Extracts

UF Leads Effort Against Rare Brain Disease

Even with devastating brain diseases such as Alzheimer's and Parkinson's, doctors can reach into their medical bags to find something to help a patient.

But they come up empty-handed when they try to help the vast majority of patients with ataxia — disabling disorders that rob people of their balance and coordination.

University of Florida neurologists are trying to change that with the help of a $1 million challenge grant from the National Institute of Neurological Disorders and Stroke to establish a nationwide network of physician-scientists with expertise in clinical ataxia research.

"The symptoms of ataxia are similar to what happens when someone gets too much alcohol into their system," says Dr. S.H. Subramony, a professor of neurology in the UF College of Medicine. "In either case there is slurred speech, inability to walk straight, falling, blurry vision — symptoms that indicate damage to a part of the brain called the cerebellum."

Ataxia — from the Greek "a taxis," meaning without order or coordination — can leave a patient unable to coordinate their eye blinks, let alone move. It can be hereditary or it could be brought on by strokes, tumors or other medical problems. One form, called sporadic ataxia, appears without apparent explanation in adults with no family history of the disease.

"Our first goal is to find a treatment to make patients' lives easier," said Dr. Tetsuo Ashizawa, chairman of the UF department of neurology and principal investigator and leader of the national effort, called the Clinical Research Consortium for Spinocerebellar Ataxias. "But the common thread ataxia shares with diseases such as Alzheimer's, Parkinson's, Huntington's and ALS is that neurons are dying. By studying ataxia, we can create insight into the neurodegenerative process in all of those diseases."

With laboratory and clinical research expertise from Ashizawa, Subramony and Dr. Michael Waters, director of the neurology department's stroke program, UF will lead nine other consortium institutions, including the Johns Hopkins University and Harvard University. The institutions are strategically placed across the nation so patients who have difficulty traveling can find close and state-of-the-art health care.

The ataxia consortium is part of the National Institutes of Health's Rare Diseases Clinical Research Network, which will be awarding more than $117 million over the next five years to explore the natural history, epidemiology, diagnosis and treatment of more than 95 rare diseases.

By definition, a rare disease affects fewer than 200,000 persons in the United States. But put them all together — 6,500 rare diseases have been identified — and an estimated 25 million Americans are affected. Diabetes, in comparison, affects an estimated 24 million people.

"Collectively rare diseases can become very huge public health problems even though the reach of each individual disease is small," Ashizawa said. "I think the NIH recognized the need to provide outreach and medical care to patients, in addition to the need for research. Now we have a huge responsibility to achieve our goals for the taxpayers."

UF researchers will be working with cell cultures, animal models and patient samples to find targets to alleviate ataxia problems. In the meantime, scientists will build a natural history database to bring this devastating disease into more precise focus.

"We want to know how a patient will progress from day to day and hour to hour if they have degenerative ataxia disorders," Ashizawa said. "We want to know what factors worsen or improve the condition."

Challenge grants are part of the American Recovery and Reinvestment Act of 2009 and address specific scientific and health research challenges that will benefit from two-year jumpstart funds.

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"Facebook For Scientists" Under Development

Imagine a website like Facebook, but instead of using it to share videos or post quizzes like "What '80s song are you?" scientists could scour a national network of researchers, only a few mouse clicks separating them from information needed for a scientific breakthrough.

That's the goal of a $12.2 million National Center for Research Resources grant awarded to the University of Florida and collaborators at Cornell University, Indiana University, Weill Cornell Medical College, Washington University in St. Louis, the Scripps Research Institute and the Ponce School of Medicine in Puerto Rico. The funding stems from the American Recovery and Reinvestment Act of 2009.

During the next two years, researchers will implement a new type of networking system at the seven schools that eventually will link researchers across the country and world to like-minded peers and potential collaborators.

By making it easier for scientists to find each other, researchers will be able to improve their ongoing studies and forge collaborations that could lead to new discoveries, said Michael Conlon, interim director of biomedical informatics for UF and the principal investigator on the grant.

