Extracts

$10 Million Gift Boosts Biomedical Engineering

A name often associated with a device that has revolutionized stroke-prevention therapy will soon also be associated with the University of Florida's College of Engineering.

St. Petersburg inventor, surgeon and entrepreneur J. Crayton Pruitt Sr. has committed $10 million to UF for its department of biomedical engineering. As a result of the gift, university officials will name the department in honor of the Pruitt family, making it the first-ever named department at UF.

Pruitt's gift is eligible for matching funds from the state of Florida Major Gift Trust Fund, which could result in a $20 million endowment for the newly named J. Crayton Pruitt Family Department of Biomedical Engineering.

"Dr. Pruitt and his family are helping to make a major statement regarding the future of biomedical engineering in the state of Florida," UF President Bernie Machen said.

Biomedical engineering plays a crucial role in modern medicine. Often described as the fusion of engineering with medicine, research initiatives typically focus on discovering materials and inventing techniques, technologies and devices for improving health care.

The Department of Biomedical Engineering at UF currently has nine faculty members, dozens of researchers and more than 75 graduate students. Research expenditures last year approached $2 million.

"It is because of Dr. Pruitt's generosity and vision that we are able to ensure the future of the biomedical engineering department," said College of Engineering Dean Pramod P. Khargonekar.

Pruitt, 74, pioneered the surgical treatment of carotid artery arteriosclerosis for the prevention of stroke. Among his many inventions is the Pruitt-Inahara Carotid Shunt, which is frequently used during a delicate surgical procedure to clean out the arteries that carry blood to the brain.

In 1995, he received a life-saving heart transplant at Shands at the University of Florida. A biventricular assist device kept him alive for 10 days while he waited for a heart.

Chris Brazda

Global Warming Changed Ancient Forest Flora

Palmettos in Pennsylvania? Magnolias in Minnesota? The migration of subtropical plants to northern climates may not be too far-fetched if future global warming patterns mirror a monumental shift that took place in the past, new research by an international team of scientists suggests.

The findings, which appeared in the journal *Science* in November, provide the first evidence that land plants changed drastically during a period of sudden global warming 55 million years ago, said Jonathan Bloch, a University of Florida vertebrate paleontologist and member of the research team.

"It indicates that should we have a period of rapid global warming on that scale today, we might expect very dramatic changes to the biota of the planet, not just the mammals and other vertebrates but forests also completely changing," said Bloch, who is a curator at the Florida Museum of Natural History on the UF campus.

Scientists have known there was significant turnover in mammals during this rapid period of global warming

Thomas Wright

John Davis (left), Gary Peter and Matias Kirst are among the UF scientists seeking to identify genes that regulate wood properties and disease resistance in loblolly pine.

$6 Million Grant Supports Loblolly Pine Research

With the aid of a $6 million grant from the National Science Foundation, University of Florida researchers are working to identify genes that regulate wood properties and disease-resistance traits in loblolly pine.

The research — to be conducted by faculty in UF's new Genetics Institute — will benefit the $200 billion forest industry in 13 Southern states where loblolly pine is the most-planted species for commercial timber. Southern pines cover just six percent of U.S. forestland but account for 58 percent of the nation's total wood production. In Florida, forestry is a $16 billion industry, the state's largest agricultural commodity.

"By aggressively seeking to identify all of the major genes controlling specific wood properties and disease-resistance traits in loblolly pine, we anticipate a significant breakthrough in our understanding of a pine species that is the highest-valued crop in nine of 13 Southern states," said Gary Peter, an associate professor of plant genomics in UF's Institute of Food and Agricultural Sciences who is leading the UF research effort to identify genes

called the Paleocene-Eocene Thermal Maximum, in which temperatures rose by perhaps as much as 10 degrees in the relatively short time span of 10,000 years, then lasting for another 80,000 to 100,000 years, Bloch said.

Global warming allowed mammals to emigrate across northern land bridges, marking the first appearance of perissodactlys in the form of the earliest known horse; artiodactyls, a group of even-toed ungulates that includes pigs, camels and hippos; as well as modern primates, he said.

But until now, no clues were available as to what happened to plants during this shift, considered one of the most extreme global-warming events during the Cenozoic, the "Age of Mammals," Bloch said. "It was very puzzling because it looked like there was nothing going on with plants, which was rather strange and disconcerting."

Excavations by team leader Scott Wing, a paleontologist at the Smithsonian Institution, in the Bighorn Basin of northwestern Wyoming uncovered fossil leaves and pollen alongside fossilized mammals in rocks that were deposited during this turbulent geologic interval.

"Up until this point we have not had a place in which we have mammal and plant remains preserved in the same rocks spanning what we call the Paleocene-Eocene boundary," Bloch said. "Amazingly, these plants came from what would have been more tropical environments."

Some of the plant remains resembled those found in rock deposits of similar age unearthed in Mississippi, Louisiana and Texas, including relatives of poinsettia and sumac, Bloch said.

However, plant fossils found in the same area dating immediately before and after this period of rising temperatures reflected typical mid-latitude forests of the time and included relatives of dawn redwood, alder, sycamore and walnut, Bloch said. As temperatures cooled, floral newcomers appeared from Europe, including species of linden and wing nut. These plants probably emigrated along the same land bridges that animals traveled, he said.

Because his research specialty is mammals, Bloch said he is particularly interested in understanding how the movement of plants affected the earliest evolution of modern primates, which first appeared throughout the world during this period.

Thomas Wright

UF paleontologist Jonathan Bloch compares lower jaw fragments from two different species of Hyracotherium, the ancestor of the modern horse. In the background are computerized images of plant fossils from a period of sudden global warming 55 million years ago.

"I would very much like to know what these forests were like when these first modern primates were coming in because it has implications for how these animals lived and behaved right from the beginning," he said.

If the landscape evolved from an initially drier habitat, with patchy open spaces, into a more lush tropical forest with densely packed trees, it might have played a role in the evolution of primates' climbing skills, Bloch said. The ancestors of living primates would have been leaping through the tree canopy, foraging for fruit and insects, he said.

Jonathan Bloch, jbloch@flmnh.ufl.edu

Cathy Keen

controlling wood properties.

"Wood is also a renewable energy source, and increasing productivity through genetics could help reduce our nation's dependence on non-renewable energy," he said.

The NSF Plant Genome Research Program grant was made to UF's School of Forest Resources and Conservation because of the school's long history of cooperating with the forestry industry, particularly in interdisciplinary genetic research to identify mechanisms that control productivity and health of planted pines, Peter said.

John Davis, an associate professor of forest biotechnology who is leading the UF effort to identify genes controlling disease resistance, said the research findings will reveal genetic mechanisms that help explain the long evolutionary success of pine trees. He said the research will generate an unprecedented glimpse of the genes that affect interactions among pine trees, fungi and other natural components of forest systems. The new insights are expected to enhance gene conservation efforts and society's ability to cope with challenges such as evolving pest populations.

Dudley Huber, an associate in forest genetics and co-director of the UF pine breeding cooperative, said understanding how different genes affect the health and viability of trees in natural and breeding populations will have immediate and far-reaching benefits for tree improvement programs and should dramatically reduce testing costs and breeding cycle times.

In addition to the valuable applied benefits of this multidisciplinary research, the loblolly pine project is expected to provide significant insight into an important frontier in fundamental genetic research: the structure, function and regulation of genes that control complex traits, said Kenneth Berns, director of the UF Genetics Institute.

The researchers are collaborators with scientists at the University of California, Davis; North Carolina State University; and Texas A&M University.

Kenneth Berns, berns@mbi.ufl.edu

Chuck Woods