prof. Yinsheng Wang
Education: Wuhan University, B.S. in Biochemistry, 2001; Wuhan University, Ph.D. in Biochemistry and Biophysics with Prof. Zheng Tan, 2006
Nonscientific interests: Sports, movies, and playing with my daughter

Living cells are constantly exposed to environmental and endogenous agents that inflict damage to DNA. The DNA lesions formed in cells may affect the primary structure of the DNA double helix and induce mutations in genomic DNA, which can cause various diseases, including cancer. My research focuses on employing an integrated chemical biology approach to examine the mutagenic and cytotoxic properties of DNA lesions in cells. By using shuttle vector technology, we demonstrated in this paper that a widely prescribed anticancer reagent, 6-thioguanine, after being incorporated into DNA, could induce G→A mutation at a frequency of ~8%. The mutagenic properties of 6-thioguanine provided significant evidence for mutation induction as a potential carcinogenic mechanism underlying the treatment-associated secondary tumor development. (Read Yuan's article, DOI: 10.1021/cb100214b)