"The goal of the program is national networking of all scientists," Conlon said. "Scientists have problems finding each other. We often find that researchers have pretty good networks with students or with scientists at institutions where they received their degree or worked before. But they don't always know people even at their own institutions."

The new program will draw information about scientists from official, verifiable sources and make it available using a type of technology called the Semantic Web.

For example, information about researchers' positions will come from their employers and a listing of their published articles will come from the journals, while researchers will provide information regarding their interests. Although users will still view the information on what looks like regular Web pages, the software developed by Cornell researchers actually collects the facts a person wants and assembles its own page.

"The Semantic Web is a collection of facts, rather than pages. It is really for computers to search and find things and present them in a reasonable way," Conlon said. "It's a next-generation type concept."

The idea for a database of researchers first sprouted at UF when two librarians at UF's Marston Science Library proposed using Cornell's VIVO software at UF to help scientists better find research articles published by UF faculty members.

Touted as a research discovery tool, VIVO is open-source software that allows people to search all publicly known information about a specific topic or researcher in one site. On Cornell's VIVO site, a search for the word "cancer," for example, yields dozens of results, but they are broken up into categories like "people," "opportunities" and "topics." Clicking on "topics" takes one to another set of subgroups that allows searchers to more quickly find exactly what they want.

"I saw the power VIVO had to show the research coming out of an institution," said Valrie Davis, a UF outreach librarian for agricultural science who teamed with UF librarian Sara Russell Gonzalez to propose using VIVO at UF after seeing it presented at a conference. "VIVO is an open source tool to connect people with common research interests. It's going to link people together. I think that is the most important part of this grant."

Initially, each institution involved in the grant will establish its own network of researchers. Librarians will implement the software and will offer support to researchers once they begin using it. Within two years, the team hopes to have the network connected across the country. Eventually, Conlon says the researchers would also like to broaden the scope of the project to include researchers around the world.

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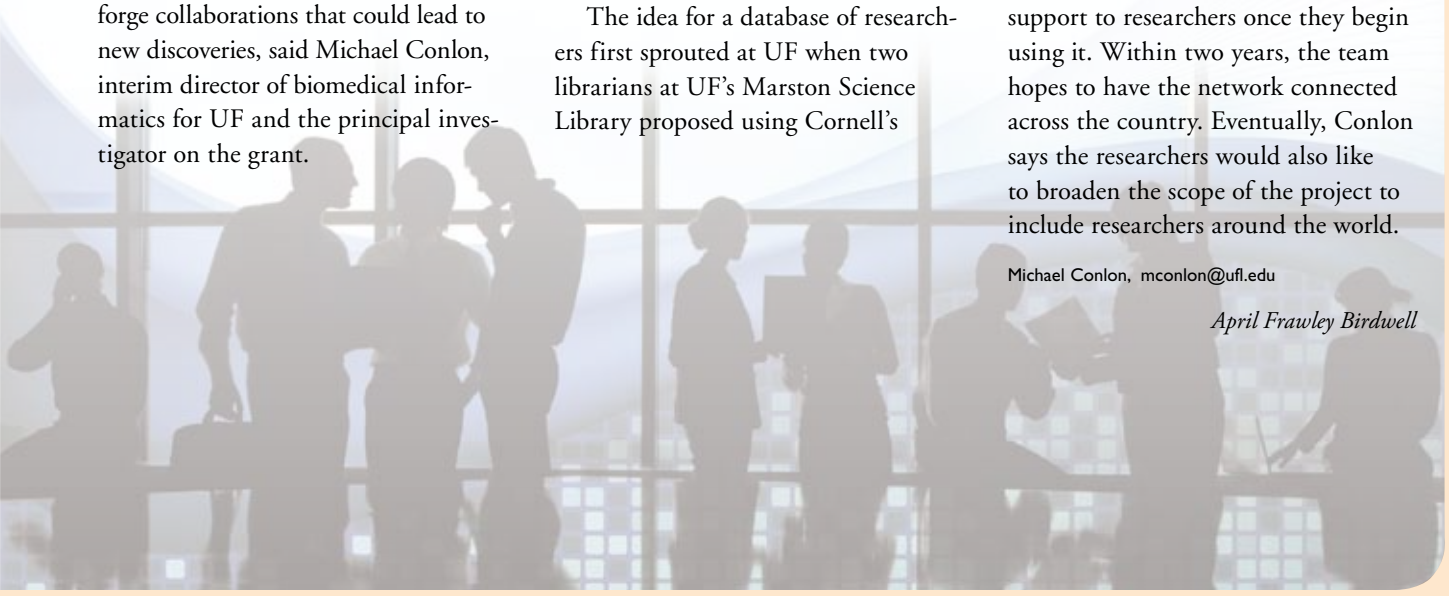
April Frawley Birdwell



