

Clues to nervous system evolution found in nerve-less sponge

Scientists turned to the sponge to find clues about the evolution of the complex nervous system and found but sponges and the rest of the animal world may not be so distant after all

Santa Barbara, Calif. – UC Santa Barbara scientists turned to the simple sponge to find clues about the evolution of the complex nervous system and found that, but for a mechanism that coordinates the expression of genes that lead to the formation of neural synapses, sponges and the rest of the animal world may not be so distant after all. Their findings, titled "Functionalization of a protosynaptic gene expression network," are published in the Proceedings of the National Academy of Sciences.

"If you're interested in finding the truly ancient origins of the nervous system itself, we know where to look," said Kenneth Kosik, Harriman Professor of Neuroscience Research in the Department of Molecular, Cellular & Developmental Biology, and co-director of UCSB's Neuroscience Research Institute.

That place, said Kosik, is the evolutionary period of time when virtually the rest of the animal kingdom branched off from a common ancestor it shared with sponges, the oldest known animal group with living representatives. Something must have happened to spur the evolution of the nervous system, a characteristic shared by creatures as simple as jellyfish and hydra to complex humans, according to Kosik.

A previous sequencing of the genome of the *Amphimedon queenslandica* - a sponge that lives in Australia's Great Barrier Reef - showed that it contained the same genes that lead to the formation of synapses, the highly specialized characteristic component of the nervous system that sends chemical and electrical signals between cells. Synapses are like microprocessors, said Kosik explaining that they carry out many sophisticated functions: They send and receive signals, and they also change behaviors with interaction - a property called "plasticity."

"Specifically, we were hoping to understand why the marine sponge, despite having almost all the genes necessary to build a neuronal synapse, does not have any neurons at all," said the paper's first author, UCSB postdoctoral researcher Cecilia Conaco, from the UCSB Department of Molecular, Cellular, and Developmental Biology (MCDB) and Neuroscience Research Institute (NRI). "In the bigger scheme of things, we were hoping to gain an understanding of the various factors that contribute to the evolution of these complex cellular machines."

This time the scientists, including Danielle Bassett, from the Department of Physics and the Sage Center for the Study of the Mind, and Hongjun Zhou and Mary Luz Arcila, from NRI and MCDB, examined the sponge's RNA (ribonucleic acid), a macromolecule that controls gene expression. They followed the activity of the genes that encode for the proteins in a synapse throughout the different stages of the sponge's development.

"We found a lot of them turning on and off, as if they were doing something," said Kosik. However, compared to the same genes in other animals, which are expressed in unison, suggesting a coordinated effort to make a synapse, the ones in sponges were not coordinated.

"It was as if the synapse gene network was not wired together yet," said Kosik. The critical step in the evolution of the nervous system as we know it, he said, was not the invention of a gene that created the synapse, but the regulation of preexisting genes that were somehow coordinated to express simultaneously, a mechanism that took hold in the rest of the animal kingdom.

The work isn't over, said Kosik. Plans for future research include a deeper look at some of the steps that lead to the formation of the synapse; and a study of the changes in nervous systems after they began to evolve.

"Is the human brain just a lot more of the same stuff, or has it changed in a qualitative way?" he asked.

<http://phys.org/news/2012-06-oldest-natural-pearl-arabia.html>

Oldest natural pearl found in Arabia

French researchers at the Laboratoire Archéologies et Sciences de l'Antiquité (ArScAn) (CNRS) have unearthed the oldest-ever archeological natural pearl.

Discovered at a Neolithic site in the Emirate of Umm al Quwain (United Arab Emirates), it dates from 5500 BC. These findings, together with previous discoveries of natural pearls on the south-eastern coast of the Arabian Peninsula, provide evidence that the earliest pearl oyster fishing took place in this region of the world.

Published in the journal *Arabian Archaeology and Epigraphy*, they show that natural pearls were a major component of cultural identity in early societies in the Persian Gulf and the northern Indian Ocean.

Until now, gemmologists had popularized the idea that the oldest natural pearl (dating from 3000 BC) came from a prehistoric Japanese site. Yet the pearl that has just been discovered at the coastal site of Umm al-Quwain 2, in the United Arab Emirates, was found at a level established by carbon-14 dating at 5547-5477, 5410-5235 BC. It is therefore the oldest natural pearl ever found at an archeological site, both in the Arabian

Peninsula and in the rest of the world. The discovery provides evidence that natural pearls were already collected 2500 years earlier in this region, for their esthetic value or even for ceremonial purposes. The presence of natural pearls at many Neolithic sites in the Arabian Peninsula confirms that they were collected not only in the Persian Gulf but also on the shores of the Indian Ocean (Sea of Oman and Arabian Sea off the coast of Oman). No ancient natural pearls have been found in Egypt, Mesopotamia, India or China, although some have been unearthed in Mesopotamia dating from 3200-3000 BC.

In the Arabian Peninsula, all the Neolithic pearls discovered (101 in total) come from the large pearl oyster *Pinctada margaritifera* and from *Pinctada radiata*, which is much smaller, easier to collect, and provides higher quality pearls. Diving for them was difficult and dangerous. Once collected, they were sorted, giving priority to the spherically shaped pearls. Although they are often white, opaque and dull due to alteration, some are remarkably well preserved, displaying white, pink, orange or brownish shades, and they have kept their original luster. Mother-of-pearl was also an important resource in the economy of local Neolithic societies, since the large valves of *P. margaritifera*'s were used to make fish hooks for the capture of a wide range of fish, some as large as tuna and sharks.

Natural pearls played a special role in funeral rites. Thus, the Umm al Quwain pearl, which was not drilled, had been placed in a grave at the site's necropolis. In other necropolises, the pearls were placed on the deceased's face, often above the upper lip. Recent work has shown that in the fifth millennium BC, half-drilled natural pearls were associated with men, and full-drilled pearls with women.

More information: Vincent Charpentier, Carl S. Phillips, Sophie Méry, 2012. Pearl fishing in the ancient world: 7500 BP. Arabian Archaeology and Epigraphy 23: 1-6.

<http://phys.org/news/2012-06-code-european-language.html>

Cracking the code on the origins of a new European language

There is strong evidence to support the discovery of a new European language.

Phys.org - Macquarie University historical linguistics researcher, Associate Professor Ilija Casule, discovered that the language, known as Burushaski, which is spoken by about 90,000 people who reside in a remote area of North West Pakistan, is Indo-European in origin, not Indo-Iranian.

Professor Casule's discovery, which has now been verified by a number of the world's top linguists, has excited linguistics experts around the world. An entire issue of the eminent international linguistics journal *The Journal of Indo-European Studies* is devoted to a discussion of his findings later this month.

More than 50 eminent linguists have tried over many years to determine the genetic relationship of Burushaski. But it was Casule's painstaking research, based on a comprehensive grammatical, phonological, lexical and semantic analysis, which established that the Burushaski language is in fact an Indo-European language most likely descended from one of the ancient



Balkan languages. Professor Casule believes that language is most probably ancient Phrygian.

About 90,000 people in a remote area of North West Pakistan speak Burushaski.

The Phrygians migrated from Macedonia to Anatolia (today part of Turkey) and were famous for their legendary kings who figure prominently in Greek mythology such as King Midas who turned whatever he touched into gold. They later migrated further east, reaching India. Indeed, according to ancient legends of the Burushaski people, they are descendants of Alexander the Great.

Tracing the historical path of a language is no easy task. Professor Casule said he became interested in the origins of Burushaski more than 20 years ago.

"People knew of its existence but its Indo-European affiliation was overlooked and it was not analysed correctly. It is considered a language isolate – not related to any other language in the world in much the same way that the Basque language is classified as a language isolate," he said.

The remoteness of the area that was independent until the early 1970s when it became part of Pakistan, ensured Burushaski retained certain grammatical and lexical features that led Professor Casule to conclude it is a North-Western Indo-European language, specifically of the Paleobalkan language group and that it corresponds most closely with Phrygian.

Dr. Casule's work is groundbreaking, not only because it has implications for all the Indo-European language groups, but also provides a new model for figuring out the origins of isolate languages – where they reside in the linguistic family tree and how they developed and blended with other languages to form a new language. Provided by Macquarie University

<http://phys.org/news/2012-06-tokyo-test-drill-oilfield-sea-japan.html>

Tokyo to test-drill for oilfield in Sea of Japan

Japan plans to test-drill in the Sea of Japan (East Sea) next year where a potentially "large-scale" oilfield has been found, a news report said Monday.

The Energy Agency has collected data proving that an area with possible oil and natural gas reserves lies some 30 kilometres (20 miles) southwest of Sadogashima island, the Yomiuri Shimbun said.

The possible oilfield, some 2.7 kilometres below the sea floor, covers 135 square kilometres (54 square miles), the evening edition of the mass-circulation daily reported. "In terms of area, it can match a large-scale oilfield overseas," an agency official was quoted by the newspaper as saying.

The government-backed Japan Oil, Gas and Metals National Corporation will carry out the 9.8 billion yen (\$124 million) test-drilling, the Yomiuri said. The three-year project is expected to begin as early as April next year after obtaining agreement from local Japanese fishermen, it said, adding that the government hopes to commercialise it in 2017 if results are favourable.

Resource-poor and energy-hungry Japan heavily relies on oil imports from the Middle East, a situation that has been exacerbated by the shuttering of all of its nuclear reactors following the disaster at Fukushima last year. On Saturday Prime Minister Yoshihiko Noda ordered two reactors in western Japan to be brought back online, bringing to an end a brief period without nuclear power.

<http://www.sciencedaily.com/releases/2012/06/120618194714.htm>

Chicago Woman Cured of Sickle Cell Disease

Chicagoan Ieshea Thomas is the first Midwest patient to receive a successful stem cell transplant to cure her sickle cell disease without chemotherapy in preparation for the transplant.

ScienceDaily - University of Illinois Hospital & Health Sciences System physicians performed the procedure using medication to suppress her immune system and one small dose of total body radiation right before the transplant. The transplant technique is relatively uncommon and is a much more tolerable treatment for patients with aggressive sickle cell disease who often have underlying organ disease and other complications, says Dr. Damiano Rondelli, professor of medicine at UIC, who performed Thomas's transplant.

The procedure initially allows a patient's own bone marrow to coexist with that of the donor. Since the patient's bone marrow is not completely destroyed by chemotherapy or radiation prior to transplant, part of the immune defense survives, lessening the risk of infection. The goal is for the transplanted stem cells to gradually take over the bone marrow's role to produce red blood cells - normal, healthy ones.

Thomas, 33, had her first sickle cell crisis when she was just 8 months old. Her disease became progressively worse as an adult, particularly after the birth of her daughter. She has spent most of her adult life in and out of hospitals with severe pain and has relied on repeated red blood cell transfusions. Her sickle cell disease also caused bone damage requiring two hip replacements.

"I just want to be at home with my daughter every day and every night," said Thomas, who depends on family to help care for her daughter during her frequent hospitalizations. This type of stem cell transplant is only possible for patients who have a healthy sibling who is a compatible donor.

Thomas' sister was a match and agreed to donate blood stem cells through a process called leukapheresis. Several days prior to leukapheresis, Thomas' sister was given drugs to increase the number of stem cells released into the bloodstream. Her blood was then processed through a machine that collects white cells, including stem cells. The stem cells were frozen until the transplant.

Last Nov. 23, four bags of frozen stem cells were delivered to the hospital's blood and marrow transplant unit. One by one, the bags were thawed and hung on an IV pole for infusion into Thomas. The procedure took approximately one hour. Her 13-year-old daughter, Miyatha, was at her bedside.

Six months after the transplant, Thomas is cured of sickle cell disease and no longer requires blood transfusions. "The donor cells have taken over completely, and blood tests show no sickle cell disease," said Rondelli, director of the blood and marrow transplant program at UI Hospital. Thomas continues to take medication to prevent rejection of the donor stem cells.

About 25 adults have received a similar chemotherapy-free stem cell transplant for sickle cell disease in recent years at the National Institutes of Health in Bethesda, Md. Approximately 85 percent have been cured.

"Sickle cell disease is devastating - both emotionally and physically," said Dr. Dennis Levinson, a private rheumatologist in Chicago and clinical associate professor of medicine at UIC, who has taken care of Thomas for the past 16 years. "I've been terribly frustrated with Ieshea's disease over the years, and I've cared for many other sickle cell patients who have died."

Levinson says the stem cell transplant provides new hope for patients who often live day-to-day on painkillers and who are often misunderstood by clinicians. As the former chief of medicine at the now closed Michael Reese Hospital, he said he has cared for many patients with sickle cell anemia and was determined to seek out the best treatment option for Thomas.

Sickle cell disease primarily affects people of African descent. It is an inherited defect of the red blood cells that causes them to be shaped like a crescent, or sickle. These abnormal cells deliver less oxygen to the body's tissues and can result in severe pain, stroke and organ damage. Approximately one in every 500 African Americans born in the U.S. has sickle cell disease. The disease affects 80,000 Americans of different ethnic backgrounds.

<http://www.bbc.co.uk/news/uk-scotland-glasgow-west-18494725>

Male tea drinkers 'may be at greater risk of prostate cancer'

Men who are heavy tea drinkers may be more likely to develop prostate cancer, according to new research.

A team from Glasgow University tracked the health of more than 6,000 male volunteers over a period of 37 years. They found men who drank over seven cups of tea per day had a 50% higher risk of developing prostate cancer than moderate and non tea drinkers. The team said it did not know if tea was a risk factor or if drinkers lived to ages where cancer was more common.

Prostate cancer is the most common cancer amongst men in Scotland and diagnosed cases increased by 7.4% between 2000 and 2010.

Screening examination

The Midspan Collaborative study began in Scotland in 1970 and gathered data from 6,016 male volunteers, all aged between 21 and 75. Volunteers were asked to complete a questionnaire about their usual consumption of tea, coffee, alcohol, smoking habits and general health, and attended a screening examination.

Just under a quarter of the men included in the study were heavy tea drinkers.

Of these, 6.4% developed prostate cancer during a follow-up of up to 37 years.

Researchers found that men who drank more than seven cups of tea per day had a significantly increased risk of prostate cancer compared to those who drank no tea or less than four cups per day.

The study was led by Dr Kashif Shafique of Glasgow University's Institute of Health and Wellbeing.

He said: "Most previous research has shown either no relationship with prostate cancer for black tea or some preventive effect of green tea.

"We don't know whether tea itself is a risk factor or if tea drinkers are generally healthier and live to an older age when prostate cancer is more common anyway." "We found that heavy tea drinkers were more likely not to be overweight, be non alcohol-drinkers and have healthy cholesterol levels.

"However, we did adjust for these differences in our analysis and still found that men who drank the most tea were at greater risk of prostate cancer."

Green tea

Chris Garner, a member of Edinburgh and Lothian Prostate Cancer Support Group, said the research would not stop him drinking tea.

He has adopted a healthier diet since being diagnosed with prostate cancer 10 years ago and drinks green tea.

Mr Garner said: "As usual you get evidence on one side and you get evidence on the other and you're left in the middle trying to decide who's right but I have to say, I don't think tea is very high on the agenda if you're looking at diet, lifestyle and so on. "There are other things which come well above tea."

Dr Kate Holmes, head of research at the Prostate Cancer Charity, said: "Whilst it does appear that - of the 6,000 men who took part in this study - those who drank seven or more cups of tea each day had an increased risk of developing prostate cancer, this did not take into consideration family history or any other dietary elements other than tea, coffee and alcohol intake.

"We would therefore not wish any man to be concerned that drinking a moderate amount of tea as part of a healthy diet will put them at an increased risk of developing prostate cancer."

The findings of the study have been published in the journal Nutrition and Cancer.

http://www.eurekalert.org/pub_releases/2012-06/asfm-dhd061312.php

Dog-associated house dust protects against respiratory infection linked to asthma
House dust from homes with dogs appears to protect against infection with a common respiratory virus that is associated with the development of asthma in children.

Researchers from the University of California, San Francisco, present their findings today at the 2012 General Meeting of the American Society for Microbiology.

"In this study we found that feeding mice house dust from homes that have dogs present protected them against a childhood airway infectious agent, respiratory syncytial virus (RSV).

RSV infection is common in infants and can manifest as mild to severe respiratory symptoms. Severe infection in infancy is associated with a higher risk of developing childhood asthma," says Kei Fujimura, a researcher on the study.

