

FOSSIL BIRD ILLUSTRATES RIPPLE EFFECT OF EXTINCTION ON SPECIES

A UNIVERSITY OF FLORIDA STUDY DEMONSTRATES EXTINCTION'S RIPPLE EFFECT THROUGH THE ANIMAL KINGDOM, INCLUDING HOW THE DEMISE OF LARGE MAMMALS 20,000 YEARS AGO LED TO THE DISAPPEARANCE OF ONE SPECIES OF COWBIRD.

The study shows the trickle-down effect the loss of large mammals has on other species, and researchers say it is a lesson from the past that should be remembered when making conservation, game and land-use decisions today.

"There's nothing worse for a terrestrial ecosystem than the loss of large mammals — and the loss of apex predators like sharks, tuna and other large fish will have the same negative impact on the oceans," said study co-author David Steadman, ornithology curator at the Florida Museum of Natural History on the UF campus. "We're seeing it with the loss of lions and elephants in parts of Africa, as well as in Florida with the decline of panthers. There's no question these losses will have a negative domino effect on our ecosystems."

The fossil study of eight songbird species from northern Mexico by Florida Museum ornithologists was published in the journal *Palaeogeography, Palaeoclimatology, Palaeocology*.

An extinct cowbird, *Pandanaris convexa*, is the most common bird found at the fossil site called Térapa, in Sonora, Mexico, about 150 miles south of Arizona. This is the first time fossils of the large bird, a member of the blackbird family, have been found in Mexico.

Finding the extinct cowbird at the fossil site was unpredictable and unexpected, according to Jim Mead, chair of the department of geosciences at East Tennessee State University, who has collected a variety of fossils at the site, including the birds used in the study. Mead described the findings at Térapa as "bizarre and exciting."

"The tropical environment is unusual because the site is so far from the coast," Mead said. "The fossil record also provides evidence animals migrated from north to south and, unexpectedly, from south to north."

The cowbird has previously been found only at the Rancho La Brea fossil site in California and a site in Reddick, between Gainesville and Ocala in North Central Florida. The study expands the bird's known range and creates new questions about whether it may have lived across the southern U.S.

"The extinct cowbird needed grasslands and these big mammals to survive," said lead author Jessica Oswald, a National Science Foundation predoctoral fellow at the Florida Museum. "Those two things play into each other because mega mammals maintain grasslands. They keep big trees from coming in and colonizing the areas



Kristin Bartlett Grace

*Jessica Oswald, an NSF predoctoral fellow at the Florida Museum of Natural History, holds the beak of an extinct species of cowbird, *Pandanaris convexa*, recently discovered for the first time in Mexico.*

because they graze, stomp and trample little saplings."

About 20,000 years ago, most of these large mammals went extinct, which led to the extinction of scavengers like condors and vultures, as well as cowbirds, Steadman said. Extinctions, especially mass extinctions, can cause radical species loss and changes in species distribution.

"Big species can't exist in a vacuum, nor can smaller species," Steadman said. "When one piece of the puzzle goes extinct, there is no good way of predicting what sort of trickle-down effect, what kind of cascade effect that will have."

Steadman and Oswald used the Florida Museum's more than 24,000 skeletal specimens of birds to identify the Mexican fossils.

Songbirds make up more than 50 percent of the world's living bird species, but the fossil record is poorly developed, especially in Central and South America. Oswald said this study helps build the fossil record of songbirds in Mexico.

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25 PERCENT OF STUDENTS IN STUDY DON'T RECOGNIZE HEARING LOSS

UNIVERSITY OF FLORIDA RESEARCHERS LOOKING FOR STUDENTS WITH “NORMAL” HEARING FOR A STUDY RECENTLY MADE A SURPRISING DISCOVERY — A QUARTER OF THE STUDENTS WHO THOUGHT THEY HAD NORMAL HEARING ACTUALLY ALREADY HAD HEARING LOSS.

Researchers in UF’s College of Public Health and Health Professions were recruiting college students with normal hearing for a study on temporary hearing loss and personal music players.

“You would expect normal hearing in that population,” said lead researcher Colleen Le Prell, an associate professor in the Department of Speech, Language and Hearing Sciences. “The criteria for normal hearing we used for the study were, we thought, extremely liberal criteria.”

