

Great Discoveries in Nutrition

Bioinformatics stakes its claim at N.C. Research Campus

By Paul Nowell

Cory Brouwer accepts the fact most people can only achieve a limited grasp of his work as the director of UNC Charlotte's Bioinformatics Services Division at the North Carolina Research Campus (NCRC).

And that's just fine with Brouwer, who realizes his scientific expertise is narrowly focused but increasingly important to mankind. He recently came aboard from the pharmaceutical giant Pfizer Inc. to oversee the University's bioinformatics research program at David Murdock's \$1 billion brainchild in nearby Kannapolis.

Scientists from several other leading universities – including Duke, UNC Chapel Hill and other UNC system schools – will benefit from the work done by UNC Charlotte researchers as they work on their own research.

"This is a great opportunity for UNC Charlotte to introduce our capabilities in this vital area to other leading scientists," Brouwer said in an interview in his office at NCRC. "When you are only a short walk down the hall from these researchers, it's much easier to overcome some of the things that can distance us. It leads to better and more effective collaboration."

That's why UNC Charlotte decided to open the division in the Core Laboratory Building at the NCRC, a 350-acre research park that will be home to the research programs of biotechnology companies as well as university and medical research programs.

There they will work, often in collaboration with their peers, in hopes of achieving Murdock's vision to make NCRC a nucleus for great discoveries in nutrition, health and biotechnology research.



The Core Lab at N.C. Research Campus

Brouwer said the UNC Charlotte team will look for opportunities to collaborate with researchers from private industry and other universities on their own groundbreaking work.

Some of those projects include:

- UNC Chapel Hill's Nutrition Research Institute will develop innovative approaches to understand the role of diet and activity in normal brain development, cancer prevention, and the prevention and treatment of obesity.
- The North Carolina State University Fruit and Vegetable Science Institute will utilize emerging technologies for plant improvement and human health benefits. The goal is to develop a new generation of fruits and vegetables with advanced nutritional and horticultural characteristics.

Researchers from Duke University are conducting the so-called MURDOCK Study, which has been compared with the 1948 Framingham Heart Study that followed generations of residents of the city in

Massachusetts. Researchers expect to recruit some 50,000 people from the Cabarrus and Kannapolis areas, sequence their genomes, and identify associations to disease.

In addition, researchers from Appalachian State University, North Carolina Central University, N.C. A&T State University and UNC Greensboro are setting up operations for various research projects in the Core Lab.

Brouwer received a doctorate in molecular biology at Iowa State University and started his career in the fledgling bioinformatics department at Pioneer Hi-Bred. After helping build the group there he moved to Connecticut to join a company called CuraGen and spent several years in the biotech world. Later he moved over to large pharma working for Pfizer, first in Connecticut, but most recently directing a computational sciences group in the United Kingdom.

His background is in bioinformatics, which uses powerful computers to solve complex problems in biology. Without bioinformatics, he said, researchers would

never be able to process the huge amount of information the biotech discovery process now generates.

For example, none of the powerful antiviral drugs approved in recent years would have come to the market without the use of bioinformatics to crunch the data.

Brouwer compares it to a tool most people can understand: a spreadsheet. That was what researchers had at their disposal before the advent of bioinformatics.

“You could never fit all the gigabytes and even terabytes of data needed for one experiment on one Excel spreadsheet,” he said. “You need our expertise to process all this data and we have the critical mass needed for these researchers to do their work.”