In the study Fujimura and her colleagues compared three groups of animals: Mice fed house dust from homes with dogs before being infected with RSV, mice infected with RSV without exposure to dust and a control group of mice not infected with RSV.

"Mice fed dust did not exhibit symptoms associated with RSV-mediated airway infection, such as inflammation and mucus production. They also possessed a distinct gastrointestinal bacterial composition compared to animals not fed dust," says Fujimura.

Pet ownership, in particular dogs, has previously been associated with protection against childhood asthma development, says Fujimura.

Recently she and her colleagues demonstrated that the collection of bacterial communities (the microbiome) in house dust from homes that possess a cat or dog is compositionally distinct from house dust from homes with no pets.

"This led us to speculate that microbes within dog-associated house dust may colonize the gastrointestinal tract, modulate immune responses and protect the host against the asthmagenic pathogen RSV," says Fujimura. "This study represents the first step towards determining the identity of the microbial species which confer protection against this respiratory pathogen."

Identification of the specific species and mechanisms underlying this protective effect represents a crucial step towards understanding the critical role of microbes in defining allergic disease outcomes and could lead to development of microbial-based therapies to protect against RSV and ultimately reduce the risk of childhood asthma development, says Fujimura.

This work represents a collaboration between the Lynch lab at University of California San Francisco and the Lukacs lab at the University of Michigan, Ann Arbor. Tine Demoor, a post-doc in Nick Lukacs lab, performed the mouse experiments and measured airway symptomology associated with RSV infection. Fujimura, Marcus Rauch, and Stephanie Galang from Susan Lynch's group performed microbiome profiling and data analysis of cecal (gut) contents from these animals.

http://www.eurekalert.org/pub_releases/2012-06/uoaf-rmb061812.php

Resveratrol may be a natural exercise performance enhancer: U of A medical research
Natural compound found in fruit, nuts and wine led to improved strength and endurance

A natural compound found in some fruits, nuts and red wine may enhance exercise training and performance, demonstrates newly published medical research from the University of Alberta.

Principal investigator Jason Dyck and his team found out in experiments that high doses of the natural compound resveratrol improved physical performance, heart function and muscle strength in lab models.

"We were excited when we saw that resveratrol showed results similar to what you would see from extensive endurance exercise training," says Dyck, who works in the Faculty of Medicine & Dentistry as a researcher in the department of Pediatrics and the department of Pharmacology.

"We immediately saw the potential for this and thought that we identified 'improved exercise performance in a pill.' "

His team's findings were published in the peer-reviewed Journal of Physiology in late May.

Dyck and his team will soon start testing resveratrol on diabetics with heart failure to see if the natural compound can improve heart function for this patient group. The 10-week study is expected to start within the next few months.

"I think resveratrol could help patient populations who want to exercise but are physically incapable.

Resveratrol could mimic exercise for them or improve the benefits of the modest amount of exercise that they can do," says Dyck. "It is very satisfying to progress from basic research in a lab to testing in people, in a short period of time."

The research was funded by the Canadian Institutes of Health Research.

Study: students who complete bachelor's degrees in four years earn more

Going to college - and completing a bachelor's degree in four years - pays off in dollars and cents.

Phys.org - A study done by UT's Center for Business and Economic Research (CBER), in cooperation with the Tennessee Higher Education Commission (THEC), has found that college students who earned their bachelor's degrees within four years make higher salaries than those who took longer to complete their degrees.

Timely college completion is a key element of the Complete College Tennessee Act enacted in January 2010. The act ties state funding for the state's public institutions of higher education - including technical schools, community colleges, and four-year universities - to the number of graduates schools produce and how well their students are progressing toward their degrees.

The CBER study found that students who completed their bachelor's degrees within four years earn \$11,500 to \$13,000 more than those who attend college but fail to complete their degrees. Students who completed their degrees within six years also earned more than non-completers, but only by \$5,300 to \$7,200. Further, seven or eight years after starting college, students who took more than six years to complete their bachelor's degrees were earning about the same amount as students who left college without a degree.

"The clear advantage went to students who earned the degree within four years," the study said.

The findings "reinforce a well-known message about the value of postsecondary education and training," said David L. Wright, THEC's chief policy officer. "This is the first time our data have been used to show the benefits of graduating as quickly as possible," he said. "I think you'll see us looking for ways to encourage students to finish college more efficiently."

The authors suggest several explanations for why it's so beneficial to complete college on a timely basis:

Students who take an extra year or two to complete their four-year degrees may find themselves working at entry-level wages, while on-time completers are already enjoying higher earnings from raises or promotions.

Students who choose to stay in college and graduate later forgo substantial earnings in the labor market over the course of their work life.

Employers may view extended college stays as a negative reflection of a student's aptitude, commitment, or efficiency at completing tasks.

The authors note there is "the notion that students who finish college faster are fundamentally different than students who take longer, in ways that influence later earnings and prove difficult to control for statistically." Although on-time degree recipients earned more than non-completers, the authors caution, "This does not mean that students should avoid college if they do not expect to finish. Our extended analyses... indicate that non-completers can benefit from spending additional time in college, even if they ultimately fail to complete a degree." They note that for students who did not receive a degree, post-college earnings rose with each additional semester a student had attended.

The researchers used data from THEC to look at all students who began as first-time freshmen at one of the state's public colleges or universities in 2002 or 2003. The researchers studied these students through 2010 to determine if they had completed their degrees and to monitor their earnings.

Among other findings:

Seventy-two percent of two-year college entrants and 45 percent of four-year college entrants failed to earn a degree in the given time period.

Those who failed to complete their degrees had lower ACT scores than degree recipients and also had lower earnings after college.

Those who failed to complete their degrees came from less affluent and more diverse neighborhoods than degree recipients.

Students are at highest risk for dropping out during their first and second terms; for students transferring from a community college, the greatest risk of dropping out is after their first term as a four-year college student.

Read the entire report [here](#). Provided by University of Tennessee at Knoxville

<http://www.sciencedaily.com/releases/2012/06/120619092933.htm>

Antibacterials in Personal-Care Products Linked to Allergy Risk in Children

Exposure to common antibacterial chemicals and preservatives may make children more prone to a range of food and environmental allergies.

ScienceDaily - Exposure to common antibacterial chemicals and preservatives found in soap, toothpaste, mouthwash and other personal-care products may make children more prone to a wide range of food and environmental allergies, according to new research from Johns Hopkins Children's Center.

Results of the NIH-funded study are published online ahead of print June 18 in the Journal of Allergy and Clinical Immunology.

Using existing data from a national health survey of 860 children ages 6 to 18, Johns Hopkins researchers examined the relationship between a child's urinary levels of antibacterials and preservatives found in many personal-hygiene products and the presence of IgE antibodies in the child's blood. IgE antibodies are immune chemicals that rise in response to an allergen and are markedly elevated in people with allergies.

"We saw a link between level of exposure, measured by the amount of antimicrobial agents in the urine, and allergy risk, indicated by circulating antibodies to specific allergens," said lead investigator Jessica Savage, M.D., M.H.S., an allergy and immunology fellow at Hopkins.

The researchers caution that the findings do not demonstrate that antibacterials and preservatives themselves cause the allergies, but instead suggest that these agents play a role in immune system development.

The investigators say their findings are also consistent with the so-called hygiene hypothesis, which has recently gained traction as one possible explanation behind the growing rates of food and environmental allergies in the developed world. The hypothesis suggests that early childhood exposure to common pathogens is essential in building healthy immune responses. Lack of such exposure, according to the theory, can lead to an overactive immune system that misfires against harmless substances such as food proteins, pollen or pet dander.

"The link between allergy risk and antimicrobial exposure suggests that these agents may disrupt the delicate balance between beneficial and bad bacteria in the body and lead to immune system dysregulation, which in turn raises the risk of allergies," Savage added.

In the study, those with the highest urine levels of triclosan - an antibacterial agent used in soaps, mouthwash and toothpaste - had the highest levels of food IgE antibodies, and therefore the highest allergy risk, compared with children with the lowest triclosan levels. Children with the highest urinary levels of parabens - preservatives with antimicrobial properties used in cosmetics, food and medications - were more likely to have detectable levels of IgE antibodies to environmental allergens like pollen and pet dander, compared with those with low paraben levels.

The team initially zeroed in on seven ingredients previously shown to disrupt endocrine function in lab and animal studies. These compounds were bisphenol A - found in plastics - and triclosan, benzophenone-3 and propyl, methyl, butyl and ethyl parabens, found in personal-hygiene products and some foods and medications. Interestingly, triclosan and propyl and butyl parabens, all of which have antimicrobial properties, were the only ones associated with increased allergy risk in the current study, the researchers noted. "This finding highlights the antimicrobial properties of these agents as a probable driving force behind their effect on the immune system," said senior investigator Corinne Keet, M.D., M.S., an allergist at Johns Hopkins Children's Center. Children with the highest urine levels of triclosan had nearly twice the risk of environmental allergies as children with the lowest urinary concentrations. Those with highest levels of propyl paraben in the urine had twice the risk of an environmental allergy. Food allergy risk was more than twice as pronounced in children with the highest levels of urinary triclosan as in children with the lowest triclosan levels. High paraben levels in the urine were not linked to food allergy risk.

To clarify the link between antimicrobial agents and allergy development, the researchers are planning a long-term study in babies exposed to antibacterial ingredients at birth, following them throughout childhood.

The research was funded by the National Institutes of Health training grant number T32AI007056-31.

Co-investigators on the research were Elizabeth Matsui, M.D., M.H.S., and Robert Wood, M.D., both of Hopkins.

Jessica H. Savage, Elizabeth C. Matsui, Robert A. Wood, Corinne A. Keet. Urinary levels of triclosan and parabens are associated with aeroallergen and food sensitization. Journal of Allergy and Clinical Immunology, 2012; DOI: 10.1016/j.jaci.2012.05.006

<http://nyti.ms/NvpmOH>

A Hormonal Remedy for Brain Injuries Is Explored

Study examining whether a surprising new treatment could minimize the damage to the brain: an infusion of progesterone, the reproductive hormone.

By DAVID TULLER

Late one evening last December, 18-year-old Michelle Vaquero was crossing a busy street in San Jose, Calif., when a car slammed into her. She landed more than 30 feet away. An ambulance rushed her to Santa Clara Valley Medical Center, where doctors diagnosed traumatic brain injury.

Miriam Richards, Ms. Vaquero's mother, said that doctors at first offered little cause for optimism. "The impact was so severe that they didn't give us any hope," she said. "They didn't tell us she'd be fine. They didn't know how bad it was."

Ms. Vaquero has been steadily recovering since the accident, and there is reason for Ms. Richards to hope that progress will continue. Shortly after she arrived at the hospital, Ms. Vaquero was enrolled in a study examining whether a surprising new treatment could minimize the damage to her brain: a three-day infusion of progesterone, the reproductive hormone.

The study, financed by the National Institutes of Health and overseen by Emory University in Atlanta, is designed to test the hypothesis that the hormone can reduce mortality and disability if administered right after a traumatic brain injury. Patients must begin the infusion within four hours of the injury, with outcomes assessed after six months. The study is one of two large trials of progesterone that have generated excitement among doctors because no medications have been approved for preventing the worst outcomes associated with serious brain injuries.

Dr. David Gordon, an assistant professor of neurosurgery at Montefiore Medical Center in the Bronx who is not involved in the research, said that he has "some measure of cautious optimism" about progesterone.

"The early data look very promising," he said. In 2007, researchers at Emory reported that in a trial of 100 patients, the mortality rate after 30 days among brain-injured patients who received progesterone was just 13 percent, compared with 30 percent among those given a placebo.

Moreover, patients with moderate traumatic brain injury who were given progesterone experienced greater functional improvement. A small study from China also reported positive outcomes with the hormone.

Traumatic brain injuries have received a lot of attention in the past decade for two reasons: the large number of such injuries suffered by soldiers in Iraq and Afghanistan, and the heightened focus on the risk of concussions in sports like football and hockey. According to the Centers for Disease Control and Prevention, about 1.7 million people a year experience a traumatic brain injury in the United States. Of those, 275,000 are hospitalized and more than 50,000 die. More than five million Americans are estimated to suffer from a long-term disability related to such injuries. The direct medical expenses and indirect costs, including lost productivity, have been estimated at \$76 billion a year, according to the C.D.C.

The notion that progesterone might blunt the effects of brain injury originated with Donald Stein, a neuroscientist and a professor of emergency medicine at Emory. Decades ago, he noticed that female rats, especially those with the high levels of progesterone typical during pregnancy, were better than male rats at remembering certain tasks, like how to swim through a water maze after an induced brain injury.

Drug companies, however, were generally not interested in pursuing the research, which contradicted the longstanding belief that the brain cannot regenerate cells. Moreover, progesterone also had been widely regarded as a hormone involved solely in menstruation, embryogenesis and pregnancy.

"Although we think of it as a female hormone, there are a lot of clues in nature that this compound has multiple roles in the human body," said Dr. David Wright, an associate professor of emergency medicine at Emory who collaborates with Dr. Stein and is lead investigator of the current clinical trial.

In fact, small amounts of progesterone are found in the brains of both women and men, suggesting that it has neuroprotective as well as reproductive functions.

Progesterone appears to affect multiple physiologic processes that follow an acute injury. It reduces the cerebral swelling that leads to brain cells dying off, for example. Progesterone also may blunt cellular damage from free radicals and promote myelin production in damaged nerve cells, experts believe.

The Emory trial will eventually include 1,140 participants at dozens of participating trauma centers around the country. Results are expected within three years, although a safety monitoring board will examine preliminary results this summer and could halt the study if the data suggest that the drug is highly effective.

A second large trial that includes international as well as domestic trauma sites is being conducted by BHR Pharma, which is using a different progesterone formulation from the one in the Emory trial. The Food and Drug Administration has promised to fast-track the approval process for the BHR formulation if the findings are positive.

(BHR Pharma has a licensing agreement with Emory related to the research. Dr. Stein, Dr. Wright and several other faculty members as well as Emory have received compensation arising from that agreement; Dr. Stein has also served as a paid consultant to the company.)

If the findings are positive, said Dr. James Quinn, a professor of emergency medicine at Stanford, which is also participating in the N.I.H. study, the potential benefits could extend to other serious conditions. "If this is neuroprotective for T.B.I., then how about for stroke?" he said. Ms. Vaquero and her doctors will not know

until the trial is over whether she received progesterone or a placebo, but so far she is pleased with her recovery. After extensive physical therapy, she has recently relearned how to walk and hopes to continue her studies at San Jose City College.

"Sometimes there's a couple of days in the month when I get depressed, but mostly I'm in a good mood," she said. "I feel that I'll be able to get back to normal, but it's going to take time."

<http://www.bbc.co.uk/news/health-18506174>

Moderate drinking in early pregnancy branded 'safe'

Drinking a low or moderate level of alcohol in early pregnancy is not linked to developmental problems in five-year-olds, researchers say.

The Danish research, published in the BJOG journal, suggested one to eight drinks a week was not linked to harm. In Denmark a standard drink has 12g of alcohol, compared with the UK's 7.9g.

UK pregnant women are advised not to drink, but experts say those who do should have no more than one or two units, once or twice a week. Heavy drinking during pregnancy is known to be linked to miscarriage, foetal alcohol syndrome and low birth weight.

Binge drinking

The Danish researchers produced five papers on drinking in pregnancy. More than 1,600 pregnant women took part, recruited at their first antenatal visit. Half were first-time mothers, and just under a third smoked during pregnancy. They were asked about their alcohol intake. Low average consumption was defined as one to four per week, moderate as five to eight drinks and high levels as nine or more per week.

Binge drinking, which women were also questioned about, was defined as having five or more drinks on one occasion. Pregnant women who did not drink during pregnancy were included in the research.

The scientists looked at the effects of alcohol on IQ, attention span, executive functions such as planning, organisation, and self-control in the five-year-olds. They found low to moderate weekly drinking in early pregnancy had no significant effect on neurodevelopment of children at the age of five - and neither did binge drinking. There were no differences in IQ test results in children whose mothers drank one to four units per week or five to eight units per week in pregnancy compared with children of abstaining mothers.

But drinking more than nine drinks per week was associated with lower attention span among the children.