The study identified 56 potential study participants who reported having normal hearing in initial phone interviews. In the next phase those students completed a health survey and a questionnaire about their previous exposure to loud noise, such as playing a musical instrument, listening to personal music players, using lawn equipment or attending sporting events or concerts. Participants then received hearing tests in a sound booth at all of the sound frequencies used in a traditional full clinical hearing test.

In 25 percent of the participants, researchers measured 15 decibels or more of hearing loss at one or more test frequencies, an amount that is not severe enough to require a hearing aid, but could disrupt learning, Le Prell said. Of the participants who demonstrated hearing loss, 7 percent had 25 decibels or more of hearing loss, which is clinically diagnosed as mild hearing loss. Hearing loss occurred in both the range of frequencies identified as “speech frequencies” because of their importance for speech discrimination, as well as higher frequencies.

“With high-frequency hearing loss a person can miss a lot of subtle speech sounds, making it much harder to discriminate

different vowels or phonemes,” Le Prell said. “It would also be much harder to hear sounds like bird songs or children’s voices.”

Several experts have speculated that increased rates of hearing loss in young adults may be related to the popularity of personal music players. The UF study did find that the highest levels of high-frequency hearing loss were in male students who reported using personal music players. More research is needed with a larger sample size to determine the role of personal music players and gender in noise-induced hearing loss, Le Prell said.

The UF study and other related studies on hearing loss in young adults point to the need for more thorough hearing tests in school children and better hearing health education for children and adolescents, Le Prell said.

“The implication is that the current screening protocols are potentially missing a lot of hearing loss, based on the kinds of failure rates that we’ve detected when you broaden the criteria,” she said.

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UF Novo-G RECONFIGURABLE SUPERCOMPUTER TOUTED AS WORLD'S FASTEST

UNIVERSITY OF FLORIDA RESEARCHERS SAY THEIR SUPERCOMPUTER, NAMED NOVO-G, IS THE WORLD'S FASTEST RECONFIGURABLE SUPERCOMPUTER AND IS ABLE TO PERFORM SOME IMPORTANT SCIENCE APPLICATIONS FASTER THAN THE CHINESE SUPERCOMPUTER TOUTED AS THE WORLD'S MOST POWERFUL.

Last November, the TOP500 list of the world's most powerful supercomputers, for the first time ever, named the Chinese Tianhe-1A system at the National Computer Center in Tianjin, China as No. 1.

But that list does not include reconfigurable supercomputers such as Novo-G, built and developed at the University of Florida, said Alan George, professor of electrical and computer engineering, and director of the National Science Foundation's Center for High-Performance Reconfigurable Computing, known as CHREC.

"Novo-G is believed to be the most powerful reconfigurable machine on the planet and, for some applications, it is the most powerful computer of any kind on the planet," George said.

"It is very difficult to accurately rank supercomputers because it depends upon what you want them to do," George said, adding that the TOP500 list ranks supercomputers by their performance on a few basic routines in linear algebra using 64-bit, floating-point arithmetic.

However, a significant number of the most important applications in the world do not adhere to that standard, including a

growing list of vital applications in health and life sciences, signal and image processing, financial science and more under study with Novo-G at Florida.

Most of the world's computers, from smartphones to laptops to Tianhe-1A, feature microprocessors with fixed-logic hardware structures. All software applications for these systems must conform to these fixed structures, which can lead to a significant loss in speed and increase in energy consumption.

By contrast, with reconfigurable machines, a relatively new and highly innovative form of computing, the architecture can adapt to match the unique needs of each application, which can lead to much faster speed and less wasted energy due to adaptive hardware customization.

Novo-G uses 192 reconfigurable processors and "can rival the speed of the world's largest supercomputers at a tiny fraction of their cost, size, power, and cooling," the researchers noted in a new article on Novo-G published in the *IEEE Computing in Science and Engineering* magazine.

Conventional supercomputers, some the size of a large building, can consume up to millions of watts of

electrical power, generating massive amounts of heat, whereas Novo-G is about the size of two home refrigerators and consumes less than 8,000 watts.

Later this year, researchers will double the reconfigurable capacity of Novo-G, an upgrade requiring only a modest increase in size, power and cooling, unlike upgrades with conventional supercomputers.

In their article, the researchers discuss Novo-G and its obvious advantages for use in certain applications such as genome research, cancer diagnosis, plant science, and the ability to analyze large data sets.

