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## Part Microbe, Part Cloud

December 2009/January 2010  
By Meredith Salisbury

### Florian Fricke

**Title:** Research Associate, University of Maryland School of Medicine

**Education:** PhD, Georg-August-University Gottingen, Germany, 2005

**Recommended by:** Jacques Ravel, Claire Fraser-Liggett

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Like any newly appointed faculty member, Florian Fricke is knee-deep in grant proposals at the moment. But if his first experience is any gauge, he should do fine: Fricke, a research associate at the University of Maryland's Institute for Genome Sciences, just won an NIH grant worth almost \$675,000 and an NSF grant for more than \$460,000.

Much of Fricke's work is related to microbial genomics, a field that first caught his interest during his PhD studies and that led him to a postdoc position with The Institute for Genomic Research, where his mentor was Jacques Ravel. Specifically, Fricke is focused on microbial evolution, starting with how microbes adapt to their particular niches. As his research at TIGR and now at Maryland has progressed, he has gotten more involved in understanding the evolution of antibiotic resistance — and especially how that resistance is passed on through horizontal gene transfer or plasmid transfer. That new emphasis represents a shift in his work, from studying individual genomes to looking more at population genomics, he notes.

Many of the studies Fricke has contributed to relate to food-borne pathogens, for which it's been helpful to sequence several strains of the same species. Thanks to collaborations with other faculty at Maryland — particularly with members of the medical school — he has also worked on projects investigating the human microbiome and how drug resistance evolves in those microbes. In looking at the path and spread of resistance, Fricke says, it's been useful to perform experiments on how resistance traits respond to selective pressures. "It's very interesting," he says. "That's where I hope my research will continue to go."

Another major effort of Fricke's revolves around trying to bring the advantages of virtual machines and cloud computing to scientists who don't have access to major computing resources. Fricke is working with Maryland's Owen White and others to package up analysis tools — such as for data from next-gen sequencing runs — and make those available remotely to other researchers. There has been a "strong trend for decentralization of genomics," Fricke says, noting that more and more researchers are using high-throughput genomic tools. But there hasn't been a corresponding trend on the analysis front, so his goal is to build a cloud computing system that anyone could access from a regular computer.

### Publications of note

Fricke recently published an essay in *PLoS Biology* entitled "The role of genomics in the identification, prediction, and prevention of biological threats." The paper is related to biodefense and is "relatively general in terms of dealing with microbial genomics," he says.


In another paper, Fricke was lead author on work published in *Applied and Environmental Microbiology*. Entitled "Antimicrobial resistance-conferring plasmids with similarity to virulence plasmids from avian pathogenic *Escherichia coli* strains in *Salmonella enterica* serovar Kentucky isolates from poultry," the paper details a study of combined virulence and drug-resistance plasmids in a case where an *E. coli* plasmid known for heightened virulence was found in a strain of resistant *Salmonella* in chicken. The findings "highlight the need for additional research in order to examine the prevalence and spread of combined virulence and resistance plasmids in bacteria in agricultural, environmental, and clinical settings," says the abstract.

### And the Nobel goes to...

Right now, Fricke says, scientists are just beginning to scratch the surface of understanding the human microbiome and its role in health. If he were to win the Nobel

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Young Investigator Profile

**Ronald Cohn**  
The McKusick-Nathans Institute of Genetic Medicine at John Hopkins  
Assistant Professor

**Studying Satellite Cell Function**  
The Cohn lab focuses on the biology of muscle regeneration as it relates to various inherited and acquired myopathic states. They are using a variety of animal models to study the relationship between impaired muscle regeneration and myopathic disease progression with the end goal of characterizing biological pathways essential for satellite cell function. Cohn and his team are also interested in the molecular pathogenesis of cardiomyopathies associated with muscular dystrophies.

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Prize one day, he hopes it would be for contributing to "a better idea of the impact of the human microbiome on health and disease," he says. "I think we're not even aware yet of how many things are influenced by the human microbiome."

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<p>Researchers led by the Wellcome Trust Sanger Institute reported that they have <a href="#">sequenced the genomes</a> of two cancers — a skin cancer and a lung cancer — and attempted to catalog the complete set of somatic mutations in each.</p>	<p>Exiqon said that it will <a href="#">divest its California-based CLIA lab</a>, Oncotech, in an effort to "gain operational and infrastructural efficiencies and to free up human financial resources." The firm will take a \$49 million charge as a result.</p>	<p>The US Congress has passed a <a href="#">spending bill</a> for fiscal year 2010 that would increase funding for the National Institutes of Health by around 2.3 percent over 2009 to \$31.2 billion, including an increase of 2.7 percent for NHGRI.</p>	<p>A number of funding agencies and other organizations have funding opportunities just for <a href="#">scientists at the beginning their careers</a>. Check out this article from this month's <i>Genome Technology</i> to see a list of some of them.</p>

**Who do you think should be the next scientific director of the intramural NHGRI research program?**

- Someone from inside NHGRI
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