'Minimising risk'

The lead authors of the work, Ulrik Schiøler Kesmodel of Aarhus University and Prof Erik Lykke Mortensen of the University of Copenhagen, said: "High prenatal exposure to alcohol has consistently been associated with adverse effects on neurodevelopment. "Areas such as intelligence, attention and executive functions have been found to be particularly vulnerable. "Our findings show that low to moderate drinking is not associated with adverse effects on the children aged five."

Patrick O'Brien, a spokesman for the Royal College of Obstetricians and Gynaecologists (RCOG) and a consultant obstetrician said the research was very well designed. This was because it asked women about their alcohol intake at the time - rather than asking them to look back as past studies have done - and because it followed children for such a long time and assessed such a range of developmental markers, he said.

The RCOG advises that women abstain from alcohol while pregnant, but if they do decide to drink evidence suggests "one or two units, once or twice a week, is acceptable after 12 weeks of pregnancy".

Dr O'Brien said: "These findings suggest low to moderate drinking has no significant effect on children aged five. However, this does not mean that women can use this as an excuse to indulge in more than the recommended amount in the UK. "This evidence suggests that the UK guidance is erring on the side of caution - but that's sensible in pregnancy." A spokeswoman for the Department of Health echoed the RCOG advice, but said it would always "take note" of new evidence. Women are advised to talk to their midwife or doctor if they have any concerns about the amount of alcohol they are drinking in pregnancy.

http://www.eurekalert.org/pub_releases/2012-06/acs-snw062012.php

Simple new way to clean traces of impurities from drug ingredients

Scientists report development of a new procedure for removing 98 percent of an impurity that can contaminate prescription drugs and increase the risk for adverse health effects in patients.

Scientists are reporting development of a simple new procedure for removing almost 98 percent of an important impurity that can contaminate prescription drugs and potentially increase the risk for adverse health effects in patients. Their report appears in ACS' journal Organic Process Research & Development.

Ecevit Yilmaz and colleagues note that contamination of medications with so-called "genotoxic" impurities (GTIs) have resulted in several major recent drug recalls. GTIs may be ingredients used to make drugs, or they may be formed during production of drugs, and can remain in the final product in minute amounts. The

presence of one GTI in the anti-viral medication Viracept distributed in the European Union forced a recall in 2007. With GTIs an ongoing serious concern for the pharmaceutical industry, the scientists sought a better way to remove an important GTI called acrolein.

They describe development of a way to remove acrolein by using engineered particles based on silica and polystyrene. Mixing the particles in a drug solution contaminated with acrolein for 20 minutes resulted in removal of nearly 98 percent of the GTI without any substantial removal of the active pharmaceutical ingredient. They note that while the separation materials are readily available, there may be the need for more research on the method before using it to clean up pharmaceuticals on a commercial basis.

The authors acknowledge funding from the European Commission.

<http://www.sciencedaily.com/releases/2012/06/120620103233.htm>

Confusion Can Be Beneficial for Learning

A new study shows that confusion when learning can be beneficial if it is properly induced, effectively regulated and ultimately resolved

ScienceDaily - Most of us assume that confidence and certainty are preferred over uncertainty and bewilderment when it comes to learning complex information. But a new study led by Sidney D'Mello of the University of Notre Dame shows that confusion when learning can be beneficial if it is properly induced, effectively regulated and ultimately resolved. The study will be published in a forthcoming issue of the journal Learning and Instruction. Notre Dame psychologist and computer scientist D'Mello, whose research areas include artificial intelligence, human-computer interaction and the learning sciences, together with Art Graesser of the University of Memphis, collaborated on the study, which was funded by the National Science Foundation. They found that by strategically inducing confusion in a learning session on difficult conceptual topics, people actually learned more effectively and were able to apply their knowledge to new problems.

In a series of experiments, subjects learned scientific reasoning concepts through interactions with computer-animated agents playing the roles of a tutor and a peer learner. The animated agents and the subject engaged in interactive conversations where they collaboratively discussed the merits of sample research studies that were flawed in one critical aspect. For example, one hypothetical case study touted the merits of a diet pill, but was flawed because it did not include an appropriate control group. Confusion was induced by manipulating the information the subjects received so that the animated agents sometimes disagreed with each other and expressed contradictory or incorrect information. The agents then asked subjects to decide which opinion had more scientific merit, thereby putting the subject in the hot spot of having to make a decision with incomplete and sometimes contradictory information.

In addition to the confusion and uncertainty triggered by the contradictions, subjects who were confused scored higher on a difficult post-test and could more successfully identify flaws in new case studies.

"We have been investigating links between emotions and learning for almost a decade, and find that confusion can be beneficial to learning if appropriately regulated because it can cause learners to process the material more deeply in order to resolve their confusion," D'Mello says. According to D'Mello, it is not advisable to intentionally confuse students who are struggling or induce confusion during high-stakes learning activities. Confusion interventions are best for higher-level learners who want to be challenged with difficult tasks, are willing to risk failure, and who manage negative emotions when they occur.

"It is also important that the students are productively instead of hopelessly confused. By productive confusion, we mean that the source of the confusion is closely linked to the content of the learning session, the student attempts to resolve their confusion, and the learning environment provides help when the student struggles. Furthermore, any misleading information in the form of confusion-induction techniques should be corrected over the course of the learning session, as was done in the present experiments."

According to D'Mello, the next step in this body of research is to apply these methods to some of the more traditional domains such as physics, where misconceptions are common.

Sidney D'Mello, Blair Lehman, Reinhard Pekrun, Art Graesser. Confusion can be beneficial for learning. Learning and Instruction, 2012; DOI: 10.1016/j.learninstruc.2012.05.003

http://www.eurekalert.org/pub_releases/2012-06/aga-fed062012.php

Food elimination diet identifies causes of difficulty swallowing and swelling of the throat ***A six-food elimination diet significantly improves symptoms in adult patients with eosinophilic esophagitis***

A six-food elimination diet significantly improves symptoms in adult patients with eosinophilic esophagitis (EoE), according to a new study in Gastroenterology, the official journal of the American Gastroenterological Association. In EoE, eosinophils and other inflammatory cells cause inflammation of the esophagus in response

to an allergic stimulus. Previously thought to be a rare disease, EoE has become one of the most common causes for dysphagia (difficulty swallowing), heartburn and the sensation of "food stuck in the throat" in adults. Similar to children, this study has now shown that food allergens have a causative role in the majority of adults with EoE.

An elimination diet that identifies specific food triggers is an effective therapeutic alternative to corticosteroids for adults with EoE. Furthermore, the results of a reintroduction process in which these trigger foods are added back into a patient's diet support the fact that food antigens are driving this response; this provides new insight into the nature of the inflammatory response in adult EoE.

"By first eliminating, then systematically reintroducing foods in our adult patients, we were able to identify the specific food triggers that caused their symptoms, such as heartburn, chest pain and difficulty swallowing, or the sensation of food being stuck in their throat," said Nirmala Gonsalves, MD, of Northwestern University and the lead author of this study. "Given the poor sensitivity of skin prick testing and lack of history of food allergy or intolerance, the six-food elimination diet with reintroduction is the only reliable method to date to identify food triggers in adult eosinophilic esophagitis and should allow us to better tailor diet to individual patients for long-term management." View a video abstract in which Dr. Gonsalves discusses her study findings.

A diet that eliminates all of the six most commonly allergenic foods (milk, soy, egg, wheat, peanuts/tree nuts and shellfish/fish) significantly improves symptoms and reduces esophageal tissue damage associated with EoE in adults. In fact, 78 percent of patients achieved greater than a 50 percent reduction in peak eosinophil (white blood cell) counts in their esophagus; dysphagia symptom scores improved significantly after the elimination diet. Once trigger foods were reintroduced, all patients had recurrence of their symptoms within five days. These results suggest that EoE is likely the same disease in children and adults.

http://www.eurekalert.org/pub_releases/2012-06/uocd-mac062012.php

Misidentified and contaminated cell lines lead to faulty cancer science

A study shows that due to a high rate of contamination, misidentification and redundancy in widely available cell lines, researchers may be drawing faulty conclusions

AURORA, Colo. - Modern cancer therapies start in cells – researchers compare cancer samples to healthy cells to discover how cancer is genetically different, and use cell lines to test promising new drugs. However, a University of Colorado Cancer Center study published this week in the journal *Gynecologic Oncology* shows that due to a high rate of contamination, misidentification and redundancy in widely available cell lines, researchers may be drawing faulty conclusions.

"I've seen faculty and graduate students leave my lab in tears when we discovered the cells on the label weren't the cells they were actually experimenting on," says Christopher Korch, PhD, investigator at the CU Cancer Center and director of the center's DNA Sequencing and Analysis Service, the paper's co-first author. "When you get a cell line, you have to look that gift horse in the mouth – there's up to a 40 percent chance it's a Trojan horse, not what it says it is."

For example, the cell line known as HES has been widely used as a "normal" model of endometrial cells since its development in 1989. There are literally hundreds of papers that, for example, look for differences between endometrial cancer cells and these supposedly normal HES endometrial cells. Unfortunately, HES is not, in fact, an endometrial cell line. It's another cell line known as HeLa which was first derived from cervical cancer.

"In the past, the technology to check cell lines didn't exist and so you can't really blame past researchers. But today it's cheap, it's easy and the technology is widely available. There's no excuse to experiment on cells without first discovering what you're experimenting on. We've suggested that journals start requiring verification of cell lines as a prerequisite of publishing," says Andrew Bradford, PhD, CU Cancer Center investigator and associate professor in the CU School of Medicine Department of Obstetrics and Gynecology, the paper's senior author.

"In fact, the process of double-checking a cell line is the same process that Scotland Yard uses to identify murderers based on DNA evidence," says Monique Spillman, MD, PD, CU Cancer Center investigator and assistant professor in the CU School of Medicine Department of Obstetrics and Gynecology, the paper's co-first author. Here's how it works: You have a sample that you know is endometrial cells from a specific patient and you have a sample that purports to be (but may or may not be!) endometrial cells – is there a match? If so, you've convicted the suspect cell line. If not, as the team so often found, just as DNA mismatch has exonerated death row inmates, DNA mismatch showing that a cell line doesn't match its label can call into question perhaps decades worth of research done using the cells.

While a misidentified cell line seems likely due to a SNAFU on the part of a lab assistant with a faulty filing system, there are more ways than clerical error to end up with the wrong label on a sample of cells.

"I see two people working with different cultures in the same hood, or using the same growth medium for the same cultures with the same pipette," Korch says. "And especially HeLa is superwoman – it can fly." HeLa cells can travel in aerosols and once they land where they shouldn't, they're so adaptive and aggressive that they tend to out compete other cell lines wherever they land – contamination leads to a quick HeLa takeover and perhaps a vial labeled HES when in fact it's HeLa.

"If you're going to make conclusions about endometrial cancer based on a cervical cancer line, your results are going to be flawed. It's not the same genetic pathways," Spillman says.

With his tongue only somewhat in his cheek, Korch reiterates Spillman's point, saying, "If you're studying prostate cancer with a cervical cancer cell line, you're going to have problems because men with prostates don't tend to have cervixes."

The work of Korch, Bradford, Spillman and colleagues including Twila Jackson builds on earlier work at the CU Cancer Center by investigators Rebecca Schweppe and Bryan Haugen who found 50 percent misidentification or contamination in available thyroid cell lines – for example, two were melanoma lines and another was a colon cancer line. The recent research finds the same systemic problems with cell lines of widely varying types. "When you bring new cells into the lab, you need to work meticulously and carefully," says Korch. "You need to put them into quarantine until you know what they are."

Korch is working to put the group's data online, both allowing investigators elsewhere to compare their cell lines to the group's controls, and also to help research groups discover what, if not as labeled, some of the cell lines they tested might be. Again like criminal DNA evidence, it's all about building a database large enough to include a match. Until then, "People really need to check their cells," says Bradford. "It's just that simple."

This work was funded in part by NCI CA125427

http://www.eurekalert.org/pub_releases/2012-06/uob-cao061912.php

Chemical analysis of pottery reveals first dairying in Saharan Africa in the fifth millennium BC

The first unequivocal evidence that humans in prehistoric Saharan Africa used cattle for their milk nearly 7,000 years ago is described in research by an international team of scientists

The first unequivocal evidence that humans in prehistoric Saharan Africa used cattle for their milk nearly 7,000 years ago is described in research by an international team of scientists, led by the University of Bristol, UK, published today in Nature.

By analysing fatty acids extracted from unglazed pottery excavated from an archaeological site in Libya, the researchers showed that dairy fats were processed in the vessels. This first identification of dairying practices in the African continent, by prehistoric Saharan herders, can be reliably dated to the fifth millennium BC.

Around 10,000 years ago the Sahara Desert was a wetter, greener place; early hunter-gatherer people in the area lived a semi-sedentary life, utilising pottery, hunting wild game and collecting wild cereals. Then, around 7,000-5,000 years ago as the region became more arid, the people adopted a more nomadic, pastoral way of life, as the presence of cattle bones in cave deposits and river camps suggests.

Domesticated animals were clearly significant to these people: the engraved and painted rock art found widely across the region includes many vivid representations of animals, particularly cattle. However, no direct proof that these cattle were milked existed – until now.

Researchers at the Organic Geochemistry Unit in Bristol's School of Chemistry, with colleagues at Sapienza, University of Rome, studied unglazed pottery dating from around 7,000 years ago, found at the Takarkori rock shelter in the Tadrart Acacus Mountains, Libya. Using lipid biomarker and stable carbon isotope analysis, they examined preserved fatty acids held within the fabric of the pottery and found that half of the vessels had been used for processing dairy fats. This confirms for the first time the early presence of domesticated cattle in the region and the importance of milk to its prehistoric pastoral people.

Julie Dunne, a PhD student in Bristol's School of Chemistry and one of the authors of the paper said: "We already know how important dairy products such as milk, cheese, yoghurt and butter, which can be repeatedly extracted from an animal throughout its lifetime, were to the people of Neolithic Europe, so it's exciting to find proof that they were also significant in the lives of the prehistoric people of Africa.

"As well as identifying the early adoption of dairying practices in Saharan Africa, these results also provide a background for our understanding of the evolution of the lactase persistence gene which seems to have arisen once prehistoric people started consuming milk products.

"The gene is found in Europeans and across some Central African groups, thus supporting arguments for the movement of people, together with their cattle, from the Near East into eastern African in the early to middle Holocene, around 8,000 years ago."

Co-author Professor Richard Evershed of Bristol's School of Chemistry, added: "While the remarkable rock art of Saharan Africa contains many representations of cattle – including, in a few cases, depictions of the actual milking of a cow – it can rarely be reliably dated. Also, the scarcity of cattle bones in archaeological sites makes it impossible to ascertain herd structures, thereby preventing interpretations of whether dairying was practiced.

"Molecular and isotopic analysis of absorbed food residues in pottery, however, is an excellent way to investigate the diet and subsistence practice of early peoples. It's an approach my colleagues and I have previously applied to successfully determine the chronology of dairying, beginning in the Fertile Crescent of the Near East and spreading across Europe."

The research was funded by the UK's Natural Environment Research Council (NERC).

<http://phys.org/news/2012-06-super-size-turbines-bigger-greener-electricity.html>

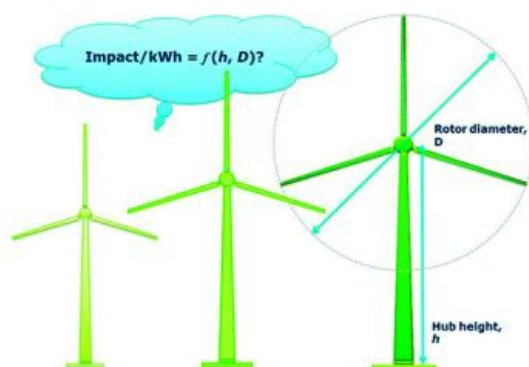
Toward super-size wind turbines: Bigger wind turbines do make greener electricity
In a study that could solidify the trend toward construction of gigantic windmills, scientists have concluded that the larger the wind turbine, the greener the electricity it produces.

Marloes Caduff and colleagues point out that wind power is an increasingly popular source of electricity. It provides almost 2 percent of global electricity worldwide, a figure expected to approach 10 percent by 2020. The size of the turbines also is increasing. Their report appears in ACS' journal Environmental Science & Technology.