Herman Lam, an electrical and computer engineering professor and co-investigator on Novo-G, said some vital science applications that can take months or years to run on a personal computer can run in minutes or hours on the Novo-G, such as applications for DNA sequence alignment at UF's Interdisciplinary Center for Biotechnology Research.

CHREC is comprised of research sites at four universities including Florida, Brigham Young, George Washington and Virginia Tech.

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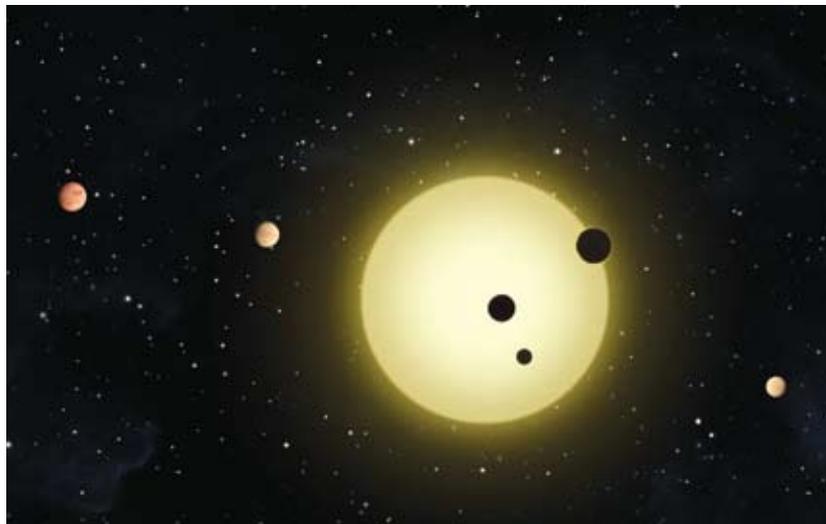


Eric Zamora

University of Florida computer researcher Herman Lam (left) and Alan George display UF's supercomputer, the Novo-G, believed to be the world's most powerful reconfigurable computer.

“This is the new prototype for a system of rocky planets beyond our own. It changes our understanding of the frequency of solar systems like our own in deep space.”

— ERIC FORD



College of Liberal Arts and Sciences

UF ASTRONOMERS HELP FIND SIX NEW PLANETS IN DISTANT SOLAR SYSTEM

A NASA TEAM INCLUDING THREE UNIVERSITY OF FLORIDA ASTRONOMERS HAS FOUND SIX NEW PLANETS IN A DISTANT SOLAR SYSTEM THAT IN SOME WAYS RESEMBLES OUR OWN.

The NASA team, including UF Associate Professor Eric Ford, postdoctoral associate Althea Moorhead and graduate student Robert Morehead, reported its finding in the journal *Nature*.

“This is the new prototype for a system of rocky planets beyond our own,” Ford said. “It changes our understanding of the frequency of solar systems like our own in deep space.”

The planets orbit Kepler-11, a sun-like star about 2,000 light years away. With temperatures hotter than Venus — likely more than 400 to 1,400 degrees Fahrenheit — the planets range in size from twice to 4 times Earth’s diameter. The five confirmed planets are larger in mass but less dense than Earth, and closely packed, taking from 10 to 47 days

to orbit the star. There is almost certainly a sixth planet orbiting nearly twice as far away, but its distance from the star makes its confirmation more difficult, Ford said.

Although scientists haven’t yet determined the planets’ composition, their densities offer some clues. Denser than water but less dense than Earth, “their surfaces could be rocky or a combination of rock and ice, but they also have a lot of gas because their densities are so low,” Ford said.

The Kepler mission is searching for planets in what is known as the habitable zone — where a planet could have liquid water on its surface — using a space telescope staring at one portion of the Milky Way for years

on end. The Kepler-11 planets were detected not by direct observation but by tracking the dimming of a star’s light when planets pass between the star and the telescope. The objects orbiting Kepler-11 were confirmed as planets by observing small irregularities in the time when each planet transits across the star, known as the transit-time variation method.

The Kepler-11 system marks the second set of planets identified by this technique, which allows scientists to find planets orbiting stars that would otherwise be too faint to be confirmed. The first system discovered by this method was Kepler-9, announced Aug. 26, 2010, which included two gas-giant planets. Kepler-11 is nearly 500 times dimmer than stars that are typically discovered by traditional methods.

“This comes as a surprise to those accustomed to the

traditional planet-discovery technique,” Ford said.