Extracts

Plant geneticist Matias Kirst and his colleagues decoded how tree cells become roots, branches and leaves.

Geneticists Reveal How Trees Know To Grow

Countless words have been put to paper over the years in attempts to describe the beauty of a tree — including carefully crafted passages by the world's most gifted writers. But those writings pale in comparison to the intricacy of a tree's own genetic script.

A team led by UF geneticist Matias Kirst has completed a first study of how the byzantine interplay of elements within a tree's genetic code spell out different structures, such as leaves, trunk and roots.

All cells in a tree have the same genetic information, whether it's in a leaf or a root. However, how that genetic information is translated into the various tree structures is based on a complex set of interactions, said Kirst, a researcher with the UF Genetics Institute.

In the English language, a silent "e" on the end of a word can affect how the vowels in the middle of the word are pronounced. Even a word's placement in a sentence can change its meaning.

Similarly, the expression of genes spelled out in one section of DNA is often regulated by a gene or multiple genes somewhere else in the genetic code. In turn, those genes moderate the activities of others — forming networks of intertwined genetic activity.

In a paper published in May in the *Proceedings of the National Academy of Sciences*, the team reports the first mapping of these networks of interactions as they affect different parts of two types of cottonwood trees.

While similar genetic network mapping has been done of human cells, this represents the first time that this level of understanding has been reached in the plant world.

The analysis also revealed that certain gene networks are active only within specific parts of the tree. Meanwhile, other gene networks were active throughout the tree.

Knowing which genes are expressed only in some parts of the tree and which are expressed throughout the tree is key to researchers and breeders attempting to develop trees and other plants best suited for biofuel, pulp, paper and timber production, Kirst said.

The work will help develop trees that are specifically suited to being used as feedstock for cellulosic ethanol, an environmentally friendly and renewable substitute for gasoline.

However, it is likely that many other plants will have similar gene networks to those discovered in the cottonwood trees — potentially leading to more sophisticated ways of improving food crops.

Kirst also was recently awarded $873,000 over five years to conduct a radically new genetic analysis of poplar trees — an effort that may help harness the trees as a sustainable and economical fuel source.

Kirst was the only researcher from Florida to receive U.S. Department of Energy special funding under the American Recovery and Reinvestment Act of 2009.

This funding will support Kirst's innovative method for comparing different poplar trees to find out which genes contribute to properties important to bioenergy production.

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Stu Hutson

UF Researches Virus Threatening Lobsters

The Caribbean spiny lobster is one of Florida's top commercial seafood species, with an annual $27 million harvest — but a recently discovered virus is killing the crustaceans and threatening the industry.

Now, scientists with the University of Florida and several other institutions have been awarded a three-year, $1.4 million National Science Foundation grant to research transmission of the virus, known as PaV1.

The research should answer many lingering questions about the spread and geographic distribution of the pathogen, and could lead to management strategies and new methods for identifying infected lobsters, said Don Behringer, an assistant professor with UF's Institute of Food and Agricultural Sciences.

One of the main issues to be investigated: whether the virus is dispersed long distances by lobster larvae, which float hundreds of miles during their first months. Infected spiny lobsters have been found in far-flung places, including the Florida Keys and parts of Mexico, Belize and St. Croix.

"This project will give us insight into how pathogens are spread in the marine environment," said Behringer, a co-discoverer of the virus. "Anything we can do to understand how the disease spreads, and how we might limit its spread, has implications for management of the disease."