One study shows that the average size of commercial turbines has grown 10-fold in the last 30 years, from diameters of 50 feet in 1980 to nearly 500 feet today. On the horizon: super-giant turbines approaching 1,000 feet in diameter. The authors wanted to determine whether building larger turbines makes wind energy more or less environmentally friendly.

Their study showed that bigger turbines do produce greener electricity - for two main reasons. First, manufacturers now have the knowledge, experience and technology to build big wind turbines with great efficiency. Second, advanced materials and designs permit the efficient construction of large turbine blades that harness more wind without proportional increases in their mass or the masses of the tower and the nacelle that houses the generator. That means more clean power without large increases in the amount of material needed for construction or fuel needed for transportation.

More information: "Wind Power Electricity: The Bigger the Turbine, The Greener the Electricity?" *Environ. Sci. Technol.*, 2012, 46 (9), pp 4725–4733. DOI: 10.1021/es204108n



Abstract

Wind energy is a fast-growing and promising renewable energy source. The investment costs of wind turbines have decreased over the years, making wind energy economically competitive to conventionally produced electricity. Size scaling in the form of a power law, experience curves and progress rates are used to estimate the cost development of ever-larger turbines. In life cycle assessment, scaling and progress rates are seldom applied to estimate the environmental impacts of wind energy. This study quantifies whether the trend toward larger turbines affects the environmental profile of the generated electricity. Previously published life cycle inventories were combined with an engineering-based scaling approach as well as European wind power statistics. The results showed that the larger the turbine is, the greener the electricity becomes. This effect was caused by pure size effects of the turbine (micro level) as well as learning and experience with the technology over time (macro level). The environmental progress rate was 86%, indicating that for every cumulative production doubling, the global warming potential per kWh was reduced by 14%. The parameters, hub height and rotor diameter were identified as Environmental Key Performance Indicators that can be used to estimate the environmental impacts for a generic turbine. Provided by American Chemical Society

<http://www.sciencedaily.com/releases/2012/06/120620133310.htm>

Respect Matters More Than Money for Happiness in Life

New research suggests that overall happiness in life is more related to how much you are respected and admired by those around you, not to the status that comes from how much money you have stashed in your bank account.

ScienceDaily - Psychological scientist Cameron Anderson of the Haas School of Business at the University of California, Berkeley, and his co-authors explore the relationship between different types of status and well-being in a new article published in Psychological Science, a journal of the Association for Psychological Science.

"We got interested in this idea because there is abundant evidence that higher socioeconomic status - higher income or wealth, higher education - does not boost subjective well-being (or happiness) much at all. Yet at the same time, many theories suggest that higher status should boost happiness," said Anderson.

So if higher socioeconomic status doesn't equate with a greater sense of well-being, then what does? Anderson and his colleagues hypothesized that higher sociometric status - respect and admiration in your face-to-face groups, such as your friendship network, your neighborhood, or your athletic team - might make a difference in your overall happiness. "Having high standing in your local ladder leads to receiving more respect, having more influence, and being more integrated into the group's social fabric," Anderson said.

Over a series of four studies, Anderson and his colleagues set out to test this hypothesis.

In the first study, they surveyed 80 college students who participated in 12 different campus groups, including sororities and ROTC. Each student's sociometric status was calculated through a combination of peer ratings, self-report, and the number of leadership positions the student had held in his or her group. The students also reported their total household income and answered questions related to their social well-being. After accounting for gender and ethnicity, the researchers found that sociometric status, but not socioeconomic status, predicted students' social well-being scores.

The researchers were able to replicate these findings in a second study that surveyed a larger and more diverse sample of participants and they found that the relationship between sociometric status and well-being could be explained, at least in part, by the sense of power and social acceptance that the students said they felt in their personal relationships. And in a third study, Anderson and his colleagues provided evidence that the relationship between sociometric status and well-being could actually be evoked and manipulated in an experimental setting.

In the fourth study, the researchers decided to bring the causal story into the real world. Following students in a MBA program, they found that changes in sociometric status from pre-graduation to post-graduation corresponded to changes in the MBA students' social well-being. And post-graduation sociometric status predicted social well-being more strongly than did post-graduation socioeconomic status.

"I was surprised at how fluid these effects were - if someone's standing in their local ladder went up or down, so did their happiness, even over the course of 9 months," said Anderson.

Together, the four studies provide clear evidence for the relationship between sociometric status and well-being. But why does sociometric status seem to matter so much when socioeconomic status doesn't?

One possible explanation, which Anderson hopes to explore in future research, is that people adapt. "One of the reasons why money doesn't buy happiness is that people quickly adapt to the new level of income or wealth. Lottery winners, for example, are initially happy but then return to their original level of happiness quickly," said Anderson.

That kind of adaptation may simply not occur with local status. "It's possible that being respected, having influence, and being socially integrated just never gets old," Anderson said.

Cameron Anderson et al. *The Local-Ladder Effect: Social Status and Subjective Well-Being*. *Psychological Science*, 2012

<http://www.scientificamerican.com/article.cfm?id=rudimentary-liver-grown-in-lab>

Rudimentary Liver Grown in the Lab

Scientists have coaxed induced stem cells to form functional liverlike tissue in a petri dish

By David Cyranoski and Nature magazine | Wednesday, June 20, 2012 | 1

Japanese scientists have used induced stem cells to create a liver-like tissue in a dish.

Although they have yet to publish their results and much work remains to be done, the achievement could have big clinical implications. If the results bear out, they would also constitute a significant advance in the ability to coax stem cells to self-organize into organs. The work was presented by Takanori Takebe, a stem-cell biologist at Yokohama City University in Japan, at the annual meeting of the International Society for Stem Cell Research in Yokohama last week. "It blew my mind," said George Daley, director of the stem-cell transplantation programme at the Boston Children's Hospital in Massachusetts, who chaired the session.

"It sounds like a genuine advance," says Stuart Forbes, who studies liver regeneration at the University of Edinburgh, UK. Forbes, who also works as a consultant for Scotland's liver-transplantation unit, says that the advance could one day help to avoid the "bleak outcome" currently experienced by the many patients who don't survive long enough to get a new liver.

But the liver described by Takebe has a long way to go before that. Takebe told how his team grew the organ using induced pluripotent stem cells (iPS), created by reprogramming human skin cells to an embryo-like state. The researchers placed the cells on growth plates in a specially designed medium; after nine days, analysis showed that they contained a biochemical marker of maturing liver cells, called hepatocytes.

At that key point, Takebe added two more types of cell known to help to recreate organ-like function in animals: endothelial cells, which line blood vessels, taken from an umbilical cord; and mesenchymal cells, which can differentiate into bone, cartilage or fat, taken from bone marrow. Two days later, the cells assembled into a 5-millimetre-long, three-dimensional tissue that the researchers labelled a liver bud - an early stage of liver development.

Under development

The tissue lacks bile ducts, and the hepatocytes do not form neat plates as they do in a real liver. In that sense, while it does to some degree recapitulate embryonic growth, it does not match the process as faithfully as the optic cup recently reported by another Japanese researcher. But the tissue does have blood vessels that proved functional when it was transplanted under the skin of a mouse. Genetic tests show that the tissue expresses many of the genes expressed in real liver. And, when transferred to the mouse, the tissue was able to metabolize some drugs that human livers metabolize but mouse livers normally cannot. The team claims that its work is “the first report demonstrating the creation of a human functional organ with vascular networks from pluripotent stem cells”.

Takebe says the success depended on properly timing the addition of the other two cell types. “It took over a year and hundreds of trials,” says Takebe.

The team says that the tissue's three dimensions will give it advantages over simple cell-replacement therapies. It could be used for long-term replacement or short-term graft while the recipient waits for a suitable liver donor, or in cases in which doctors anticipate that the native liver will eventually regain its function. But such applications would require extensive development, including making sure that the tissue contains the proper arrangement of lobules.

It won't be easy, says Forbes. To treat chronic liver disease, the cells would have to be stable for at least five years, the average survival period for those with the disease. But it is not clear whether that would be possible, especially considering that they would be exposed to many toxins and pathogens. Furthermore, the organ would need to stay the right size, without atrophying or developing cancerous growth. “Any deviation from the mature phenotype could be catastrophic for the graft,” says Forbes.

A niche in the market

Other researchers have developed competing technologies using scaffolds to build three-dimensional liver-like structures. Sangeeta Bhatia, a bioengineer at the Massachusetts Institute of Technology in Cambridge, for example, has produced a scaffold-based graft that doesn't try to recapitulate development but has proved to be functional and transplantable in mice. Bhatia is now working on increasing the number of hepatocytes present on the two-centimetre graft, to ensure that it is useful in the clinic. “One billion cells is the next frontier,” she says.

In the meantime, Takebe and the rest of the team, led by Hideki Taniguchi, also a stem-cell biologist at Yokohama City University - who are collaborating on the project with researchers at Sekisui Medical, a biotechnology firm based in Tokyo - hope that his liver bud could be useful for toxicity testing in drug screening, for which bile ducts are not needed. Many conventional hepatocyte cells that are transplanted to mice for in vivo testing last for only two or three days, but the drug and its various metabolites might take weeks to metabolize, so toxic effects might not be apparent in such testing. Takebe says his graft has the necessary staying power.

Many researchers are already growing hepatocyte-like cells: Bhatia, for example, has already commercialized a device that uses bioengineered cells for drug testing. However, Takebe's liver bud has the advantage of being grown from iPS cells, rather than, for example, the primary human hepatocytes used in Bhatia's graft, which could make it useful in modelling rare diseases or examining the specific genetic backgrounds of the iPS cell donors.

Markus Grompe, who studies liver disease at the Oregon Health and Science University in Portland, says that Takebe's team is “on the right track”. Still, he says, the liver cells need to function much more efficiently than they do at present. On the basis of a cursory inspection of Takebe's data presented at the meeting, Grompe says that the liver bud was producing only a small fraction of the albumin - a plasma protein that is a key marker of liver function - that it should. But Takebe says that since his group generated the data presented at the Yokohama meeting, procedural improvements have already led to higher levels of albumin.

The next step for the team is to try to make the liver bud more liver-like, by including structures such as bile ducts.

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<http://www.sciencedaily.com/releases/2012/06/12062012855.htm>

Apple Peel Compound Boosts Brown Fat, Reduces Obesity in Mice

A study shows that a natural substance found in apple peel can partially protect mice from obesity and some of its harmful effects

ScienceDaily - Obesity and its associated problems such as diabetes and fatty liver disease are increasingly common global health concerns. A new study by University of Iowa researchers shows that a natural substance found in apple peel can partially protect mice from obesity and some of its harmful effects.

The findings suggest that the substance known as ursolic acid reduces obesity and its associated health problems by increasing the amount of muscle and brown fat, two tissues recognized for their calorie-burning properties. The study, which was published June 20 in the journal PLoS ONE, was led by Christopher Adams, M.D., Ph.D., UI associate professor of internal medicine and a Faculty Scholar at the Fraternal Order of Eagles Diabetes Research Center at the UI.

"From previous work, we knew that ursolic acid increases muscle mass and strength in healthy mice, which is important because it might suggest a potential therapy for muscle wasting," Adams says. "In this study, we tested ursolic acid in mice on a high-fat diet - a mouse model of obesity and metabolic syndrome. Once again, ursolic acid increased skeletal muscle. Interestingly, it also reduced obesity, pre-diabetes and fatty liver disease. "Since muscle is very good at burning calories, the increased muscle in ursolic acid-treated mice may be sufficient to explain how ursolic acid reduces obesity. However, we were surprised to find that ursolic acid also increased brown fat, a fantastic calorie burner. This increase in brown fat may also help protect against obesity."

Until quite recently, researchers believed that only infants had brown fat, which then disappeared during childhood. However, improved imaging techniques have shown that adults do retain a very small amount of the substance mostly in the neck and between the shoulder blades. Some studies have linked increased levels of brown fat with lower levels of obesity and healthier levels of blood sugar and blood lipid, leading to the suggestion that brown fat may be helpful in preventing obesity and diabetes.

The UI team, which also included Steven Kunkel, Christopher Elmore, Kale Bongers, Scott Ebert, Daniel Fox, Michael Dyle, and Steven Bullard, studied mice on a high-fat diet over a period of several weeks. Half of the animals also received ursolic acid in their high-fat food. Interestingly, mice whose diet included ursolic acid actually ate more food than mice not getting the supplement, and there was no difference in activity between the two groups. Despite this, the ursolic acid-treated mice gained less weight and their blood sugar level remained near normal. Ursolic acid-treated mice also failed to develop obesity-related fatty liver disease, a common and currently untreatable condition that affects about one in five American adults.

Further study showed that ursolic acid consumption increased skeletal muscle, increasing the animals' strength and endurance, and also boosted the amount of brown fat. Because both muscle and brown fat burn calories, the researchers investigated energy expenditure in the mice and showed that ursolic acid-fed mice burned more calories than mice that didn't get the supplement.

"Our study suggests that ursolic acid increases skeletal muscle and brown fat leading to increased calorie burning, which in turn protects against diet-induced obesity, pre-diabetes and fatty liver disease," Adams says.

"Brown fat is beneficial and people are trying to figure out ways to increase it. At this point, we don't know how ursolic acid increases brown fat, or if it increases brown fat in healthy mice. And, most importantly, we don't know if ursolic acid will benefit people. Our next step is to determine if ursolic acid can help patients."

The research was supported by funding from the Fraternal Order of Eagles Diabetes Research Center at the University of Iowa, the National Institute of Arthritis and Musculoskeletal and Skin Diseases of the National Institutes of Health (grant 5R01AR059115-03), the Department of Veterans Affairs, and the University of Iowa Research Foundation.

Kunkel SD, Elmore CJ, Bongers KS, Ebert SM, Fox DK, et al. Ursolic Acid Increases Skeletal Muscle and Brown Fat and Decreases Diet-Induced Obesity, Glucose Intolerance and Fatty Liver Disease.. PLoS ONE, 2012 DOI:

10.1371/journal.pone.0039332

<http://phys.org/news/2012-06-chimps-self-medicate-human-pressure.html>

Chimps self-medicate under human pressure

Chimpanzees living in small fragments of forest close by people and farm animals are turning in increasing numbers to natural remedies in an effort to deal with their stressful and disease-prone existence, a new study suggests.

Scientists already knew the apes respond to seasonal intestinal worm infections by swallowing the leaves of particular forest plants whole. The rough leaves seem to have a purgative effect, causing them to excrete the parasites and soothing sore guts. But this rudimentary defence mechanism was never meant to handle the kind

of pressure that chimps are now facing as human farms and settlements eat into their forest habitat. Stressed by encounters with humans and exposed to new infections, they are self-medicating more than ever, but it doesn't seem to be keeping them healthy.

Researchers focused on chimpanzees living in Bulindi, Uganda, where a few fragments of forest remain amid villages and farmland. They monitored the apes' routes through the forest and regularly sampled their faeces, which they inspected for the whole leaves, as well as intestinal parasites like nematodes and tapeworms. They found that these so-called 'village chimpanzees' suffer from multiple parasite infestations, and are swallowing leaves far more often in response. 'At other sites it's rare to find the undigested leaves in more than one or two in 100 dung samples,' says Dr Matthew McLennan, a specialist at Oxford Brookes University in interactions between chimps and humans, and the lead author of the paper. 'At Bulindi it was more like one in ten. So it's happening at a different order of frequency than in less disturbed landscapes.'

It could be that the chimpanzees are picking up new parasite infections from people and farm animals. In one case, a chimp was found to be carrying a kind of tapeworm normally seen in chickens; McLennan suspects it wasn't truly infected, and had merely preyed on a domestic fowl not long ago, but this still highlights the potential for chimps to be exposed to new pathogens through contact with human civilisation. He also notes that the risk goes both ways; it's possible that dangerous new diseases could make the leap from chimps to humans when the two species are living cheek by jowl.

It's also possible that the apes simply find existence stressful with their habitat changing so quickly and with so many humans around - aggressive confrontations are increasingly common, and stress is known to make animals' immune systems less effective in many situations. Having the apes living in such small, fragmented areas of forest isn't good either for them or for local people. The chimps can't get enough food in the degraded forest all year round, so when their favoured fruits are out of season they tend to emerge and raid farmers' crops, making off with bananas, sugar cane and other valuable crops.

