

# Brewing Systems Biology

*Lloyd Smith directs the Genome Center of Wisconsin, where the theory of collaboration in systems biology has to trump a very practical consideration: lack of joint space.*

By Ciara Curtin

Audrey Gasch might have left the University of Wisconsin, Madison, after her undergraduate days, but she has since returned to her alma mater to take up a post at the Genome Center of Wisconsin. She joined the center in 2004 as part of a relatively new hiring program that groups open faculty positions together to bring in people with similar interdisciplinary research interests.

“Here at the university, there was already a tradition of collaboration across different departments,” says Gasch. “The fact that the genome center was hiring people through this special kind of cluster or joint appointment arrangement was really attractive to me.”

At the genome center, Gasch’s lab is free to pursue the wide-ranging experiments that fall under the systems biology umbrella with lots of help from those around her — something she says she might not have been able to do elsewhere. “Compared to a lot of different places that I’ve been, [this tradition of collaboration] is quite unique and it’s hard to conjure that kind of cross-department collaboration,” she says.

Like many systems biologists, Gasch is interested in different facets of a broader research question. Hers builds around stress response: its physiological manifestations, how it relates to complex signaling networks, and the evolution of stress defense. For all this, Gasch



collaborates with other members but also with outside biologists, computer scientists, statisticians, and engineers.

Gasch certainly isn’t the only one. There are 16 other members of the genome center, six of whom were brought in through similar hiring initiatives. The genome center brought together these new hires with faculty already on campus to form a group of people with similar interests to build on the school’s tradition of working with one another. The center is also involved in training students as collaborative members of the systems biology field.

“Genomics science by definition requires spanning a whole bunch of different disciplines and fields,” says David Schwartz, a genome center member. In the future, Director Lloyd Smith plans to build even more interactions among his faculty by developing their common research themes, including synthetic biology.

### THE MINI-FERMENT

The genesis of the Genome Center of Wisconsin traces back to 1997 with a former university chancellor’s initiative. This so-called cluster hire initiative

bundles together full-time equivalents from retiring professors to hire new faculty interested in interdisciplinary research, instead of returning the FTEs to the academic department. From this initiative, genetics professor Fred Blattner created the genome center under the auspices of the university's biotechnology center and was awarded three FTEs.

One of the first people hired was David Schwartz, who is now not only a genome center member but also a researcher in the departments of chemistry and genetics. Since then, more people, including Gasch, have been hired through subsequent initiatives. "Those are the people that we might not be able to have on campus if it wasn't for the initiative," says Lloyd Smith.

In 2004, the genome center got a new home in the Genetics-Biotechnology Addition. While not all of the faculty can fit within the center's limited square footage, the center does house conference rooms, a gene expression center, and four labs — those of Gasch, Schwartz, Nicole Perna, and James Thompson, a stem cell biologist. The other center members are spread out in their other academic homes. "That's one downside to the genome center. It's just not as physically as big as we would like. It would be nice to have all these 20 people in one building," says Smith. "If that was the case you could really get a kind of ferment going. We have a kind of mini-ferment in the one building, but not as much physical proximity as one would like."

### TEAM SPIRIT

Despite its space constraints — or perhaps because of them — the genome center is fairly aggressive in working to spark collaborations among its members. "What we try to do is to foster integration and collaborations. Wisconsin has always been a wonderful place to do that. We really pay no attention to labels," says Michael Sussman, director of the biotechnology center and a genome center member.

As director, Smith sets up monthly



**NAME:** Genome Center of Wisconsin

**HOST:** University of Wisconsin, Madison, and the University of

Wisconsin Biotechnology Center

**DIRECTOR:** Lloyd Smith

**ESTABLISHED:** July 1998

**STAFF:** 16 members and 22 affiliate members

**FUNDING:** Faculty members are hired through the University of Wisconsin's Cluster Hire Initiative. The Center has two NIH training grants and also receives funds from the Wisconsin Alumni Research Foundation.

**RESEARCH EFFORTS:** Chemical and synthetic biology, computational biology, genome biology and evolution, proteome and structural genomics, systems and functional genomics, and technology innovation.

lunches for the genome center faculty to come together. "It's just lunch; it's just a social interaction. A lot of people have said that it's valuable because there are people from all different departments and so you end up chatting for an hour or two with people from all different [backgrounds]," he says, describing how he combats faculty isolation to foster research interactions.

In systems biology, working together is a must. "Many of us can't be experts in everything so, for example, if someone wants to do metabolomic profiling or fluxomics, they are going to come to me because that's what I know," says Sussman, who works on metabolomics and proteomics. "I'm not as good a geneticist, so I'll go to other people to help my genetics projects."

Not only are the genome center members working with one another, they are also teaching students to be scientists in these highly collaborative fields. With two recently renewed NIH training grants, the center funds a program in genomic sciences and another in computational biology and informatics.

The genomic science training program, started by Schwartz, trains 12 to 18 pre-doctoral and post-doctoral students in how to bridge the different disciplines involved in genomics. The trainees work with mentors in two different disciplines while taking courses in genomics. "That's what's really unique about these training programs, that they really encourage students to have multiple mentors that are across

disciplines," says Gasch, who is one of the faculty trainers.

The other program, called CIBM, is an initiative for computation and informatics in biology and medicine that was begun by George Phillips and Fred Blattner. This program, too, has pre- and post-doctoral trainees (15 and four, respectively) who receive grounding in biology, biostatistics or bioinformatics, and computer science.

For the future of the genome center, Smith is looking to build even more interactions among the faculty and to draw on the expertise of the center's 22 affiliate members, the other researchers on the Madison campus who also conduct research in genomics.

To build those new interactions, Smith has met with all the center members to identify common themes in their current work and their plans for future work. "Out of that four themes emerged, some of which we are already working on and some of which we could be," says Smith. The main themes that are already being studied at the genome center are host-pathogen interactions, stem cell biology, and complex traits. Another, synthetic biology, is still up-and-coming. Smith is planning a retreat for January to develop synthetic biology as a field for the genome center to tackle. For that retreat, he is also inviting the affiliate members with the idea of getting them a bit more involved in the workings of the center. "It seems like it could be a nice integrative theme that a lot of people could get excited about," he says.