special interest

University of Oregon's Institute of Molecular Biology Celebrates 50 Years

BY CHRIS TACHIBANA

In 1959, the University of Oregon began a daring experiment. Just six years after James Watson and Francis Crick published their paper on the structure of DNA, the university founded its Institute of Molecular Biology, bringing scientists from chemistry, biology and physics together in a common space to work in a new field that combined all three areas.

Fifty years later, the risk-takers who founded and nurtured the enterprise have a lot to be proud of, including generations of scientists who were shaped at and inspired by IMB.

A three-tiered cake marks the 50th anniversary of the University of Oregon's Institute of Molecular Biology. Credit: Jack Liu.

The Early Years under Aaron Novick

At an anniversary celebration this fall, institute Director Bruce Bowerman recalled how chemist Terrell L. Hill conceived the institute in 1957 and recruited its first director, biophysicist Aaron Novick.

Hill met Novick when they were both working on the Manhattan Project, and Novick's time there influenced his career and the institute. Carol Gross, a professor at the University of California, San Francisco, and keynote speaker at the 50th anniversary symposium, was a graduate student with Novick. She said that, because of Novick, "the institute was very political. Having worked on the atom bomb and knowing its aftermath, Aaron was very antinuclear and antiwar." She added that Novick's open, egalitarian attitude set the tone of the institute: "He always ate lunch in the lunchroom so he could participate in discussions [on topics] like: Given rate of protein synthesis, could a spider make silk de novo or did it have to be premade?"

Novick created the nucleus of the IMB by hiring its first members with the help of biochemists John

and Charlotte Schellman, who were known for advancing the study of protein structure, folding and stability through techniques such as circular dichroism spectroscopy. Their first hire was Frank W. Stahl, who had just shown, with Matthew Meselson, that DNA is replicated by a semiconservative mechanism. Stahl, now emeritus, continues to focus on the mechanisms of meiotic recombination. In a recent biology department newsletter, he said the institute was founded on three principles: No one would be called "professor" or "doctor," facilities would be shared and new hires would recruit new members.

Oregon Makes a Splash with Zebrafish

In keeping with the last principle, in 1960, Stahl recruited phage biologist George Streisinger, whose work illustrates the collaborative, multidisciplinary philosophy of the IMB: Streisinger generated a series of T4 lysozyme mutants that were used by protein biochemists like the Schellmans and Rick Dahlquist and biophysicists like Brian W. Matthews, S. James Remington and Joan Wozniak for studies on protein structure and thermostability.

In the 1970s, Streisinger used his knowledge of aquarium fish to develop the zebrafish as a research model. Zebrafish are small, hardy and easily bred, developing from transparent egg to fish in 24 hours. Streisinger realized that zebrafish could be used as a vertebrate model for studies on development and behavior that had previously used fruit flies. So, he developed techniques for breeding, mutagenizing and screening zebrafish, including generating haploid fish for easy phenotypic analysis. The University of Oregon continues to be internationally recognized for zebrafish research.

Gross pointed out that this project illustrates the value placed on maximizing every individual at the IMB. She described the long process Streisinger went through to find and develop a new model organism and said "He finally hit on zebrafish, and what stuck with me was the time he was given to really think through this transition. All the while, he had the support of everyone around him."

Another major discovery that came from the institute was the first three-dimensional structure of a DNA-binding protein, published in 1982 by Matthews. Steve Kowalczykowski, now a professor at the University of California, Davis, was a postdoctoral fellow with Peter von Hippel. He still remembers the day he saw preliminary data for the Cro repressor structure: "One of Brian Matthews' postdocs showed me how its spacing was perfect to fit into the major groove of the DNA. It was stunning."

Von Hippel Reinvents the Institute

In 1967, the institute hired von Hippel, who Bowerman called "the heart and soul of the institute." Von Hippel, a pioneer in the biophysical analysis of DNA transcription and replication complexes, was institute director from 1969 to 1980. Gross did a postdoctoral fellowship with him and said, "[Novick] invented the institute, but Pete reinvented it, bringing a big-science energy and perspective, with more graduate students and bigger labs. He kept all the great things but brought the institute into the next phase."

At the anniversary symposium, Bowerman announced

A Tribute to Peter von Hippel

Unveiled at the 50th anniversary celebration for the Institute of Molecular Biology, the Peter von Hippel graduate student endowment fund is "a tribute to von Hippel's generosity and magnanimity, and his many and longstanding contributions to the university and the institute." The endowment will support one graduate student a year, contributing to his or her

the creation of the Peter von Hippel graduate student endowment, seeded with donations from faculty and alumni (see sidebar). In his spontaneous response, von Hippel praised the IMB for its ability to "evolve with the times and grow," saying, "I'm impressed to look around and see people who have done extremely well, spread out all over the world and are having an impact."

stipend and tuition expenses beginning in 2010.

If you are interested in making a tax-deductible contribution to the endowment, contact Sarah Cheesman at **sec@uoregon.edu** or 541-346-0044.

An Interdisciplinary Institute

A primary goal of the IMB is fostering collaboration between scientists with different expertise, and interaction is encouraged in many ways. Kowalczykowski recalls, "We didn't really separate the social and the scientific. Everyone was so accessible. It was such an easygoing place, but that belied the scientific intensity." He remembers having easy access to people like Streisinger, Sidney Bernhard, Stahl, Dahlquist, and the Schellmans. "When the institute was formed," he says, "everyone was all on the same floor and complimented each other fantastically. Decades later, [institutes] were trying to implement programs that were already in place at the IMB. That was the genius of the founders, to fuse biology, chemistry and physics to solve long-standing problems. It's a place that was way ahead of its time."

The institute's multidisciplinary approach inspired Rhett Kovall of the University of Cincinnati, who recalls the openness and community and said that playing on softball teams and interacting with other graduate students definitely influenced his career. Although he was solving protein structures in the Matthews lab, his roommate was studying Caenorhabditis elegans genetics in the Bowerman lab. Now the head of his own research group, Kovall says, "We don't just solve structures, we do a lot of biology, and I think that goes all the way back to my graduate training."

Today, the institute has 23 active faculty members, housed in contiguous facilities in the university's science complex. Everyone has access to proteomics, genomics, DNA sequencing and histology laboratories; electron and confocal microscopes; facilities for biophysical studies, including x-ray crystallography and nuclear magnetic resonance and on-site production of monoclonal antibodies and transgenic mice.

Looking ahead to the next 50 years, and perhaps trend-spotting for molecular biology in general, Matthews, an institute faculty member since 1969 and a former director, said, "At the time that I joined the institute, a major emphasis was on the 'molecular' part of 'molecular biology,' i.e. on the basic structure and function of biomolecules. To some degree, the physics drove the biology. Now the emphasis is more on the 'biology' aspect. I expect this trend to continue. In the future, it will be the biology that will drive the identification of important questions, but techniques from physics will still be a key in solving many of these problems."

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