'It's a bad situation for everyone,' McLennan says. 'People's activities are changing the landscape and affecting the chimps' behaviour - if they can't get enough to eat in the forests, they start looking for food in people's fields. Chimpanzees are big wild animals and can be very dangerous; it's not surprising that local people are afraid of them, so they harass them and try to drive them off. But it turns into a vicious cycle, because it can make the chimps more aggressive.'

McLennan is now planning follow-up research looking in more detail at the health implications of chimps and humans living in close contact for members of both species.

The paper appears in the American Journal of Primatology.

More information: High Frequency of Leaf Swallowing and its Relationship to Intestinal Parasite Expulsion in "Village" Chimpanzees at Bulindi, Uganda. Matthew R. McLennan, Michael A. Huffman. American Journal of Primatology, Volume 74, Issue 7, pages 642-650, July 2012. DOI: 10.1002/ajp.22017 Provided by PlanetEarth Online

http://www.eurekalert.org/pub_releases/2012-06/cchm-ncd061812.php

New candidate drug stops cancer cells, regenerates nerve cells

Scientists have developed a small-molecule-inhibiting drug that in early laboratory cell tests stopped breast cancer cells from spreading and also promoted the growth of early nerve cells called neurites.

CINCINNATI - Researchers from Cincinnati Children's Hospital Medical Center report their findings online June 21 in Chemistry & Biology. The scientists named their lead drug candidate "Rhosin" and hope future testing shows it to be promising for the treatment of various cancers or nervous system damage.

The inhibitor overcomes a number of previous scientific challenges by precisely targeting a single component of a cell signaling protein complex called Rho GTPases. This complex regulates cell movement and growth throughout the body. Miscues in Rho GTPase processes are also widely implicated in human diseases, including various cancers and neurologic disorders.

"Although still years from clinical development, in principle Rhosin could be useful in therapy for many kinds of cancer or possibly neuron and spinal cord regeneration," said Yi Zheng, PhD, lead investigator and director of Experimental Hematology and Cancer Biology at Cincinnati Children's. "We've performed in silico (computerized) rational drug design, pharmacological characterization and cell tests in the laboratory, and we are now starting to work with mouse models."

Because the role of Rho GTPases in cellular processes and cancer formation is well established, researchers have spent years trying to identify safe and effective therapeutic targets for specific parts of the protein complex. In particular, scientists have focused on the center protein in the complex called RhoA, which is essential for the signaling function of the complex. In breast cancer for example, increased RhoA activity makes the cancer

cells more invasive and causes them to spread, while a deficiency of RhoA suppresses cancer growth and progression.

Despite this knowledge, past efforts to develop an effective small-molecule inhibitor for RhoA have failed, explained Zheng, who has studied Rho GTPases for over two decades. Most roadblocks stem from a lack of specificity in how researchers have been able to target RhoA, a resulting lack of efficiency in affecting molecular processes, problems with toxicity, and the inability to find a workable drug design.

For the current study, Zheng and his colleagues started with the extensive body of research from Cincinnati Children's and other institutions describing the processes and functions of Rho GTPases. They then used high-throughput computerized molecular screening and computerized drug design to reveal a druggable target site. This also provided a preliminary virtual simulation on the potential effectiveness of candidate drugs.

A key challenge to binding a small-molecule inhibitor to RhoA is the protein's globular structure and lack of surface pocket areas suitable for easy binding, Zheng said. The unique chemical structure of the lead compound identified by researchers, Rhosin, allows it to effectively bind to two shallow surface grooves on RhoA. This enables the candidate drug to take root and begin affecting cells. The two-legged configuration of Rhosin also describes a useful drug design strategy for more effectively targeting difficult molecular sites like RhoA. The researchers also wanted to make sure Rhosin effectively blocked what are known as guanine nucleotide exchange factors (GEFs). Guanine nucleotide is a critical energy source and signaling component of cells. Activation of GEFs is required to set off the regulatory signaling of GTPases (GTP stands for guanosine triphosphate).

After conducting a series of laboratory cell tests to verify the targeting and binding capabilities of Rhosin to RhoA, the researchers then tested the candidate drug's impact on cultured breast cancer cells and nerve cells. In tests on a human breast cancer cells, Rhosin inhibited cell growth and the formation of mammary spheres in a dose dependent manner, acting specifically on RhoA molecular targets without disrupting other critical cellular processes. Rhosin does not affect non-cancerous breast cells. This, along with other tests the scientists performed, indicated Rhosin's effectiveness in targeting RhoA-mediated breast cancer proliferation, according to the researchers.

Researchers also treated an extensively tested line of neuronal cells with Rhosin, along with nerve growth factor, a protein that is important to the growth and survival of neurons. Rhosin worked with nerve growth factor in a dose-dependent way to promote the proliferation of branching neurites from the neuronal cells. Neurites are young or early stage extensions from neurons required for neuronal communications.

Funding for the study came from National Institutes of Health.

Also collaborating on the study were NanoTemper Technologies in Munich, Germany and the Drug Discovery Center at the University of Cincinnati.

http://www.eurekalert.org/pub_releases/2012-06/uocp-dbm062112.php

Dad's brains mean more to his son's success than his money: Study

Sons of fathers with high incomes tend to end up with higher than average incomes themselves, but new research shows that it's not just dad's money that helps a son on his way.

According to a study recently published in the Journal of Political Economy, human capital endowments passed from father to son - perhaps in the form of smarts, advice, work ethic, or some other intangible - could be more important to a son's success than the size of dad's paycheck.

"We know there's a correlation between fathers' income and sons'." said David Sims, an economics professor at Brigham Young University and one of the study's authors. "What's gotten less attention is the mechanism. We wanted to see if the intergenerational income correlation is due to money - what we can buy for our kids - or if human capital attributes passed from father to son play a role as well."

The problem is that separating the two inputs is tricky. On average, fathers with higher human capital endowments also tend to have higher incomes, so it's hard to tell which factor is doing what. Sims and his colleagues used a statistical model and a rich dataset to try to disentangle the two.

The authors' methodology builds on the following thought experiment. Take two smart, similarly skilled and educated fathers. Say one lived in a town with a robust labor market and he had a big salary. The other father wasn't so lucky. He lived in a town with a depressed labor market, and had much lower earnings despite his comparable human capital. If money is the only thing that matters in the intergenerational transfer of income, then we'd expect that the son of the lucky father would end up with a higher income than the son of the unlucky father. However, if human capital matters, the two sons may end up with more similar incomes.

To test this idea, the researchers used remarkably detailed government administrative data on a large sample of Swedish fathers with sons born between 1950 and 1965. The data included salary information for fathers and

sons as well as clues about fathers' human capital: education levels and the nature of their occupations. Fathers with more education or those who work in jobs that require specialized skills are considered to have higher human capital endowments that could be passed to sons.

First, Sims and his colleagues looked for a raw correlation between fathers' incomes and their sons', which, as expected, was quite strong. Then they employed a statistical methodology to isolate differences in fathers' income due to something other than human capital, like in the example of similar fathers who worked in differing labor market conditions. If the income correlation weakens for fathers and sons in these types of situations, the researchers could conclude that money isn't the only thing that matters.

And that's exactly what the study found. Income differences not related to a father's human capital were weaker predictors of a son's income. In other words, human capital matters.

"We can conclude that, for the men in our dataset, differing human capital endowments passed from father to son account for about two-thirds of the overall intergenerational income relationship," Sims said. "We don't offer a final answer here, but we do offer some boundary conditions and present a methodology that could help unravel the question."

Lars Lefgren, Matthew J. Lindquist, and David Sims, "Rich Dad, Smart Dad: Decomposing the Intergenerational Transmission of Income. Journal of Political Economy 120:2 (published June 8, 2012).

http://www.eurekalert.org/pub_releases/2012-06/ci-ewi062112.php

Extensive water in Mars' interior

Until now, Earth was the only planet known to have vast reservoirs of water in its interior.

Washington, D.C. - Scientists analyzed the water content of two Martian meteorites originating from inside the Red Planet. They found that the amount of water in places of the Martian mantle is vastly larger than previous estimates and is similar to that of Earth's. The results not only affect what we know about the geologic history of Mars, but also have implications for how water got to the Martian surface. The data raise the possibility that Mars could have sustained life. The research was led by former Carnegie postdoctoral scientist Francis McCubbin, now at the University of New Mexico. The analysis was performed by Carnegie Institution investigator Erik Hauri and team and is published in the journal *Geology*.

The scientists analyzed what are called shergottite meteorites. These are fairly young meteorites that originated by partial melting of the Martian mantle - the layer under the crust - and crystallized in the shallow subsurface and on the surface. They came to Earth when ejected from Mars approximately 2.5 million years ago. Meteorite geochemistry tells scientists a lot about the geological processes the planet underwent.

"We analyzed two meteorites that had very different processing histories," explained Hauri. "One had undergone considerable mixing with other elements during its formation, while the other had not. We analyzed the water content of the mineral apatite and found there was little difference between the two even though the chemistry of trace elements was markedly different. The results suggest that water was incorporated during the formation of Mars and that the planet was able to store water in its interior during the planet's differentiation."

Based on the mineral's water content, the scientists estimated that the Martian mantle source from which the rocks were derived contained between 70 and 300 parts per million (ppm) water. For comparison, the upper mantle on Earth contains approximately 50-300 ppm water. Hauri and team were able to determine these values with new techniques and new standards they developed that can quantify water in apatite using a technology called secondary ion mass spectrometry (SIMS).

"There has been substantial evidence for the presence of liquid water at the Martian surface for some time," Hauri said. "So it's been puzzling why previous estimates for the planet's interior have been so dry. This new research makes sense and suggests that volcanoes may have been the primary vehicle for getting water to the surface." McCubbin concluded, "Not only does this study explain how Mars got its water, it provides a mechanism for hydrogen storage in all the terrestrial planets at the time of their formation."

This work was supported by NASA Cosmochemistry grants NNX11AG76G, NNX10AI77G, the New Mexico Space Grant Consortium, and the Carnegie Institution.

<http://arstechnica.com/science/2012/06/2-8-million-years-of-climate-data-lurking-in-russian-lake/>

2.8 million years of climate data lurking in Russian lake

"Data desert" has a record much older than 800,000 year-old Antarctic ice core.

by Scott K. Johnson - June 22 2012, 3:20am TST

If you thought Iceland's volcano that erupted in 2010 - Eyjafjallajökull - as hard to pronounce, avert your eyes. A unique new record of arctic climate has just been published from Russia's Lake El'gygytgyn - or as many researchers despairingly call it, "Lake E."

The 550 ft deep lake fills an impact crater that formed nearly 3.6 million years ago. Since then, the lake has dutifully collected sediment that washed in from the small basin surrounding it.

The area has been spared the abuse of ice sheets, as well, which tend to disturb accumulated sediments and sometimes scrape them away altogether.

Since the lake is nutrient-poor and covered with ice for much of the year, the water is clear and oxygen-rich. But conditions change along with climate, and that's what makes the lake appealing to paleoclimate researchers. Such lengthy records of climate are incredibly rare above sea level. Ice cores from Greenland only go back around 125,000 years, and the longest Antarctic ice core completed records around 800,000 years.

At great expense and effort, a large group of collaborators collected several sediment cores from the lake bottom, including a 517 meter long one that went straight down to the bedrock at the bottom of the crater. (They also recorded some videos in the field). In the first of many papers to be published, the researchers describe a record of the last 2.8 million years of climate in the Siberian Arctic.

A host of methods were used to interrogate the core and extract the stories it tells. Changes in magnetic properties helped determine the age along the core (using the frequent oscillations of Earth's magnetic field) and indicate how much oxygen was in the water.

When lakes stay stratified all year instead of mixing in the spring and fall, or when a surplus of organic matter sits decaying at the bottom, oxygen in the deep lake water becomes depleted and magnetite (an iron oxide) dissolves. The ratio of manganese to iron provides another measure of oxygenation.

The researchers also measured organic carbon, which tracks the preservation or decay of organic matter, and the ratio of silicon to titanium, which --shows the productivity of photosynthetic diatoms.

In addition, pollen assemblages were painstakingly collected to record shifts in the plant ecosystems around the lake. And you can figure out a lot just using your eyeballs and some good old-fashioned sedimentology.

The researchers identified three distinct "facies," or characteristic packages of sediment.

The first included thin gray and black layers of sediment that were deposited during the coldest periods, when ice on the lake stayed year-round. Without periods of wind-driven mixing, the bottom water became oxygen-poor. The gray sediment is indicative of reduced iron (rather than oxidized), and the black color signifies organic matter that accumulated rather than decaying completely.

Another facies containing browner sediment with less distinct layers is the most common in the core. This corresponds, roughly, to modern conditions. The ice thaws off in summer, allowing photosynthetic activity and oxygenation.

The third facies, a rusty-red due to the prevalence of oxidized iron (in contrast to the gray sediment), appears to be associated with particularly warm episodes between "ice ages" (or glaciations). Photosynthetic activity was especially high during these "super interglacials."

These time periods are identified by their ocean sediment core monikers - Marine Isotope Stages (MIS). MIS 5e, which occurred around 130,000 years ago, came at a peak in arctic summer solar radiation. Sea level likely hit a high point a few meters higher than it is today. MIS 11c, a little over 400,000 years ago, was an unusually long interglacial, though it doesn't look as warm as MIS 5e in Antarctic ice core records.

Surprisingly, the Lake El'gygytgyn region seems to have been considerably warmer during MIS 11c than it was during MIS 5e. This is despite the fact that summer solar radiation was less intense (though the season was longer) and greenhouse gas concentrations were similar.

The authors write, "Consequently, the distinctly higher observed [temperature and precipitation] at MIS 11c cannot readily be explained by the local summer orbital forcing or GHG concentrations alone, and suggest that other processes and feedbacks contributed to the extraordinary warmth at this interglacial, and the relatively muted response to the strongest forcing at MIS 5e."

The Arctic is especially sensitive to climate changes (through the loss of reflective snow and ice, for example), and what happens there affects the rest of the planet as well. Figuring out which feedbacks could account for the warm temperatures during MIS 11c could be useful.

Seeing how climate responds to many different situations helps researchers obtain a deeper understanding of the climate system. And therein lies the value in climate records from disparate regions. As the authors put it, "The observed response of the region's climate and terrestrial ecosystems to a range of interglacial forcing provides a challenge for modeling and important constraints on climate sensitivity and polar amplification."

Science, 2012. DOI: 10.1126/science.1222135 (About DOIs).

Genomics and African Queens: Diversity Within Ethiopian Genomes Reveals Imprints of Historical Events

Researchers have found that the genomes of some Ethiopian populations bear striking similarities to those in Israel and Syria

ScienceDaily - Researchers have started to unveil the genetic heritage of Ethiopian populations, who are among the most diverse in the world, and lie at the gateway from Africa. They found that the genomes of some Ethiopian populations bear striking similarities to those of populations in Israel and Syria, a potential genetic legacy of the Queen of Sheba and her companions.

The team detected mixing between some Ethiopians and non-African populations dating to approximately 3,000 years ago. The origin and date of this genomic admixture, along with previous linguistic studies, is consistent with the legend of the Queen of Sheba, who according to the Ethiopian Kebra Nagast book had a child with King Solomon from Israel and is mentioned in both the Bible and the Qur'an. Ethiopia is situated in the horn of Africa, and has often been regarded as one of the gateways from Africa to the rest of the world. The Ethiopian region itself has the longest fossil record of human history anywhere in the world. Studying population genetics within this diverse region could help us to understand the origin of the first humans.

"From their geographic location, it is logical to think that migration out of Africa 60,000 years ago began in either Ethiopia or Egypt. Little was previously known about the populations inhabiting the North-East African region from a genomic perspective. This is the first genome study on a representative panel of Ethiopian populations," explains Luca Pagani, first author from the Wellcome Trust Sanger Institute and the University of Cambridge. "We wanted to compare the genome of Ethiopians with other Africans to provide an essential piece to the African - and world - genetic jigsaw." They found that the Ethiopian genome is not as ancient as was previously thought and less ancient than the genomes of some Southern African populations.

