Bioengineering Professor Elected To National Academy Of Engineering

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Bernhard O. Palsson, a professor of bioengineering and adjunct professor of medicine at the University of California, San Diego, has been elected to the National Academy of Engineering (NAE). The academy honor, among the highest professional distinctions accorded an engineer, is in recognition of Palsson's "scholarship, technological advances, and entrepreneurial activities in metabolic engineering."

"My bioengineering colleagues and I at UCSD are delighted by the news of Bernhard's election to the National Academy," said Andrew McCulloch, chair of the Jacobs School of Engineering's Department of Bioengineering. "This honor is highly deserved recognition of his innovative contributions and pioneering leadership in biotechnology, tissue engineering, and systems biology research and education."

The academy named Palsson and 75 additional new members and nine foreign associates on February 10, which brings the total number of academy members at UCSD's Jacobs School of Engineering to 15, including two bioengineering professors in the past two years. The academy's U.S. membership is now 2,216 and the number of foreign associates has risen to 186.

Born in Iceland, Palsson attended the University of Iceland in Reykjavik before moving to the U.S. in 1977. He received a bachelor's degree in chemical engineering from the University of Kansas in 1979, and a Ph.D. in chemical engineering from the University of Wisconsin in 1984. He was named an assistant professor of chemical engineering at the University of Michigan in 1984, and he was promoted to associate professor in 1990. Palsson joined the Jacobs School 's Department of Bioengineering as a professor in 1995.

In addition to authoring more than 200 scientific papers and giving more than 100 invited talks at conferences, Palsson has recently delivered keynote addresses and plenary talks at systems biology conferences in Spain, France, Toronto and Banff, Canada, Santa Fe, NM, St. Louis, MO, and Germany, as well as at the National Institutes of Health in Bethesda, Md. He serves on the editorial boards of several bioengineering and biotechnology journals, and his book, *Systems Biology: Properties of Reconstructed Networks* (Cambridge University Press, 2006), is the first textbook on the field. Systems biology has emerged as a multidisciplinary field of science since the development in the 1980s of technologies that permit researchers to reconstruct biochemical reaction networks that underlie a variety of cellular functions.

Palsson also founded two San Diego startup companies, Genomatica, a computational systems biology company, and Cyntellect, a provider of high-throughput imaging and laser-based manipulation of living cells. In Michigan, he founded Aastrom Biosciences, Inc., a company specializing in the repair or regeneration of human tissues utilizing the company's proprietary adult stem cell technology.

Palsson's research interests are wide-ranging, from the reconstruction of genome-scale biochemical reaction networks to genome-scale mathematical analysis techniques.

His most recently published paper in January in *PLoS Computational Biology* reported that the location of genes and other features distributed along the chromosomes of bacteria and simpler organisms is fundamentally important to how the microbial cells operate. "This high degree of organization of prokaryotic [organisms that lack nuclei] genomes is a complete surprise, and this finding carries many implications that biologists might not have considered before," Palsson said.

A 2002 paper in *Nature* reported that a computer model of E. coli accurately predicted the endpoints of adaptive evolution. Palsson has continued to study this behavior by using *computer* modeling and DNA sequencing to elucidate underlying genetic mechanisms. A 2004 paper in *Nature* paper suggested 115 previously unknown mechanisms of genetic regulation. Together these two Nature papers suggest ways to design specific biological materials for commercial use and to predict the evolution of drug resistance in bacteria.

Palsson's group has applied the analysis methods used in *E. coli* to the yeast *Saccharomyces cerevisiae*, bacterial pathogens such as *Staphylococcus aureus* and *Helicobacter pylori*, and human cell types. Palsson is now developing a genome-scale reconstruction of the complete human metabolic network as a new tool to understand, classify, and treat human diseases.

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