Kepler-11 also is remarkable in that the planets travel in nearly the same plane, similar to those in our solar system, making it much more likely that multiple planets could be detected orbiting a single star. The next step will be to delve deeper into the data continuing to arrive from the Kepler spacecraft to determine mass and orbits of the planets more precisely, providing clues to how the planets formed.

“Much of the scientific community thought that multiple planets transiting the same star would be unlikely,” Ford said. “That idea has been completely overturned by this new discovery. Without the transit-timing method, these planets might have gone unconfirmed for years.”

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Alisson Clark

NEW DRUG HALTS RUNAWAY BLOOD CELLS IN BONE MARROW

LIKE A SWITCH STUCK IN THE ON POSITION, THE BONE MARROW CAN CHURN OUT BLOOD CELLS THAT BLOAT INTERNAL ORGANS AND CLOG BLOOD VESSELS, LEADING TO LIFE-THREATENING DISEASE.

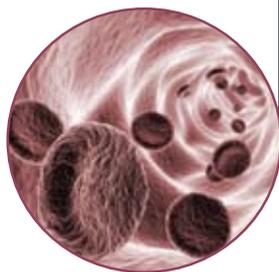


Maria Farias

Christopher Cogle (left) and Peter Sayeski.

“The disease has a path it’s going to take and you need to be able to alter that path — our drug does that to a reasonable extent.”

— Peter Sayeski



Now University of Florida scientists have discovered a potential new drug that can throw the switch on the runaway blood cell-production mechanism. The drug shrinks cell-gorged organs and stems the overproduction of blood cells, and the researchers are working toward bringing it into clinical trial in one year.

“The disease has a path it’s going to take and you need to be able to alter that path — our drug does that to a reasonable extent,” said Peter P. Sayeski, an associate professor of physiology and functional genomics in the UF College of Medicine, who led the research team.

The work, funded in part by the National Institutes of Health and the American Heart Association, is described in the *Journal of Biological Chemistry*.

The new drug, dubbed “G6” by the researchers, targets a group of life-threatening and hard-to-diagnose diseases called myeloproliferative neoplasms, or MPNs, that occur when the bone marrow cranks out too many red cells, white cells or platelets because of a mutant form of a protein called Jak2 that is key to blood cell formation. The condition is estimated to affect about 170,000 people in the United States, according to data from the MPN Research Foundation, also known as the MPD Foundation.

“These bone marrow cells are replicating and growing out of control because one very important protein is stuck in the on position,” said Dr. Christopher R. Cogle, an associate professor of hematology/oncology in the UF College of Medicine and a member of the UF Shands Cancer Center.

The result is blood counts so high they elevate patients’ risk of stroke, bleeding, infection and blood clots in various parts of the body. Ironically, the condition can also lead to low blood cell count and anemia symptoms, because it impedes the flow of normal cells from the bone marrow into the blood stream.

Doctors typically treat patients for years with low-dose oral chemotherapy that keeps the disease in check, but doesn’t cure it. And long-term chemotherapy carries its own risk of secondary blood cancers and leukemia, and of depressing normal blood cell counts.

The UF researchers, along with colleagues at the University of South Florida, Heriot-Watt University in the United Kingdom and Budapest University of Technology and Economics in Hungary, used computer technology to identify a chemical compound that can bind to the mutant protein and, in effect, turn it off. The compound belongs to a family called stilbenoids, which are known to slow cell growth and have antioxidant and tumor-suppressing properties.

In laboratory studies of cell cultures and in mice, the new drug reduced swelling in the spleen, corrected the unhealthy low ratio of white to red blood cells in the bone marrow and decreased the percentage of immature blood cells circulating through the body.

“What makes this interesting is that we altered the disease in the bone marrow,” said Sayeski, who is also a member of the UF Shands Cancer Center. “If you’re not treating the source, then you can’t cure these patients.”

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Czerne M. Reid

STUDY: UF HAS \$8.76 BILLION ECONOMIC IMPACT ON STATE

THE UNIVERSITY OF FLORIDA'S ECONOMIC IMPORTANCE IN FLORIDA HAS CONTINUED TO GROW IN RECENT YEARS, THANKS TO AN INCREASE IN RESEARCH GRANTS AND RISING DEMAND FOR HEALTH CARE SERVICES, ACCORDING TO A NEW STUDY BY UF'S INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES.