There were also links with other populations. "We found that some Ethiopians have 40-50% of their genome closer to the genomes of populations outside of Africa, while the remaining half of their genome is closer to populations within the African continent," says Dr Toomas Kivisild, co-author from the University of Cambridge. "We calculated genetic distances and found that these non-African regions of the genome are closest to populations in Egypt, Israel and Syria, rather than to the neighbouring Yemeni and Arabs."

The team found that these two groups of African and non-African people mixed approximately 3,000 years ago, well before the historically-documented Islamic expansions and the colonial period of the last centuries.

An earlier study found that Ethio-Semitic, an Ethiopian language belonging to a linguistic family primarily spoken in the Middle East, split from the main Semitic group 3,000 years ago, around the same time as the non-African genomic component arrived in Ethiopia. All this evidence combined fits the time and locations of the legend of the Queen of Sheba, which describes the encounter of the Ethiopian Queen and King Solomon.

"None of this research would have been possible without the superb fieldwork of our Ethiopian colleagues Professor Endashaw Bekele and Dr Ayele Tarekegn over many years. The outstanding genetic diversity present within the peoples of Ethiopia is a rich resource that will contribute greatly, both to our understanding of human evolution and the development of personalised medicine." says Dr Neil Bradman, co-lead author from UCL (University College London). "The Ethiopian Government has a practice of encouraging genetic research, a policy that bodes well for the future."

"Our research gives insights into important evolutionary questions," says Dr Chris Tyler-Smith, co-lead author from the Wellcome Trust Sanger Institute. "We see imprints of historical events on top of much more ancient prehistoric ones that together create a region of rich culture and genetic diversity. The next step for our research has to be to sequence the entire genomes, rather than read individual letters, of both Ethiopian people and others to really understand human origins and the out-of-Africa migration."

Pagani et al. *Ethiopian Genetic Diversity Reveals Linguistic Stratification and Complex Influences on the Ethiopian Gene Pool*. *The American Journal of Human Genetics*, 2012 DOI: 10.1016/j.ajhg.2012.05.015

Common Blood Pressure Drug Linked to Severe Gastrointestinal Problems

Researchers have discovered an association between Olmesartan, and severe gastrointestinal issues such as nausea, vomiting, diarrhea, weight loss and electrolyte abnormalities

ScienceDaily - Mayo Clinic researchers have discovered an association between a commonly prescribed blood pressure drug, Olmesartan, and severe gastrointestinal issues such as nausea, vomiting, diarrhea, weight loss and electrolyte abnormalities -- symptoms common among those who have celiac disease. The findings are published online June 21 in the medical journal Mayo Clinic Proceedings.

From 2008-11, Mayo Clinic physicians treated 22 patients with symptoms similar to celiac disease, including intestinal inflammation and abnormalities. Patients came from 17 states, and some had been diagnosed with celiac disease. They had chronic diarrhea and weight loss; the median weight loss was 39 pounds, and one patient lost 125 pounds. Fourteen of the 22 were hospitalized because of the severity of their symptoms. When given a blood test, however, these patients didn't come back with results typical of celiac disease. They also didn't respond to treatments such as gluten-free diets.

After examining their medications, Mayo Clinic gastroenterologist Joseph Murray, M.D., pulled several of the patients off Olmesartan. Their symptoms dramatically improved. Eventually, all 22 were taken off the drug, and all showed improvement. Eighteen of the 22 patients had intestinal biopsies after stopping the medication and showed improvement.

"We thought these cases were celiac disease initially because their biopsies showed features very like celiac disease, such as inflammation," says Dr. Murray, the lead author. "What made them different was they didn't have the antibodies in their blood that are typical for celiac disease."

Olmesartan -- prescribed for the treatment of hypertension, or high blood pressure -- works by blocking substances that tighten blood vessels, allowing blood to flow more smoothly and the heart to pump more efficiently, according to the U.S. National Library on Medicine.

"It's really an awareness issue. We want doctors to be aware of this issue, so if they see a patient who is having this type of syndrome -- they think about medications as a possible association," Dr. Murray says. "We've reported an association. What needs to be known next is the science to understand why there is such an association."

The investigators were supported in part by the National Institutes of Health, the American College of Gastroenterology Junior Faculty Development Award, the Swedish Society of Medicine, the Swedish Research Council and the Fulbright Commission. Alberto Rubio-Tapia et al. Severe Spruelike Enteropathy Associated With Olmesartan. Mayo Clinic Proceedings, 2012 DOI: 10.1016/j.mayocp.2012.06.003

http://www.eurekalert.org/pub_releases/2012-06/bumc-hqo062212.php

Higher quality of life seen among regular moderate drinkers than among abstainers Study shows a positive relation between regular moderate alcohol intake and quality of life in middle-aged adults

Data from a nationally representative sample of 5,404 community-dwelling Canadians ages 50 and older at baseline (1994/1995) was used to estimate the effects of alcohol drinking patterns on quality of life when subjects were aged =50 years and after a follow-up period. Health-related quality of life was assessed with the Health Utilities Index Mark 3 (HUI3). The authors report that most participants showed stable alcohol-consumption patterns over 6 years.

Detailed information was available on the participants alcohol consumption. Moderate drinkers were defined as those having 1 drinks per week with no more than 3 on any day for women and no more than 4 on any day for men. The repeated assessments allowed for the investigators to classify subjects according to changes over time in their drinking patterns, so that "persistent moderate drinkers" could be identified. 31.4% of the subjects decreased their intake over the follow-up period. The investigators also did secondary analyses among subjects who did not report any adverse health conditions (heart disease, cancer, stroke, or diabetes) during the first four years of follow up; these subjects were referred to as "consistently healthy."

Regular moderate drinkers had the highest indices of quality of life at baseline, but subsequent changes in quality of life indicators were similar in all groups except for those reporting decreasing alcohol consumption. The investigators conclude that regular moderate drinkers had higher initial levels of health-related quality of life than abstainers and those in other groups. However, rates of decline over time were similar for all groups except those decreasing their consumption from moderate levels, who showed a greater decline in their level of health-related quality of life than regular moderate users.

While Forum reviewers admired the intent of this study, there were concerns about some of the statistical and epidemiologic aspects. The reasons that some people stopped drinking or decreased their intake were not known; although they were 'consistently healthy' at baseline. Forum reviewer Harvey Finkel comments: "As people age, even disregarding medical obstacles, social interactions generally decrease, which leads to both less stimulation to drink and less opportunity to drink." It is thus important that the reasons that someone stops drinking, or decreases his or her intake, are taken into account.

Further, the "baseline" quality of life measures in this study were obtained when subjects were aged 50 or older; this baseline value of quality of life was higher in moderate drinkers. However, there are statistical problems if adjustments are made for this when quality of life is assessed subsequently and related to drinking pattern. Peto

has described this problem as a "horse-racing effect." He states that in prospective studies, the correlation between exposures (e.g., drinking pattern) and outcomes (e.g., quality of life) assessments during follow up are likely to be the same as the outcome at the end of follow up. As an analogy he uses a race between 'slow' and 'fast' horses; it is likely that the fast horses will be ahead at the mid-point of the race as well as at the end. Environmental effects on quality of life begin early in life, and if one adjusts for the mid-life value (as done and referred to as "baseline" in the present study), you may end up disregarding much of the effect of subsequent alcohol intake.

Overall, this study shows a positive relation between regular moderate alcohol intake and quality of life in middle-aged adults. The effects on the subsequent quality of life as one ages of continued alcohol consumption, or of decreasing intake, remain unclear.

Critique 083: Higher quality of life seen among regular moderate drinkers than among abstainers 20 June 2012

To read the full critique: <http://www.bu.edu/alcohol-forum/critique-083-higher-indices-of-quality-of-life-are-seen-among-persistent-moderate-drinkers-than-among-abstainers-20-june-2012/>

http://www.eurekalert.org/pub_releases/2012-06/uos-rfs062212.php

Research finds Stonehenge was monument marking unification of Britain

Researchers conclude that Stonehenge was built as a monument to unify the peoples of Britain

After 10 years of archaeological investigations, researchers have concluded that Stonehenge was built as a monument to unify the peoples of Britain, after a long period of conflict and regional difference between eastern and western Britain.

Its stones are thought to have symbolized the ancestors of different groups of earliest farming communities in Britain, with some stones coming from southern England and others from west Wales.

The teams, from the universities of Sheffield, Manchester, Southampton, Bournemouth and University College London, all working on the Stonehenge Riverside Project (SRP), explored not just Stonehenge and its landscape but also the wider social and economic context of the monument's main stages of construction around 3,000 BC and 2,500 BC.

"When Stonehenge was built", said Professor Mike Parker Pearson of the University of Sheffield, "there was a growing island-wide culture – the same styles of houses, pottery and other material forms were used from Orkney to the south coast. This was very different to the regionalism of previous centuries. Stonehenge itself was a massive undertaking, requiring the labour of thousands to move stones from as far away as west Wales, shaping them and erecting them. Just the work itself, requiring everyone literally to pull together, would have been an act of unification."

Stonehenge may have been built in a place that already had special significance for prehistoric Britons. The SRP team have found that its solstice-aligned Avenue sits upon a series of natural landforms that, by chance, form an axis between the directions of midsummer sunrise and midwinter sunset.

Professor Parker Pearson continued: "When we stumbled across this extraordinary natural arrangement of the sun's path being marked in the land, we realized that prehistoric people selected this place to build Stonehenge because of its pre-ordained significance. This might explain why there are eight monuments in the Stonehenge area with solstitial alignments, a number unmatched anywhere else. Perhaps they saw this place as the centre of the world".

Although many people flocked to Stonehenge yesterday for the summer solstice, it seems that the winter solstice was the more significant time of the year when Stonehenge was built 5,000-4,500 years ago.

Professor Parker Pearson said: "We can tell from ageing of the pig teeth that higher quantities of pork were eaten during midwinter at the nearby settlement of Durrington Walls, and most of the monuments in the Stonehenge area are aligned on sunrise and sunset at midwinter rather than midsummer. At Stonehenge itself, the principal axis appears to be in the opposite direction to midsummer sunrise, towards midsummer sunset, framed by the monument's largest stone setting, the great trilithon."

Parker Pearson and the SRP team firmly reject ideas that Stonehenge was inspired by ancient Egyptians or extra-terrestrials. He said: "All the architectural influences for Stonehenge can be found in previous monuments and buildings within Britain, with origins in Wales and Scotland. In fact, Britain's Neolithic people were isolated from the rest of Europe for centuries. Britain may have become unified but there was no interest in interacting with people across the Channel. Stonehenge appears to have been the last gasp of this Stone Age culture, which was isolated from Europe and from the new technologies of metal tools and the wheel."

Previous theories have suggested the great stone circle was used as a prehistoric observatory, a sun temple, a place of healing, and a temple of the ancient druids. The Stonehenge Riverside Project's researchers have rejected all these possibilities after the largest programme of archaeological research ever mounted on this

iconic monument. As well as finding houses and a large village near Stonehenge at Durrington Walls, they have also discovered the site of a former stone circle – Bluestonehenge – and revised the dating of Stonehenge itself. All these discoveries are now presented in Parker Pearson's new book Stonehenge: exploring the greatest Stone Age mystery published by Simon & Schuster. The research was supported by the Arts and Humanities Research Council, National Geographic and many other funding bodies.

http://www.eurekalert.org/pub_releases/2012-06/wuis-arm062212.php

Animal reservoir mystery solved

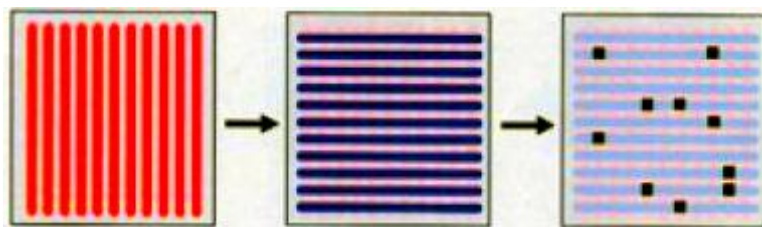
Scientists have identified a novel animal reservoir for a group of tick-borne diseases - and it lives in your backyard

A team of scientists at Washington University in St. Louis has been keeping a wary eye on emerging tick-borne diseases in Missouri for the past dozen years, and they have just nailed down another part of the story.

They knew from earlier work that the animal reservoirs for the diseases included white-tailed deer, wild turkey and a species in the squirrel family, but the DNA assay they had used wasn't sensitive enough to identify the species. Squirrels belong to a large family called the Sciuridae, which includes chipmunks, fox squirrels, red squirrels, flying squirrels, ground hogs and prairie dogs.

In the May issue of the Journal of Medical Entomology the scientists, led by Robert E. Thach, PhD, professor of biology in Arts & Sciences, report that a more sensitive assay has allowed them to identify the major species in question as the eastern gray squirrel. Yes, the friendly neighborhood seed thief and dog tease is also a mobile tick blood supply and bacteria incubator.

The work is important because tick-borne diseases can be efficiently controlled only if all of the animal reservoirs that might contribute to transmission of the disease have been identified.



The squirrel species was identified with an assay in which short sequences of mitochondrial DNA unique to a host animal, called probes (red), were deposited in lines on a membrane. The membrane was then rotated 90 degrees and DNA from a tick that had been tagged with a light-generating dye (blue) was laid down in lines perpendicular to the probe lines. Wherever two lines crossed, DNA from the tick sample mixed with probes for animal DNA. If the two matched, the molecules "hybridized" together and stuck to the membrane, showing up, after further treatment, as glowing spots (black). Thach et al.

Not your New England tick

The most prevalent tick-borne disease in North America is Lyme disease, which is transmitted by the bite of an infected black-legged tick. In the southeastern United States, however, the most common diseases are ehrlichiosis and STARI, which are transmitted by the bite of a different tick, the lone star tick.

Until 1986, ehrlichia bacteria were thought to cause disease only in animals. But in that year, a physician noticed mulberry-shaped aggregates characteristic of the bacteria in the blood of a gravely ill man.

The lone star tick, similarly, was thought to be merely a nuisance species until 1993, when the DNA of one of the ehrlichia species was found in lone star ticks collected in Missouri and several other states.

Ehrlichiosis typically begins with vague symptoms that mimic those of other bacterial illnesses. In a few patients, however, it progresses rapidly to affect the liver and other organs, and may cause death unless treated with antibiotics. STARI is similar to Lyme disease but seems to be less virulent.

The reservoirs

By 2010, with the pathogens and their vector identified, the WUSTL team was trying to find the animal reservoirs. Looking for pathogens and host species, they ran two assays on the ground-up ticks: one to identify the DNA of pathogens and the other to identify the DNA of animals that had provided blood meals.

The blood meal assay on ticks carrying pathogens identified white-tailed deer blood and the blood of a species in the squirrel family, but it couldn't distinguish among 20 or so possible squirrel species. So the team was very interested when they read a paper in the Journal of Medical Entomology about a new assay that could identify tick blood meals down to the species level. The assay, developed by scientists at the University of Neuchatel in Neuchatel, Switzerland, used a segment of mitochondrial DNA instead of nuclear DNA as a species marker. Mitochondria, organelles within the cells that convert energy into forms cells can use, have their own DNA, probably because they were once free-living bacteria.

For reasons that are not entirely clear, mitochondrial DNA mutates faster than DNA tucked away in the cell nucleus. It may be that the mitochondria simply have more primitive DNA repair mechanisms and so cannot fix

mistakes if they occur. In any case, the more mutations, the greater the difference between the DNA of two different species, and the greater the power of the assay to distinguish among species, Thach says. To tailor the assay for their purposes, the team retrieved the DNA sequences for possible North American host species from Genbank, an open-access sequence database. Sequences not available in the database were determined by the lab.

Lisa S. Goessling, now a research lab supervisor in the School of Medicine, used the sequences to make a palette of probes for 11 species and — just to make sure the net was cast wide enough — several higher taxonomic orders. The scientist then re-ran old samples and newly collected ticks through the new assay. Spots on the assay where the tick blood and the gray squirrel probe overlapped lit up, signaling the presence of gray squirrel blood in the ticks.

Why not the others?

Lone star ticks are famously aggressive and indiscriminate biters, so why hadn't they attacked other animals? Is there something special about deer or gray squirrels that makes the ticks prefer them? This isn't the kind of question the scientists can answer definitively, but Thach doesn't think so. He has a simpler answer.

