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Biophysicist in Profile

CRAIG GOUGH

Craig Gough, founder of Reconesis, a biotech and pharmaceutical consulting company based in Tokyo, Japan, knows when to stick with his strengths. “My talent is being able to recognize which combination of previously published methods is appropriate for a problem, rather than developing novel techniques,” he says. This talent, whether used for researching real-world applications in the lab or improvising a jazz solo at the piano, earns him his living.

Gough got started in science by way of music. A professional musician right out of high school, he spent a few years playing gigs around Vancouver. He even entered Berklee College of Music in Boston to continue his musical education. However, it only took a year in Boston, with its multitude of universities offering countless opportunities, to realize that there was more to his general childhood interest in science. He reclaimed that interest at McGill University in Montreal, majoring in biochemistry. After completing his undergraduate degree, he modeled himself after chemical physics majors at Cornell University, taking the courses they took, which piqued his interest in areas like quantum mechanics and newer, juicier aspects of biophysics. Exploring this territory, Gough excelled. “Craig is all or none in any endeavor or project,” says *Andrew Carmen*, a fellow student at Cornell and a member of Alpha Chi Sigma, the national chemistry fraternity, of which Gough was also a member. “He can often cut through the theoretical space like a bullet to make profound insights that others casually miss.”

Faced with deciding what to do next to take advantage of this ability and his freshly earned masters in biophysical chemistry, Gough transferred to the University of California, San Francisco (UCSF), where he found a plethora

of options. “As it turned out, at that time molecular dynamics of macromolecules was just starting to come into its own and I saw that with more computational power, this method could have vast potential to solve biological problems,” he says. He hastened

to join *Peter Kollman’s* lab, where he stayed throughout his PhD.

Gough continued at UCSF as a postdoc in *Raj Bhatnagar’s* lab, which proved to be challenging. “This was an experimental lab, with no other computational experts present, in which I was expected to use computational chemistry to tackle problems related to the design of bioactive peptides derived from proteins,” he recalls. There was, however, a bright side. “It was worth tackling the challenges inherent in this position,” he says, “as some of the projects I worked on involved collaborations with industry, and I could see the advantages of working in industry.”

One of his industry partners was *Amrit Judd*, President and CEO of Synvax, Inc., who enlisted Gough for help on an NIH-funded project developing antivirals for influenza. She couldn’t have found a more informed colleague, recalling vividly “his thorough knowledge about almost all the programs and

“The most attractive aspect of working in industry is being able to use a variety of approaches to solve a particular problem.”

—CRAIG GOUGH

tools available to conduct computational chemistry and design biologically active compounds, especially peptides to make them therapeutically useful,” she says.

After his postdoc, Gough joined the Integrated Database Team at the Japan Biological Information Research Center (JBIRC) in Tokyo. Five years later, Gough sensed that the project was “winding down,” he says. He knew he had to take another path if he wanted to keep pursuing his own work. He also knew he wanted to stay in Japan with his wife, *Chie Shinohara*, a neurosurgeon with an already prosperous career. After a fruitless search for a position in academia or industry that matched his ideal, Gough opted to blaze his own trail. “I decided to start Reconesis,” Gough says, “pursuing the research in which I’m interested and developing aspects of that research which could be valuable in terms of services and consulting to biotech and pharmaceutical companies as well as academic groups.”

With Reconesis, Gough created a career that offers the freedom to research what he wants, when he wants, where he wants. “I am predicting sites in the three-dimensional structures of proteins which are dynamically coupled to functional sites such as ligand binding sites and/or catalytic active sites and which could positively or negatively modulate the activity of those sites,” he says. Putting his innate talent to work, he takes an existing knowledge base of methods and improvises new uses for them. “I am using these approaches on a large number of proteins of pharmaceutical interest in order to show the potential for developing drugs that could inhibit or activate the proteins in question for the purposes of disease therapy,” he says.

With so much independence inside a niche market, Gough faces his own set of difficulties. “The most challenging aspect of my work is choosing problems that are simultaneously soluble, intellectually interesting, and relevant enough to other groups in industry or academia to be a source of income,” he says—a formidable task, but one he has honed down to a science. He typically starts with the literature. “The existence of well-tested published methodology suggests that your extension of the method beyond the published test cases to practical cases is likely to result in successful solution of the relevant problems,” he explains,

“while the fact that this new methodology requires specialized expertise not commonly found in industrial or academic settings means that it’s not hard to demonstrate how your own work can be useful to other research groups, for marketing purposes.” For Gough, working out new real-world solutions using these tools is heady stuff, with a generous payoff. “The intellectual interest comes from the challenge of applying the methodology to novel situations, which might present more difficulties and complications than the published test cases,” he says.

Finding customers is a challenge in itself. One tried-and-true avenue down which he struts his sales pitch is the Biophysical Society Annual Meeting. “The annual meetings provide a broader exposure than more focused meetings such as those in theoretical chemistry or biochemistry,” he says. “They have been most useful for meeting academic specialists in other fields who may be possible collaborators and/or users of the services of Reconesis.”

Gough’s self-made career leaves him ample flexibility for family time. He and his wife often travel together, especially to the mountains for a change of scenery from their urban home. Shinohara is also a musician; listening to classical and jazz music, as well as playing it themselves, supplies a favorite pastime for the couple. “He’s taught me ... to improvise on violin in a jazz context, to develop the intuitive freedom to do this,” says Shinohara. “However, I think he didn’t really teach me in a formal way, he just provided an environment where I could pick it up by myself.”

Indeed, Gough fostered his own independent spirit when he embarked on his unique career path. “Consider all of the career options that are open, not just the path leading to a traditional academic faculty position,” he advises. “In the past, a faculty position may have been the only option in which to pursue basic research in biophysics; industry positions involved applied research that was less creative and less independent. However, in recent years companies have begun doing the kinds of research once found only in academia.” So has Gough, with great success.



Craig Gough and his wife, Chie Shinohara, taking in the Japan wilderness.