If the study confirms that PaV1 is spread by lobster larvae, that would have implications for other species and other diseases, because many marine animals go through a free-floating larval stage, said Mark Butler, a professor with Old Dominion University in Norfolk, Va.

During the project, researchers will examine possible forms of virus transmission, the virus' effects on lobsters, and factors influencing local disease outbreaks, Butler said. They will also hold workshops for fishermen and resource managers in Florida and the Caribbean.

The virus was discovered in 1999 by Behringer, Butler and Jeffrey Shields with the Virginia Institute of Marine Science. Many of the early findings regarding PaV1 epidemiology came while the team was working at the Keys Marine Laboratory located on Long Key. This work showed that the disease primarily kills juvenile spiny lobsters, though some become infected without apparent harm.

The PaV1 virus attacks blood cells and tissues, causing lobsters to become listless and solitary, Behringer said. Most eventually die from metabolic depletion, a condition characterized by loss of energy.

Beginning with the 2000-2001 lobster season, harvest declined approximately 30 percent from previous harvest years and has yet to rebound, said John Hunt, a longtime lobster biologist and program manager with the Florida Fish and Wildlife Conservation Commission.

Hunt said he believes the virus is a likely cause of the reduction.

Florida produces more than 90 percent of the nation's spiny lobster; in 2007 the harvest was about 3.8 million pounds, with a dockside value of $27 million, according to the Florida Department of Agriculture and Consumer Services. Recreational lobster diving is also a significant tourist industry.

The Caribbean spiny lobster is found in the Gulf of Mexico, Caribbean Sea and western Atlantic Ocean, from Bermuda to Brazil, Behringer said.

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Tom Nordlie

Don Behringer

Researcher Don Behringer holds a juvenile Caribbean spiny lobster infected with the virus PaV1, in waters off Marathon Key.

Extracts

Addresses Accurately Predict School Success

Current school reform efforts, like No Child Left Behind, emphasize teacher quality as the most important factor in student success, but University of Florida researchers have identified another, stunningly accurate predictor of classroom performance — the student's home address.

Right down to the neighborhood and street number.

The researchers attribute their finding to a profound correlation they documented between home location, family lifestyles and students' achievement on state standardized tests.

"The core philosophy of school reform today is that effective schools and quality teaching can correct all learning problems, including those of poor minority students who are most at risk, and if they fail it's the educators' fault," said Harry Daniels, professor of counselor education at UF's College of Education and lead investigator of the study. "While school improvement and teaching quality are vital, we are demonstrating that the most important factor in student learning may be the children's lifestyle and the early learning opportunities they receive at home.

"Where students live — their neighborhood and even the street — may be the most accurate indicator of academic achievement."

Since 2006, the researchers have conducted ongoing studies in two Florida school districts, in Alachua and Bay counties, tracking children from working poor families compared with more well-off counterparts.

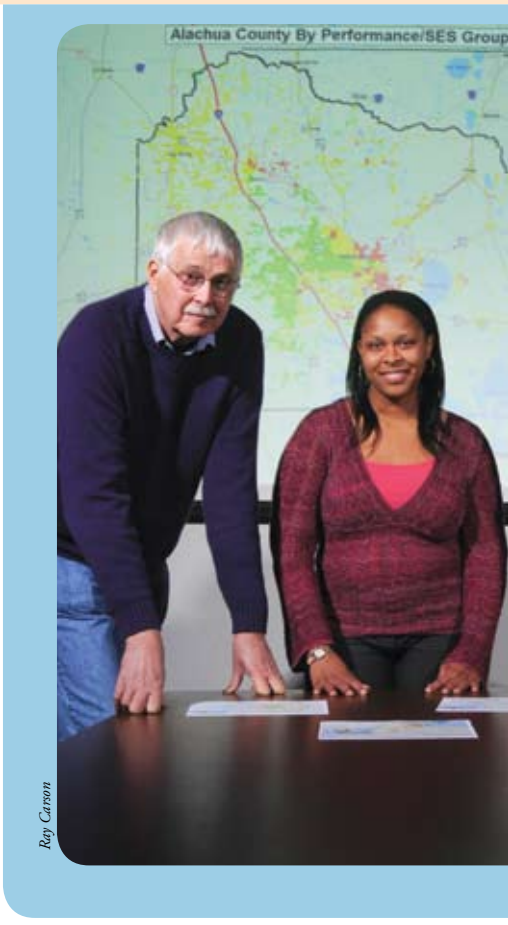
Daniels and co-researchers Eric Thompson and Dia Harden, both UF graduate students in counselor education, reported their findings in March at the American Counseling Association's annual conference and exposition, the world's largest gathering of counselors.