"If you think of an inventory of the animals in the woods and the amount of blood in each, well, most of the available blood in the woods is in deer, and next to that in turkeys and squirrels, because turkeys are so big and there are so many squirrels. So I suspect it's mainly just a mass phenomenon," he says.

Neighborhood, neighborhood, neighborhood

Having found gray squirrel DNA in tick blood, the scientists attacked the problem from a different angle to see if they could confirm their results. They trapped gray squirrels rather than ticks.

Were the gray squirrels carrying tick-borne pathogens? The answer, it turned out, depends on where you are. Only 5 percent of the squirrels in a relatively urban suburb (University City, Mo.) were carrying a pathogen, but 25 percent of the squirrels in a wooded "garden suburb" (Kirkwood, Mo.) were infected.

Why the difference? Thach suspects it comes down to white-tailed deer. There are few, if any, in University City, but they cruise backyards in Kirkwood. Wherever deer go they shed ticks.

This also is the likely answer to another conundrum: the absence or near absence of ticks in Forest Park, the 1,371-acre urban park that adjoins Washington University in St. Louis. Thach says an exhaustive search turned up only one tick.

Why so few ticks? Perhaps because the only deer in Forest Park are the ones in the Saint Louis Zoo.

<http://www.bangkokpost.com/news/asia/299282/roman-jewellery-found-in-ancient-japan-tomb>

Roman jewellery found in ancient Japan tomb

Glass jewellery believed to have been made by Roman craftsmen has been found in an ancient tomb in Japan

Glass jewellery believed to have been made by Roman craftsmen has been found in an ancient tomb in Japan, researchers said Friday, in a sign the empire's influence may have reached the edge of Asia.

A 5mm diameter piece of glass jewellery believed to have been made by Roman craftsmen, was found in an ancient tomb at Nagaokakyo near Kyoto, in western Japan. The glass beads are one of the oldest multilayered glass products were believed to be made in the Roman Empire and sent to Japan, a researcher said.

Tests have revealed three glass beads discovered in the Fifth Century "Utsukushi" burial mound in Nagaoka, near Kyoto, were probably made some time between the first and the fourth century, the Nara National Research Institute for Cultural Properties said.

The government-backed institute has recently finished analysing components of the glass beads, measuring five millimetres (0.2 inches) in diameter, with tiny fragments of gilt attached. It found that the light yellow beads were made with natron, a chemical used to melt glass by craftsmen in the empire, which succeeded the Roman Republic in 27 BC and was ultimately ended by the Fall of Constantinople in 1453.

The beads, which have a hole through the middle, were made with a multilayering technique - a relatively sophisticated method in which craftsmen piled up layers of glass, often sandwiching gold leaf in between. "They are one of the oldest multilayered glass products found in Japan, and very rare accessories that were believed to be made in the Roman Empire and sent to Japan," said Tomomi Tamura, a researcher at the institute. The Roman Empire was concentrated around the Mediterranean Sea and stretched northwards to occupy present-day England. The finding in Japan, some 10,000 kilometres (6,000 miles) from Italy, may shed some light on how far east its influence reached, Tamura said. "It will also lead to further studies on how they could have got all the way to Japan," she said.



http://www.eurekalert.org/pub_releases/2012-06/ehs-pmf062212.php

Pasta made from green banana flour a tasty alternative for gluten-free diets
New option for patients with celiac disease, study in the Journal of the Academy of Nutrition and Dietetics reports

Philadelphia, PA - People with celiac disease struggle with limited food choices, as their condition makes them unable to tolerate gluten, found in wheat and other grains. Researchers from the University of Brazil have developed a gluten-free pasta product from green banana flour, which tasters found more acceptable than regular whole wheat pasta. The product has less fat and is cheaper to produce than standard pastas. Their research is published today in the Journal of the Academy of Nutrition and Dietetics.

"There was no significant difference between the modified pasta and standard samples in terms of appearance, aroma, flavor, and overall quality," reports lead investigator Renata Puppim Zandonadi, PhD, Department of Nutrition, University of Brazil. "Green bananas are considered a sub-product of low commercial value with little industrial use. For banana growers and pasta product makers, there is the possibility of diversifying and expanding their market."

Researchers compared a standard whole-wheat pasta preparation made from whole wheat flour and whole eggs with one made from green banana flour, egg whites, water, and gums. The alterations reduced the fat content and increased the protein value of the modified pasta, important because gluten removal typically reduces some proteins responsible for some sensory characteristics of pasta products. The egg whites and gum result in pasta that is less sticky than typical gluten-free pastas, and promote firmness, elasticity, moisture, and uniformity. The modified pasta decreased fat content by over 98%. This reduction is particularly important to patients with celiac disease, because many gluten-free products compensate for the removal of gluten with high levels of lipid content.

Fifty testers who did not have celiac disease and 25 celiac disease patients compared the pastas. In both groups, the modified pasta was better accepted than the standard in aroma, flavor, texture, and overall quality, indicating that the product can possibly be commercialized to a wider market than just those with celiac disease. The modified pasta had a high quantity of resistant starch, which may help control glycemic indexes, cholesterol, intestinal regularity, and fermentation by intestinal bacteria. "Considering that untreated celiac disease promotes cancer in intestinal cells and a highly inflammatory mucosal status, developing gluten-free products with bioactive compounds such as the ones present in green banana flour is important for celiac disease patients," concludes Dr. Zandonadi. "Patients will benefit from ingesting a product with a better nutritional profile made from an ingredient that is produced and consumed throughout the world."

In an accompanying podcast presentation, Raquel Braz Assunção Botelho, PhD, discusses the potential benefits of green banana flour-based pasta for people with celiac disease.

<http://www.sciencedaily.com/releases/2012/06/120622163509.htm>

Reward the Second Best, Ignore the Best

New research suggests why the richest should pay more tax; why rewarding the top performers leads to recurrent crises; and why we should resist the temptation to imitate the most successful

ScienceDaily - New research published in Proceedings of the National Academy of Sciences suggests reasons why the richest should pay more tax; why rewarding the top performers leads to recurrent crises and scandals; and why we should resist the temptation to learn from and imitate the most successful.

Successful people don't like to have their success explained by luck, while audiences, too, seem unwilling to acknowledge the role of luck in determining success. As a result, the stories of the most successful attract the most media attention -- described as 'extreme success' in this research report. These outliers are perceived to be the most skilful and so receive the highest rewards and get imitated.

However, new research by Dr Chengwei Liu, Assistant Professor of Strategy & Behavioural Science at Warwick Business School and Professor Jerker Denrell at Oxford Saïd Business School shows that the idea that the exceptional performers are the most skilled is flawed. The reason is that exceptional performance often occurs in exceptional circumstances. Top performers are often the luckiest people, who have benefitted from rich-get-richer dynamics that boost their initial fortune.

Consider a college drop-out who turns out to be the wealthiest person in the world. Yes, Bill Gates may be very talented, but his extreme success perhaps tells us more about how circumstances beyond his control created such an outlier. Stated differently, what is more exceptional in this case may not be Gates's talent, but the circumstances he happens to be in.

For example, Gates's upper class background enabled him to gain extra programming experience when less than 0.01% of his generation then had access to computers; his mother's social connection with IBM's chairman enabled him to gain a contract from the then leading PC company, generating a lock-in effect that was crucial for establishing the software empire. Of course, Gates's talent and effort play important roles in the extreme success of Microsoft. But that's not enough for creating such an outlier. Talent and effort are likely less important than the circumstances (e.g., network externalities generated by customers' demand for software compatibility boosted Gates's initial fortune enabled by his social background) in the sense that he could not have been so successful without the latter.

A rational learner should realise that it is more useful to draw lessons from the less exceptional performers, the second best, because their circumstances are likely to be less extreme, implying their performances are more informative and offer more evidence for skill.

Dr Chengwei Liu commented, "Humans, however, often rely on the heuristic of learning from the most successful. Our research found that even though observers were given clear feedback and incentives to be accurate in their judgement of performers, 58% of them still assumed the most successful were the most skilled when they are clearly not, mistaking luck for skill. This assumption is likely lead to disappointment -- even if you can imitate everything Bill Gates did, you will not be able to replicate his initial fortune. This also implies that rewarding the highest performers can be detrimental or even dangerous because imitators are unlikely to achieve exceptional performance without luck unless they take excessive risk or cheat, which may partly explain the recurrent financial crises and scandals."

Implications of this research

The lucky few should understand and appreciate the role that luck played in their extreme success, and with that understanding comes an obligation to those that have not. The lucky few may be more skilful than others eventually, but the way they gain their superior skill can be due to strong rich-get-richer dynamics combined with the good fortune of being successful initially. This can justify a higher tax rate for the richest when their extreme fortune is accumulated in the fortunate fashion defined in this research.

This research also has important implications for learning and goal setting for individuals, organisations and society. Media and popular business books often advise on how to learn from the most successful with a goal of moving from 'good to great'. This research suggests that following such advice is likely to lead to frustrations and wasted resource, as it requires luck rather than talent to be exceptional. Instead, learning from the second best and setting the goal of moving from 'poor to good' may be more constructive not only for individual learners but also for business and society collectively.

Last but not least, rewarding the second best when it's clear that extreme performance cannot be achieved without luck, excessive risk-taking or cheating, may be a solution to avoid recurrent crises and scandals. But since a non-linear relationship between performance and reward is counterintuitive and may be perceived as unfair, policy-makers need to design 'nudges' to help people resist the temptation to reward or imitate the top performers.

J. Denrell, C. Liu. Top performers are not the most impressive when extreme performance indicates unreliability. Proceedings of the National Academy of Sciences, 2012; 109 (24): 9331 DOI: 10.1073/pnas.1116048109

http://www.eurekalert.org/pub_releases/2012-06/tes-dtl062212.php

Declining testosterone levels in men not part of normal aging, study finds

A new study finds that a drop in testosterone levels over time is more likely to result from a man's behavioral and health changes than by aging.

The study results will be presented Monday at The Endocrine Society's 94th Annual Meeting in Houston.

"Declining testosterone levels are not an inevitable part of the aging process, as many people think," said study co-author Gary Wittert, MD, professor of medicine at the University of Adelaide in Adelaide, Australia.

"Testosterone changes are largely explained by smoking behavior and changes in health status, particularly obesity and depression." Many older men have low levels of the sex hormone testosterone, but the cause is not known. Few population-based studies have tracked changes in testosterone levels among the same men over time, as their study did, Wittert said.

In this study, supported by the National Health and Medical Research Council of Australia, the authors analyzed testosterone measurements in more than 1,500 men who had measurements taken at two clinic visits five years apart. All blood testosterone samples underwent testing at the same time for each time point, according to Wittert. After the researchers excluded from the analysis any men who had abnormal lab values or who were taking medications or had medical conditions known to affect hormones, they included 1,382 men in the data analysis. Men ranged in age from 35 to 80 years, with an average age of 54.

On average, testosterone levels did not decline significantly over five years; rather, they decreased less than 1 percent each year, the authors reported. However, when the investigators analyzed the data by subgroups, they found that certain factors were linked to lower testosterone levels at five years than at the beginning of the study. "Men who had declines in testosterone were more likely to be those who became obese, had stopped smoking or were depressed at either clinic visit," Wittert said. "While stopping smoking may be a cause of a slight decrease in testosterone, the benefit of quitting smoking is huge."

Past research has linked depression and low testosterone. This hormone is important for many bodily functions, including maintaining a healthy body composition, fertility and sex drive. "It is critical that doctors understand that declining testosterone levels are not a natural part of aging and that they are most likely due to health-related behaviors or health status itself," he said. Unmarried men in the study had greater testosterone reductions than did married men. Wittert attributed this finding to past research showing that married men tend to be healthier and happier than unmarried men. "Also, regular sexual activity tends to increase testosterone," he explained.

The study findings were presented by Andre Araujo, PhD, who was a visiting professor at the University of Adelaide and is vice president of epidemiology at New England Research Institutes, Watertown, Mass.

<http://www.sciencedaily.com/releases/2012/06/120623145123.htm>

Predicting Treatment Response in Central Nervous System Diseases: Simple Way of Avoiding Dangerous Side Effects?

Researchers have found a way to identify which patients are likely to respond well to valproic acid prior to starting treatment

ScienceDaily - The commonly-used epilepsy drug, valproic acid (VPA), can have a highly beneficial effect on some babies born with spinal muscular atrophy (SMA), the number one genetic killer during early infancy. But in about two-thirds of such cases it is either damaging or simply has no effect. Now, for the first time, researchers have found a way to identify which patients are likely to respond well to VPA prior to starting treatment. Their results have major implications, not just for SMA patients, but for other conditions treated with the drug such as migraine and epilepsy, and may even provide the conditions for turning VPA non-responders into responders, the researchers say.

Dr. Lutz Garbes, from the Institute of Human Genetics, University of Cologne, Germany, will tell the annual conference of the European Society of Human Genetics on June 24 that he and his colleagues had analysed blood RNA samples from a small group of SMA patients who had been treated with VPA. They found, as expected, that only about one third of patients responded well. In an attempt to discover whether blood sampling was the most appropriate test method to use, they also looked at VPA response in another tissue -- fibroblasts (a type of skin cell). They found that the response in blood and in skin was the same in 60% of cases. The researchers then generated pluripotent stem cells from fibroblasts of both a VPA responder and a non-responder, and differentiated them into GABAergic neurons (neurons that produce the amino acid GABA, the chief neurotransmitter in the mammalian nervous system). These neurons, when treated with VPA, exhibited a similar response to that previously found in blood and fibroblasts.

"This indicates for the first time that response to VPA is the same among blood and skin and suggests that monitoring blood for VPA therapy is indeed feasible in central nervous system diseases," says Dr. Garbes. "But, even more importantly, by using the SMA patients' fibroblasts we were able to identify a decisive factor in the suppression of the positive response to VPA treatment. Utilising transcriptome-wide microarray profiling*, we found that high levels of the fatty acid transporter protein CD36 are associated with the lack of positive response to treatment.

"The implications of this discovery are far-reaching. First, we have been able to prove that monitoring blood is a reliable method for doctors to determine response to VPA treatment in many central nervous system diseases, since our findings are not specific to SMA. Second, the identification of CD36 as the crucial factor in suppressing response to treatment provides a simple way of appraising whether a patient will respond to therapy before treatment starts. And third, in the long run we may find a way to target CD36 in order to be able to change a non-VPA responder into a responder."

Knowing that CD36 is a crucial factor here means that the current, potentially dangerous, 'trial and error' approach to VPA treatment is now obsolete, the researchers say. Screening of patients for CD36 prior to treatment would mean that only those who would respond positively to VPA would be given it. This is important because, in some cases, VPA can cause life-threatening side-effects such as impairment of liver, blood cell and pancreatic function, especially in those just starting the treatment. "But we still do not understand

how CD36 suppresses response to VPA, only that it does so," says Dr. Garbes. "A greater understanding of its effects could also lead to the detection of even better targets to overcome the problem. "

In the case of SMA, VPA works by inhibiting enzymes called histone deacetylase (HDACs) which are involved in regulating the packaging of DNA. HDACs lead to a denser DNA packaging whereby protein production from genes is reduced. Other enzymes called histone acetyltransferases (HATs) lead to a more relaxed DNA structure, producing more protein. By inhibiting HDACs with VPA, the DNA packaging balance shifts towards the more relaxed structure and thus genes get activated and proteins produced. In SMA, the crucial gene is SMN2, a copy gene of the disease-determining gene SMN1. In healthy individuals, SMN1 is the major source of SMN protein, but SMN2 cannot fully compensate for the loss of SMN1 in SMA patients. By increasing SMN2 activity, it will produce more SMN protein and ameliorate the condition.

"Avoiding needless VPA treatment of non-responders would have a major effect on healthcare costs and improve quality of life for patients," Dr. Garbes will say. "Half of the babies born with SMA will die within two years, but the other half can live to twenty or even longer, so this is an important finding for them. Our findings may also help identify patients who are candidates for VPA treatment in many other diseases of the central nervous system, some of them very common.

"In the EU, approximately 550 SMA babies are born each year, and there are about 311,000 new cases of epilepsy per year. It is estimated that, in Europe, migraine affects up to 28% of people at some time in their lives. We are happy that we may have been able to contribute to the development of personalised medicine for so many people," he will conclude.