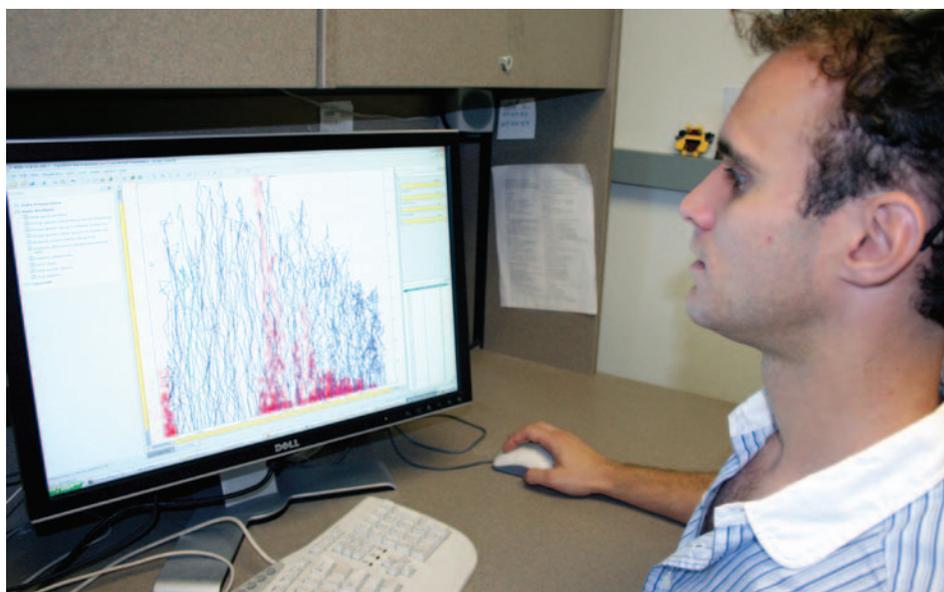
UNC Charlotte is invested in bioinformatics. In August 2009, the University’s Bioinformatics Research Center (BRC) moved into a new \$35 million building on the Charlotte Research Institute Campus of UNC Charlotte. The building offers space for both wet and dry laboratories, and includes core facilities for molecular biology, proteomics, and computing.

“The work being done in life sciences and biotechnology in the 21st Century is really equivalent to what was being done in physics and electronics in the 20th Century,” said Larry Mays, director of UNC Charlotte’s Bioinformatics Center. “It’s vitally important for this university to be actively engaged in this biotechnology enterprise.”

The BRC took a leadership role in developing bioinformatics programs in collaboration with the developers of the NCRC. Brouwer and his colleagues will focus on the development of novel analytical methods for knowledge discovery in large biological datasets.

“The NCRC provides us with a real opportunity for UNC Charlotte to be closely involved in this cutting-edge work,” Mays said. “One of the key problems facing biotechnology is trying to make sense of the enormous amount of data in these research projects.”

Research at the division will enable basic and applied researchers to ask and answer complex questions in molecular and population biology, to manage and navigate the vast data sets that are generated by modern molecular biology methods, and to translate the results into practical benefits



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through understanding of the interacting effects of health, nutrition, development, and behavior.

Mays said UNC Charlotte’s presence in the Core Lab at NCRC also gives faculty members an opportunity to develop new technological tools for the future. Besides Brouwer, other UNC Charlotte faculty members are working at NCRC, including Ann Loraine and Xiuxia Du .

Finally, Mays said, the Bioinformatics Services Division provides a rich training ground for students to learn the skills necessary to work in the field.

Murdock’s signature can be found throughout the Core Lab Building, from the imported Italian marble floors and rare furniture to the distinctive yellow paint (Murdock’s favorite color) on almost every wall in the Core Lab.

Even the brightly-colored mural on the ceiling above the lobby pays tribute to his nutritional beliefs – it features a cornucopia of fruits and vegetables. The

311,000-square-foot Core Lab Building will house \$150 million of state-of-the-art scientific equipment that is available for use by tenant universities and companies.

The most celebrated piece of equipment is the Bruker 950-megahertz nuclear magnetic resonance spectrometer, which Sheetal Ghelani, business development manager at the David H. Murdock Research Institute, described as “the largest of its kind in the Western Hemisphere.”

The two-story, eight-ton machine will significantly enhance key areas of research, such as drug development and nutrition. The machine will allow scientists to deduce the structure of larger and more complex molecules and hopefully lead to discoveries of new therapies.

As she led visitors on a tour of the Core Lab Building, Ghelani pointed out some of the technology available to the UNC Charlotte researchers and their counterparts from other universities, medical centers and private businesses.

“What we really have here is an incredible capacity; it’s not that we have equipment that is completely unique,” she said. “What is unique about this place is that we have all these labs under one roof and there’s unlimited potential to put the pieces together to solve some large puzzles. “

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