The study found that the university's total economic impact on the state for the 2009-2010 fiscal year was \$8.76 billion, and total employment impact was more than 100,000 jobs.

UF's economic impact — as large as the state's spectator sports industry that includes professional sports teams and NASCAR — represents the ripple effect of the university's statewide presence with research and education centers throughout Florida, UF physician practices and Shands HealthCare hospitals and programs, and extension offices in all 67 counties.

The economic impact from health-care makes up a large part of the total and is actually larger than UF operations, said Alan Hodges, an extension scientist in the food and resource economics department and the study's lead author. Operations includes money spent on personnel, utilities and supplies.

The economic impact from health-care services provided by Shands HealthCare and UF physician outpatient practices was \$2.88 billion, and their expenditures were more than \$2 billion. The economic impact of UF operations was \$2.34 billion, and its expenditures were \$1.75 billion.

"I continue to be astounded by the impacts of Shands and related health-care services," Hodges said.

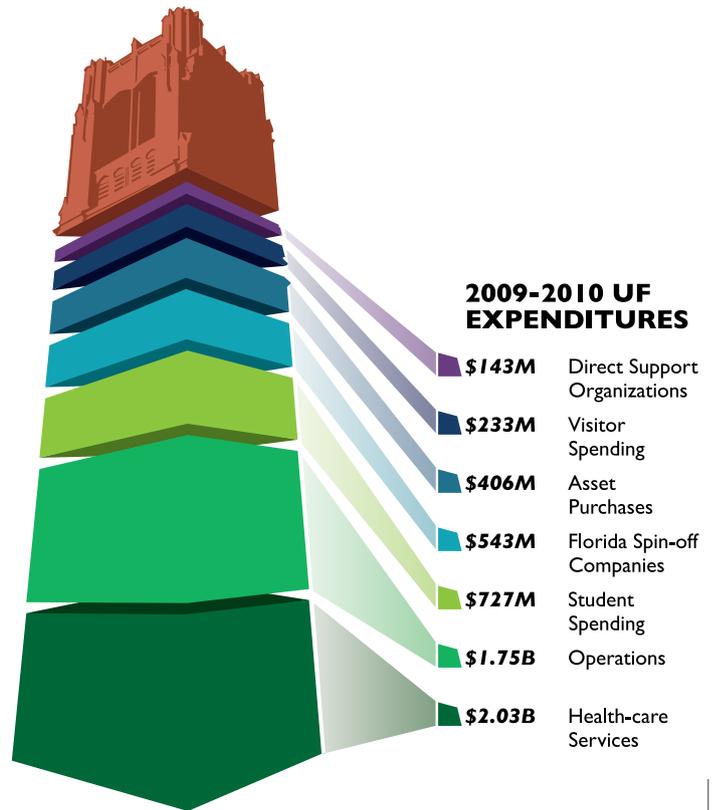
The report also examined the impact of spin-off companies that use technology developed at UF, a growing area of importance as the university looks to convert lab results into real-world solutions.

The economic impact of UF spin-off companies, which often involve biological or medical technology, was \$1.43 billion, and their total employment impact was more than 8,000 jobs. These companies are located throughout the state.

"The commercialization of university research is fundamental to the broader effort of building an innovation economy in Florida," UF President Bernie Machen said. "By creating jobs and attracting private development, we are helping turn around an economic crisis that has been particularly difficult on this state."

Employment impact includes the university's direct employment of more than 40,000 full- and part-time jobs as well as more than 64,000 additional jobs created through spending by UF and its related organizations.

There were more than 4.7 million visitors to UF in



fiscal year 2009-2010, and they spent about \$232.7 million on goods and services. Revenue for the university was more than \$4.27 billion, and expenditures were more than \$5.83 billion.

UF received \$593 million in state appropriations in fiscal year 2009-2010 and gave the state a nearly \$15 return on every dollar it invested in the university. By comparison, UF's state appropriation in 2005-2006 was \$665 million.

The study can be found online at <http://www.fred.ifas.ufl.edu/economic-impact-analysis/publications.shtml>.

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Robert H. Wells

"The commercialization of university research is fundamental to the broader effort of building an innovation economy in Florida. By creating jobs and attracting private development, we are helping turn around an economic crisis that has been particularly difficult on this state."

— **BERNIE MACHEN**
UF President