Collaborating with UF business geography professor Grant Thrall, the Florida researchers produced special "geo-demographic" maps of the two school districts, showing every student's home address, color-coded to indicate their household lifestyle traits. The researchers borrowed "lifestyle segmentation" profiling methods used by direct marketers and political strategists to classify every student into one of several lifestyle groups (four in Bay County, three in Alachua), each based on a common set of values, income level, spending patterns, education level, ethnic diversity of neighborhood and other shared traits.

"The color-coded patterns on the maps reflect the tendency of families with like lifestyles to live in clusters in the same neighborhoods, and family income level is just one of several variables they share," Daniels said.

The researchers then examined the relationship between each group's lifestyle profile and their math and reading scores on the Florida Comprehensive Assessment Test, the state's standardized exam used to evaluate student and school performance. Researchers discovered the groups' socio-economic level corresponded with their group ranking on FCAT scores. The most affluent lifestyle group registered the highest FCAT scores, the second richest group ranked second in test scores, and so on. On the math tests, the gap between the highest and lowest scoring lifestyle groups was more than two grade levels.

"The testing patterns in both counties virtually mirrored each other," Daniels said. "Every lifestyle group improved in FCAT scores from year to year until the 10th grade exam (which students must pass to graduate high school), when improvement leveled off. But they all improved at the same rate, so the achievement gap persisted year to year."



Ray Carson

On the researchers' special maps, the color-coding patterns by neighborhood were almost identical for both FCAT achievement levels and lifestyle profiles.

While neighborhood location and a student's home life are factors beyond teachers' control, Daniels said such home-based variables merit heightened attention in bridging the achievement gap in America's schools.

"The promise of this approach is its potential to help schools reach those younger students in time to improve their chances for success," he said.

Researchers (from left) Harry Daniels, Dia Harden and Eric Thompson found that students' success in school was closely tied to their home address.

William Goodman, supervisor of guidance and student services for Alachua County Public Schools, said the UF team's data-mapping methods can help school districts target specific neighborhoods and schools for federal and state grant money to improve educational services.

"Data mapping and life-segmentation research is likely to become more prevalent as there is a growing awareness about how this decision-making tool might best be used to improve the quality of life for students," Goodman said.

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Biomedical Sciences Building Bridges Medicine, Engineering and Public Health

UF's new Biomedical Sciences Building — dedicated in May — brings together scientists from different UF colleges and disciplines to advance medical discoveries and translate them into treatments for patients.

The $90.5 million, 163,000-square-foot building houses researchers from the colleges of Medicine, Engineering, and Public Health and Health Professions, creating the potential for new collaborations. Laboratories have an "open" design in which teams are not cut off from each other by walls.

"The University of Florida is already home to the largest biomedical enterprise in Florida," said Win Phillips, UF's vice president for research. "By encouraging research collaborations across many disciplines, the Biomedical Sciences Building positions us to grow in new directions — and play a key role in future discoveries that ultimately benefit people everywhere."

Research units include the UF Diabetes Center of Excellence, the UF Center for Translational Research in Neurodegenerative Disease, the J. Crayton Pruitt Family department of biomedical engineering and the Rehabilitation Research Program in the department of physical therapy. The Howard Hughes Medical Institute Science for Life laboratory, a cross-disciplinary training program for undergraduate students, also is housed in the eight-story building.