Biophysicist in Profile

Wonpil Im

The only thing that Wonpil Im has ever done to ensure himself anything resembling a predictable future was to heed his uncle's advice about job security by getting a degree in the sciences. His arrival at his current position as Assistant Professor and 2007 Alfred P. Sloan Research Fellow in the Department of Molecular Biosciences at the University of Kansas, Lawrence, is the result of hard work, some networking, and an utterly fearless personality.

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Im accordingly began his undergraduate career in the chemistry department of Hanyang University in Seoul, South Korea. By his senior year, he had found his passion for computational chemistry in *Youngdo Won's* lab, where he stayed to complete his MSc. As he began looking abroad for a suitable place to pursue his PhD, it became clear that his English scores were insufficient to admit him into any graduate program in the US. Won, believing his student deserved a chance, made a call to his friend *Benoît Roux* at the University of Montreal. Shortly thereafter, Im joined Roux's lab, leaving both his interim job teaching science to private school students and his home in Seoul behind.

Roux proved to be a singular mentor. "He taught me many skills with great patience," Im says. Initially, Im's poor English required the pair to painstakingly pass notes between them until they understood each other. This plan proved effective: Im soon began absorbing elements of Roux's expertise in continuum electrostatics and membrane simulation to even Roux's satisfaction. "I had high expectations about Wonpil's ability," Roux says. "He surpassed those expectations many times."

Today, Roux helps test the results obtained by Im's pet project, CHARMM-GUI, an academic biomolecular simulation program with a web-based graphical user interface to help users create and test complex calculations. The program does everything from performing standard molecular dynamics and energy minimization to calculating chemical and conformational free energy and providing tools for analysis and manipulation of atomic coordinates and dynamics trajectories. *Sunhwan Jo*, a graduate student in Im's lab, has been assisting with CHARMM-GUI development since his undergrad years. "I thought it was just building a simple web interface for PDB file conversion for simulation software," says Jo, "but apparently, [Wonpil] had a bigger plan." CHARMM-GUI's goal is to allow accessibility worldwide so users can "generate various input files and molecular systems to facilitate and standardize the usage of common and advanced simulation techniques," Im says. The interface has so far garnered more than 78,050 usages from around the globe.

Such levels of student assistance with hefty projects are not unprecedented in Im's lab. "He is a very energetic and engaging mentor," says Jo. Im's students are inspired by his exuberance and his genuine interest in the work they do en route to their respective careers. "Once you have earned Wonpil's trust he will be dedicated to making you the best scientist he possibly can," says *Philip Morris*, one of Im's undergraduate students. "He sees your potential

and knows how to help you achieve it." For Im, achievement is as easy as knowing what you want and taking steps to get it, while taking setbacks in stride. "I often tell my students, 'If you are given a project, and the project ends without a single problem, then who is smart? You learn things most when you overcome challenges,'" Im says. "In my work, developing the methods that do not exist and interpreting the results of such new methods are the most challenging tasks."

For Im, this particular philosophy applies to science as well as to life. His postdoc with *Charles Brooks III*, Warner-Lambert/Parke-Davis Professor of Chemistry and Professor of Biophysics at the University of Michigan, was ideal training ground for Im to meld his personal style with the fundamentals he learned from Roux. Im convinced Brooks to let him develop another GB model, and Brooks was glad he did. "Wonpil felt strongly that he could reformulate aspects of the model in a manner that kept the best qualities of existing models and provided advantages over some of them," says Brooks. Brooks, Im, and postdoc *Michael Lee* developed and implemented the GBSW approach and collaborated with *Michael Feig* to generalize it to the treatment of membrane environments. "Wonpil is a very energetic and enthusiastic colleague," says Feig, "always full of ideas and never discouraged to pursue a scientific question he set out to explore."

While in Brooks' lab, Im was deciding what uncharted scientific terrain he wanted to explore next. "I thought, I know I have many holes in my background and my English skills are poor, but it might be fun to see how far I can reach among many smart people in the field." With that, he joined the University of Kansas, Lawrence faculty. Along with the CHARMM-GUI project, his lab also uses transmembrane (TM) modeling, standard molecular dynamics simulation, and novel free energy calculation to understand membrane protein structure and function by determining the delicate balance of forces governing TM helix-helix and helix-lipid interactions, especially TM-induced signaling of cytokine receptors and TM-induced immunoregulation/signaling, with collaborators *Anthony Kossiakoff, Jose Villadangos*, *Satoshi Ishido*, and *Matthew Call*. "Computational biophysics is certainly heading to larger scale simulations," he says. "Yet, we are still lacking much fundamental understanding even on smaller scales. I would like to contribute to fundamental understanding of TM-induced signaling that involves two TM helices as a minimum functional unit."

Im and his daughter, Nayoung, walking in Chicago.

Though Im sticks with what he knows consistently enough to become an expert, he yearns to develop new projects as he is enlightened by his research. "I learn lots of new things from my work," he says. "I do want to expand my research interest to challenging biophysical topics that I never worked on." Many of these novelties he publishes, often in *Biophysical Journal*. He regularly attends BPS Annual Meetings, viewing them as an opportunity to share cutting-edge science—and to cut a rug. "As serious as Wonpil is about discussing science during the BPS Meeting poster sessions," says Feig, "he is about the BPS Meeting dance. He always insists on going early and reserving a table near the dance floor to make sure he gets the most out of it."

"What stands out [about Im] is that he continues to grow," says colleague *Olaf Andersen*, professor in the Department of Physiology and Biophysics at Weill Cornell Medical College. "He seems to be intrepid, without making waves." This ever-present growth as a scientist and as an individual stems from both the passion Im brings to his work and his continual reassessment of his level of contentment with it. "The very first reason why you want to [build a career in science] should be that you really like what you are doing, so that you have a mental power to overcome such difficulties, yet enjoy your research," he says. "I do not see my limits yet, expecting much more scientific fun stuff in my lab."