

Staking a Claim in Bioinformatics

In September 2009, the National Research Council published *The New Biology for the 21st Century* outlining recommendations to ensure that the “New Biology” contributes solutions to the most pressing societal issues involving food, health, energy and the environment.

“They make the same argument I’ve made for years,” said Larry Mays, PhD, director of the UNC Charlotte Bioinformatics Research Center and Chair of the Department of Bioinformatics and Genomics, “which is looking at biology in a broad way (and) understanding the commonalities among all life forms. Biology has to be linked to physics, chemistry, mathematics and computer science. If you can put all these things together through the right teams of people, what you’ve got is a new biology.”

New biology is dependent on the ability to analyze data; hence, the report’s recommendation to develop the information technologies and sciences critical to its success. In other words, bioinformatics, which is the application of computational techniques to biology.

“Data are generated, and the question is what to do with it. We’re dealing with it through high-throughput data sets. We’re talking about huge data sets,” Mays explained. “The result is that we can ask more detailed questions now than we could just a few years ago. That is only going to increase the amounts of data by incredible amounts. That’s why we have to understand computational techniques.”

UNCC has gone beyond understanding computational techniques to a multi-million dollar investment in their bioinformatics program. In August 2009, they opened a 94,000-square-foot bioinformatics building on campus and, in May 2010, a Bioinformatics Center in the David H. Murdock Research Institute (DHMRI) at the NC Research Campus (NCRC) in Kannapolis.

“Our research involves applications of computing to real world biological problems,” Mays said. “We have people who are doing molecular modeling and protein structures. We have other people who are doing basic research on how to improve gene chips and diagnostic probes and others working on genome wide associative studies. Other people are using computational tools to predict bacterial genes, and (develop) tools for plant genomics.”



Dennis Livesay, PhD, (center) associate professor in UNCC's Department of Bioinformatics and Genomics, received a half-million dollar grant to purchase and implement a high-performance computing cluster to support computational biology projects.

His department of 12 has attracted over \$3 million in National Institutes of Health and National Science Foundation grants in the last year alone. Dennis Livesay, PhD, associate professor in the Department of Bioinformatics and Genomics, is the most recent recipient of an NIH grant. The nearly one-half million dollar grant will purchase a high-performance computing cluster of 650 computing cores with 1.2 terabytes (TB) of Random Access Memory (RAM) and 56 TB of usable disk storage. The computing cluster will support computational biology efforts involving projects in protein stability and dynamics, protein electrostatics, RNA structure prediction and digital processing of biological images.

Jessica Schlueter, PhD, a Bioinformatics and Genomics faculty member, gained notice as a member of the team of scientists who sequenced the soybean genome. A discovery first published in the journal *Nature* in January 2010.

Mays predicts that the course of bioinformatics research gives UNCC a critical role to play in future discoveries from pollution and environmental remediation to personalized medicine. UNCC is partnered with the Canon Research Center at Carolinas Medical Center conducting whole genome association studies to find methods to improve the accuracy of analyzing genomic data.

Mays oversees two degree programs, a PhD in Bioinformatics and a Professional Science Master's in Bioinformatics. Graduates have gone onto positions with companies like BioCytics, the Greenville Healthcare System and the NCRC.

“It really sneaked up on us, but biology became an information science,” Mays noted. “It makes it a great time to be in biotechnology.” **i**

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