

Collaborative Science Reveals Genome Secrets

Sharing knowledge and bridging disciplines is the story of the University of Washington's Department of Genome Sciences. Genome scientists are taking advantage of growing information now available to develop and apply genetic, genomic, proteomic, and computational tools. In this spirit of cooperation, the department is unlocking secrets of the genome and uncovering exciting new insights into leading edge questions in biology and medicine.

The Genome Sciences department is a result of this type of academic collaboration. It is the union of two UW departments, the Genetics department and the Molecular Biotechnology (MBT) department, both with separate histories and cultures.

The Genetics department was formed in the College of Arts and Sciences in the late 1950's. Its founder, Herschel Roman, became internationally known for establishing yeast as a prime experimental system for molecular genetics. Because of his work, yeast was acknowledged as the ideal organism to explore the nature of recombination, in which chromosomes exchange genetic material before being passed on to offspring. As department chair, Dr. Roman began to recruit an array of prestigious faculty to the department.

By the 1960's the Genetics department was a leading center for research on genetic analysis in other model organisms as well, such as bacteria and the fruit fly. The department also developed a reputation for strong undergraduate and graduate training programs. In 1965, they moved into the J wing of the Health Sciences building. By the late 1990's, however, the J wing had become crowded and rundown, making it difficult to recruit new faculty. The department was still years away from the UW constructing a new building for it.

MBT was formed in the early 1990s as a department of the School of Medicine. The UW recruited Dr. Lee Hood to chair the department. Hood's professional career began at Caltech, where he built an international reputation by designing and developing machines that could sequence or synthesize DNA and protein. Soon the MBT department was also developing innovations, in mass spectrometry, flow cytometry, DNA sequencing, and technology to detect genetic variation. The department came to reside in the newly built K Wing in the Health Sciences building and enjoyed a substantial endowment from the Gates Foundation. In 2000, wanting to expand his vision, Dr. Hood left the UW to form his own institute, and other faculty left the department at around the same time.

Although Genetics and MBT represented different fields, they were each spokes in the wheel of the burgeoning DNA sequencing revolution. During the late 1990's, the study of genetics was alive with excitement. The Human Genome Project, which had begun a decade before, was about to complete the DNA sequence of human hereditary information. It would soon identify the approximately 20,000 genes in our DNA, helping to decipher the function of many human genes and to map disease mutations and variation. Advances in computational biology were making it possible to store this information in readily accessible databases. Biologists realized

that this accomplishment would have a tremendous impact on the prevention, diagnosis, and treatment of human disease as well as all research into human biology.

After an intense review of both the Genetics and MBT departments, talks began concerning a merger in order to build a new department that could best tackle the gold mine of data that the Human Genome Project had generated. Although the prospect of such a merger held great promise for advancing both fields, there were many hurdles to overcome. Since the departments resided in separate units, the College of Arts and Sciences for Genetics and the School of Medicine for MBT, the administrative challenges were immense. One of the schools would have to relinquish a department and with it grant dollars and faculty lines, no small feat in academia. The merger would transform the cultures of both departments, academically and personally. It was also apparent that a new building would be necessary to adequately house the expansion.

The deans of the schools, David Hodge in Arts and Sciences and Paul Ramsey in the medical school, set to work with Stan Fields, slated to become the acting chair of the new department, Breck Byers, acting chair in Genetics, and Maynard Olson, acting chair in MBT. They began to meet and bring the faculty together for discussions. The exciting prospect of creating an innovative new department was underway. Even the name was up for reinvention. The Genetics faculty suggested that the name contain the word “Genetics.” The MBT faculty countered with the desire to keep “Molecular Biotechnology” in the mix. In the end the newly formed department would contain the substance of both but the names of neither.

In 2001, the Genome Sciences department was formed. The goal for the new department was to recruit the next generation of outstanding faculty; to form undergraduate and graduate programs that would create cutting-edge researchers; to collaborate with departments, within and outside of the university; and to capitalize on the new tools for genome analysis. The merger produced a department with four main strands: experimental (model organism) genetics, human genetics, computational biology, and technology development. Hours of deliberation and compromise had resulted in a new department able to reach heights unachievable by either of the existing units alone.

Immediately an effort began to attract an outstanding chair. A search committee vigorously sought out Dr. Robert Waterston from Washington University. Bob Waterston was the perfect candidate to continue and enhance this cooperative spirit. His degree in medicine connected with the human geneticists and his work on muscle development in the model organism *C. elegans* showed his commitment to experimental research. His work on the nematode and mouse genome projects demonstrated his expertise in computational biology and technology development. As one of the original pioneers of The Human Genome Project, he had collaborated with Dr. John Sulston in England and was instrumental in connecting the work of Maynard Olson and Phil Green of the UW to the project. Under Waterston’s leadership, one of the main goals of The Human Genome Project was to make its vast databank of genes publically available for researchers without cost. Thus, his impact in the field was tremendous.

2002 was a portentous time for both Bob Waterston and the Genome Sciences department. The new department needed a chair to lead it into the future of gene interpretation and Waterston was now interested in creating a place that “pulled together genetics, human genetics, computational

biology and technology under one roof.” His new mission was to understand the genome that had been sequenced. The University of Washington approached Waterston, promising him an opportunity to create such an innovative department. Along with generous funding, the UW also committed academic autonomy, numerous faculty lines, and a new building to the department.

Waterston accepted the offer and, once he arrived, began a push to recruit exceptional young faculty. The Genome Sciences graduate program was established and set out to attract highly talented students from around the country. Today it currently ranks among the top 5 Genetics/Genomics graduate programs in the United States and has approximately 60 students.

With resources from the medical school, the Bill and Melinda Gates Foundation, and others, plans for the William F. Foege building began. In 2006, the 260,000 square foot, \$150 million facility was completed. The design incorporated dry and wet labs on every floor and common spaces to encourage interaction: coffee lounges and kitchen areas, informal lobbies with armchairs, side tables and whiteboards, and even a 200-seat auditorium, all meant to spur conversations.

Collaborations, both inside and outside of the university, have helped the Genome Sciences department bolster this exciting teamwork atmosphere. It has formed close ties with the School of Medicine to study human variation more effectively. The faculty also partner with clinicians interested in applying genomic technologies to medical problems. In addition, the department has established a strong outreach program. By bringing leading-edge science and ethics teachers to K-12 classes, the department helps address the unique social and ethical challenges implied in the new discoveries in genome sciences.

Today, the UW Department of Genome Sciences is carrying on its legacy of collaboration. It is a world pioneer of genome interpretation and technology innovation. It brings national prominence to the University of Washington and is at the forefront in unlocking life-changing secrets of the genome.