**A transcriptome-wide microarray profile provides a way of identifying all the genes that are differentially expressed in distinct cell populations or subtypes, allowing the effects of treatment to be monitored.*

<http://www.sciencedaily.com/releases/2012/06/120623145623.htm>

Lichen Can Survive in Space: Space Station Research Sheds Light On Origin of Life; Potential for Better Sunscreens

It seems possible that organisms could colonize planets by hitching rides on asteroids

ScienceDaily - You can freeze it, thaw it, vacuum dry it and expose it to radiation, but still life survives. ESA's research on the International Space Station is giving credibility to theories that life came from outer space -- as well as helping to create better sunscreens. In 2008 scientists sent the suitcase-sized Expose-E experiment package to the Space Station filled with organic compounds and living organisms to test their reaction to outer space. When astronauts venture on a spacewalk, hours are spent preparing protective suits to survive the hostile conditions.

No effort was made to protect the bacteria, seeds, lichen and algae attached to the outside of the Space Station, however. "We are exploring the limits of life," explains ESA's René Demets.

Our atmosphere does a wonderful job of protecting life on Earth by absorbing harmful UV rays and keeping temperatures relatively stable. In contrast, the space samples endured the full power of the Sun's rays. The samples were insulated somewhat by the Space Station but still had to cope with temperatures changing from -12°C to +40°C over 200 times as they orbited Earth. The samples returned to Earth in 2009 and the results have now been published in a special issue of the journal *Astrobiology*.

Lichen have proven to be tough cookies -- back on Earth, some species continue to grow normally. René explains, "These organisms go into a dormant state waiting for better conditions to arrive." The lichen have attracted interest from cosmetic companies. They can survive the full power of the Sun for 18 months, so knowing more could lead to new ingredients for sunscreen. Living organisms surviving in open space supports the idea of 'panspermia' -- life spreading from one planet to another, or even between solar systems.

It seems possible that organisms could colonize planets by hitching rides on asteroids. ESA is probing this *Hervé Cottin, Yuan Yong Guan, Audrey Noblet, Olivier Poch, Kafila Saiagh, Mégane Cloix, Frédérique Macari, Murielle Jérôme, Patrice Coll, François Raulin, Fabien Stalport, Cyril Szopa, Marylène Bertrand, Annie Chabin, Frances Westall, Didier Chaput, René Demets, André Brack. The PROCESS Experiment: An Astrochemistry Laboratory for Solid and Gaseous Organic Samples in Low-Earth Orbit. Astrobiology, 2012; 12 (5): 412 DOI: 10.1089/ast.2011.0773*

http://www.eurekalert.org/pub_releases/2012-06/nu-ltt062212.php

Learn that tune while fast asleep

Research shows that stimulation during sleep can enhance skill learning

EVANSTON, Ill. – Want to nail that tune that you've practiced and practiced? Maybe you should take a nap with the same melody playing during your sleep, new provocative Northwestern University research suggests. The research grows out of exciting existing evidence that suggests that memories can be reactivated during sleep and storage of them can be strengthened in the process.

In the Northwestern study, research participants learned how to play two artificially generated musical tunes with well-timed key presses. Then while the participants took a 90-minute nap, the researchers presented one of the tunes that had been practiced, but not the other.

"Our results extend prior research by showing that external stimulation during sleep can influence a complex skill," said Ken A. Paller, professor of psychology in the Weinberg College of Arts and Sciences at Northwestern and senior author of the study.

By using EEG methods to record the brain's electrical activity, the researchers ensured that the soft musical "cues" were presented during slow-wave sleep, a stage of sleep previously linked to cementing memories. Participants made fewer errors when pressing the keys to produce the melody that had been presented while they slept, compared to the melody not presented.

"We also found that electrophysiological signals during sleep correlated with the extent to which memory improved," said lead author James Antony of the Interdepartmental Neuroscience Program at Northwestern. "These signals may thus be measuring the brain events that produce memory improvement during sleep."

The age-old myth that you can learn a foreign language while you sleep is sure to come to mind, said Paul J. Reber, associate professor of psychology at Northwestern and a co-author of the study.

"The critical difference is that our research shows that memory is strengthened for something you've already learned," Reber said. "Rather than learning something new in your sleep, we're talking about enhancing an existing memory by re-activating information recently acquired."

The researchers, he said, are now thinking about how their findings could apply to many other types of learning.

"If you were learning how to speak in a foreign language during the day, for example, and then tried to reactivate those memories during sleep, perhaps you might enhance your learning."

Paller said he hopes the study will help them learn more about the basic brain mechanisms that transpire during sleep to help preserve memory storage.

"These same mechanisms may not only allow an abundance of memories to be maintained throughout a lifetime, but they may also allow memory storage to be enriched through the generation of novel connections among memories," he said.

The study opens the door for future studies of sleep-based memory processing for many different types of motor skills, habits and behavioral dispositions, Paller said.

"Cued Memory Reactivation During Sleep Influences Skill Learning" will publish June 24 in the journal Nature Neuroscience. The research was supported by a grant from the National Science Foundation. In addition to Paller, Antony and Reber, co-authors include Eric W. Gobel of the Interdepartmental Neuroscience Program, and Justin K. O'Hare of the Department of Psychology, all of Northwestern University.

<http://phys.org/news/2012-06-line-blurs-animal-monkeys-math.html>

What was he thinking? Study turns to ape intellect

Scientists wonder if apes are capable of thinking about what other apes are thinking

AP - The more we study animals, the less special we seem.

Baboons can distinguish between written words and gibberish. Monkeys seem to be able to do multiplication. Apes can delay instant gratification longer than a human child can. They plan ahead. They make war and peace. They show empathy. They share.

"It's not a question of whether they think — it's how they think," says Duke University scientist Brian Hare. Now scientists wonder if apes are capable of thinking about what other apes are thinking.

The evidence that animals are more intelligent and more social than we thought seems to grow each year, especially when it comes to primates. It's an increasingly hot scientific field with the number of ape and monkey cognition studies doubling in recent years, often with better technology and neuroscience paving the way to unusual discoveries.

This month scientists mapping the DNA of the bonobo ape found that, like the chimp, bonobos are only 1.3 percent different from humans.

Says Josep Call, director of the primate research center at the Max Planck Institute in Germany: "Every year we discover things that we thought they could not do."

Call says one of his recent more surprising studies showed that apes can set goals and follow through with them. Orangutans and bonobos in a zoo were offered eight possible tools — two of which would help them get at some food. At times when they chose the proper tool, researchers moved the apes to a different area before they could get the food, and then kept them waiting as much as 14 hours. In nearly every case, when the apes realized they were being moved, they took their tool with them so they could use it to get food the next day, remembering that even after sleeping. The goal and series of tasks didn't leave the apes' minds.

Call says this is similar to a person packing luggage a day before a trip: "For humans it's such a central ability, it's so important."

For a few years, scientists have watched chimpanzees in zoos collect and store rocks as weapons for later use. In May, a study found they even add deception to the mix. They created haystacks to conceal their stash of stones from opponents, just like nations do with bombs.

Hare points to studies where competing chimpanzees enter an arena where one bit of food is hidden from view for only one chimp. The chimp that can see the hidden food, quickly learns that his foe can't see it and uses that to his advantage, displaying the ability to perceive another ape's situation. That's a trait humans develop as toddlers, but something we thought other animals never got, Hare said.

And then there is the amazing monkey memory.

At the National Zoo in Washington, humans who try to match their recall skills with an orangutan's are humbled. Zoo associate director Don Moore says: "I've got a Ph.D., for God's sake, you would think I could out-think an orang and I can't."

In French research, at least two baboons kept memorizing so many pictures — several thousand — that after three years researchers ran out of time before the baboons reached their limit. Researcher Joel Fagot at the French National Center for Scientific Research figured they could memorize at least 10,000 and probably more. And a chimp in Japan named Ayumu who sees strings of numbers flash on a screen for a split-second regularly beats humans at accurately duplicating the lineup. He's a YouTube sensation, along with orangutans in a Miami zoo that use iPads.

It's not just primates that demonstrate surprising abilities.

Dolphins, whose brains are 25 percent heavier than humans, recognize themselves in a mirror. So do elephants. A study in June finds that black bears can do primitive counting, something even pigeons have done, by putting two dots before five, or 10 before 20 in one experiment.

The trend in research is to identify some new thinking skill that chimps can do, revealing that certain abilities are "not uniquely human," said Emory University primatologist Frans de Waal. Then the scientists find that same ability in other primates further removed from humans genetically. Then they see it in dogs and elephants. "Capacities that we think in humans are very special and complex are probably not so special and not so complex," de Waal said. "This research in animals elevates the animals, but it also brings down the humans.... If monkeys can do it and maybe dogs and other animals, maybe it's not as complex as you think."

At Duke, professor Elizabeth Brannon shows videos of monkeys that appear to be doing a "fuzzy representation" of multiplication by following the number of dots that go into a box on a computer screen and choosing the right answer to come out of the box. This is after they've already done addition and subtraction. This spring in France, researchers showed that six baboons could distinguish between fake and real four-letter words — BRRU vs KITE, for example. And they chose to do these computer-based exercises of their own free will, either for fun or a snack.

It was once thought the control of emotions and the ability to empathize and socialize separated us from our primate cousins. But chimps console, and fight, each other. They also try to soothe an upset companion, grooming and putting their arms around him.

"I see plenty of empathy in my chimpanzees," de Waal said. But studies have shown they also go to war against neighboring colonies, killing the males and taking the females. That's something that also is very human and led people to believe that war-making must go back in our lineage 6 million years, de Waal said.

When scientists look at our other closest relative, the bonobo, they see a difference. Bonobos don't kill. Hare says his experiments show bonobos give food to newcomer bonobos, even when they could choose to keep all the food themselves.

One reason scientists are learning more about animal intellect is computers, including touch screens. In some cases, scientists are setting up banks of computers available to primates 24-7. In the French word recognition experiment, Fagot found he got more and better data when it was the baboons' choice to work.

Animal cognition researcher Steve Ross at the Lincoln Park Zoo in Chicago agrees.

"The apes in our case seem to be working better when they have that control, that choice to perform," he said. Brain scans on monkeys and apes also have helped correct mistaken views about ape brain power. It was once thought the prefrontal cortex, the area in charge of higher reasoning, was disproportionately larger than the rest of the brain only in humans, giving us a cognitive advantage, Hare said. But imaging shows that monkey and ape prefrontal cortexes have that same larger scale, he said.

What's different is that the human communication system in the prefrontal cortex is more complex, Hare said.

So there are limits to what non-human primates can do. Animals don't have the ability to communicate with the complexity of human language. In the French study, the baboons can recognize that the letters KITE make a word because through trial and error they learn which letters tend to go together in what order. But the baboons don't have a clue of what KITE means. It's that gap that's key.

"The boundaries are not as sharp as people think, but there are certain things you can't overcome and language is one of them," said Columbia University animal cognition researcher Herbert Terrace.

And that leads to another difference, Ross said. Because apes lack language skills, they learn by watching and mimicking. Humans teach with language and explanation, which is faster and better, Ross said.

Some of the shifts in scientific understanding of animals are leading to ethical debates. When Emory University researcher Lori Marino in 2001 co-wrote a groundbreaking study on dolphins recognizing themselves in mirrors, proving they have a sense of self similar to humans, she had a revelation.

"The more you learn about them, the more you realize that they do have the capacity and characteristics that we think of as a person," Marino said. "I think it's impossible to ignore the ethical implications of these kinds of findings."

After the two dolphins she studied died when transferred to another aquarium, she decided never to work on captive dolphins again. She then became a science adviser to the Nonhuman Rights Project, which seeks legal rights or status for animals. The idea, Marino said, is to get animals such as dolphins "to be deemed a person, not property."

The intelligence of primates was one of the factors behind a report last year by the Institute of Medicine that said the National Institutes of Health should reduce dramatically the number of chimpanzees it uses in biomedical research.

The NIH is working on new guidelines that would further limit federal medical chimpanzee use down from its current few dozen chimps at any given time, said NIH program planning chief James Anderson. Chimps are a special case, with their use "very, very limited," he said. But he raises the question: "What happens if your child is sick or your mother is dying" and animal research might lead to a cure?

The issue is more about animal welfare and giving them the right "not to be killed, not to be tortured, not to be confined unnecessarily" than giving them legal standing, said David DeGrazia, a philosophy and ethics professor at George Washington University.

Hare says that focusing on animal rights ignores the problem of treatment of chimps in research settings. He contends that for behavioral studies and even for many medical research tests they could be kept in zoos or sanctuaries rather than labs.

Animals performing tasks in near-natural habitats "is like an Ivy League college" for the apes, Hare said.

"We're going to see them do stunning and sophisticated things."

<http://www.bbc.com/news/technology-18427851>

Voice algorithms spot Parkinson's disease

A mathematician has come up with a non-invasive, cheap test which he hopes will offer a quick way to identify the disease

Jane Wakefield By Jane Wakefield Technology reporter, TEDGlobal, Edinburgh

Parkinson's is a devastating disease for those living with the condition and currently there is no cure.

Diagnosis can also be slow as there are no blood tests to detect it.

But now mathematician Max Little has come up with a non-invasive, cheap test which he hopes will offer a quick new way to identify the disease.

He will be kicking off the TEDGlobal conference in Edinburgh calling for volunteers to contribute to a huge voice database.

Mr Little has discovered that Parkinson's symptoms can be detected by computer algorithms that analyse voice recordings.

In a blind test of voices, the system was able to spot those with Parkinson's with an accuracy of 86%.

Mr Little was recently made a TED Fellow.

The non-profit organisation behind the TED (Technology, Entertainment and Design) conference creates 40 such fellowships each year. The programme aims to target innovators under the age of 40 and offers them free entry to conferences and other events.

Intel founder

Mr Little became interested in understanding voice from a mathematical perspective while he was studying for a PhD at Oxford University in 2003.

"I was looking for a practical application and I found it in analysing voice disorders, for example when someone's voice has broken down from over-use or after surgery on vocal chords," he told the BBC.

"I didn't occur to me at the time that people with Parkinson's and other movement disorders could also be detected by the system."

But a chance meeting with someone from Intel changed that.

Andy Grove, one of Intel's founders and ex-chief executive, was diagnosed with Parkinson's in 2000 and has since pledged millions of his personal fortune to fund research into the disease.

This includes funds for the chipmaker to develop its own projects to monitor the symptoms.

"They were using devices that detect breakdown in dexterity and accelerometers but they had also recorded the voices of around 50 patients with Parkinson's," explained Mr Little.

The recordings were detailed as the team had recorded the patients once a week over a six-month period.

"They had an enormous amount of data but they didn't know what to do with it. So we wondered whether my technique would work," said Mr Little.

"They set me a blind test to see if I can tell them which ones had Parkinson's. I had 86% accuracy using the techniques I'd developed."

Voice tremors

The system "learns" to detect differences in voice patterns.

"This is machine learning. We are collecting a large amount of data when we know if someone has the disease or not and we train the database to learn how to separate out the true symptoms of the disease from other factors."

Voice patterns can change for a number of reasons, including throat surgery, heavy smoking and even just having a common cold.

But Mr Little believes the system will be smart enough to tell the difference.

"It is not as simple as listening for a tremor in the voice. That tremor has to be in context of other measures and the system has to take in other factors such as if someone has a cold."

Now he is looking for volunteers to contribute to a vast voice bank to help the database to learn even more.

He is aiming to record up to 10,000 voices and has set up local numbers in 10 countries around the world. In the UK the number is 01865 521168.

Anyone can call and they need to state whether or not they have been diagnosed with the disease.

There is also a website where people can find out more about the project.

"The more people that call in, the better," he said.

"If we get 10,000 recordings we'd be very happy but even a tenth of that would be great,"

Clinical trials

He hopes that the technology will be available to doctors within the next two years.

"We're not intending this to be a replacement for clinical experts, rather, it can very cheaply help identify people who might be at high risk of having the disease and for those with the disease, it can augment treatment decisions by providing data about how symptoms are changing in-between check-ups with the neurologist," he said.

There could also be a role for the technology in clinical trials.

"The technology makes it easy for people to report their progress whilst on a new drug, for example," he added.

"If you can catch the disease early it will make a huge difference to care costs. It could become a key technology in reducing the burden of care on the NHS."