http://www.pasthorizonspr.com/index.php/archives/01/2012/neanderthals-see-red-200000-years-ago

Neanderthals see red 200,000 years ago

A new report has confirmed the use of significantly older iron oxide finds that constitute the earliest documented use of red ochre by Neanderthals.

The use of manganese and iron oxides by late Neanderthals is well documented in Europe from 60–40,000 years ago, and although they are often interpreted as being used as pigments the exact function is still largely unknown.

A new report in the Proceedings of the National Academy of Sciences (PNAS) has confirmed the use of significantly older iron oxide finds that constitute the earliest documented use of red ochre by Neanderthals.

Ochre is a mineral pigment and red ochre includes iron oxide (haematite) which produces the red colour. The research team is certain that this material was not found in the locality meaning Neanderthals would actively have had to seek the material out and transport it back to the site. Such actions do imply that the material was used for a specific and (to the Neanderthals) useful purpose, which might have included use as a pigment in creating images or as a ritual material or something more prosaic.

Today modern hunter-gatherer peoples have been seen to use red ochre as an insect repellent, as a method of preserving food, medication and as a means of tanning hides. It's not known of course if Neanderthals were involved in any of these activities, but it does show the wide range of uses that this material can be used for.

Neanderthal remains have been found in Europe and parts of central and western Asia. They lived during the Pleistocene epoch as early as 600,000-350,000 years ago and are believed to have died out some 30,000 years ago.

These finds of ochre amounted to 14 small concentrates retrieved during excavations at Maastricht-Belvédère in the Netherlands in the 1980s. The excavations exposed a series of well-preserved flint artefact and bone scatters gathered in a river valley setting during a late Middle Pleistocene full interglacial period.

Samples of the reddish material were submitted to various forms of analyses to study their physical properties. X-ray powder diffraction analysis by C. Arps in the mid 1980s showed that these red stains were indeed very probably caused by haematite, which may have entered the sandy sediment in a liquid form, as droplets.

The ochre material found by the team is believed to date back 200-250,000 years ago. Prior to this find, use of manganese and iron oxide by Neanderthals had been seen only as recently as 60-40,000 years ago (which has been interpreted as a use of pigments, though there is as yet no evidence to support such claims).

The team also notes that the time frame of the use of ochre by Neanderthals now coincides with the earliest use of ochre by Homo sapiens in Africa.

The discovery gives a more complete picture of the materials used by the early Neanderthals and of their culture as a whole. We also now know that the use of red ochre was not a specific characteristic of early-modern humans in South Africa, which is what was previously assumed. Of course what exactly the Neanderthals used red ochre for is still unclear. ***Source:*** *Proceedings of the National Academy of Sciences (PNAS)*
More information: *Use of red ochre by early Neanderthals, PNAS, Published online before print January 23, 2012, doi: 10.1073/pnas.1112261109*
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http://www.sciencedaily.com/releases/2012/01/120129151046.htm

Want Your Enemies to Trust You? Put On Your Baby Face

Do baby-faced opponents have a better chance of gaining your trust?

ScienceDaily - By subtly altering fictional politicians' faces, researchers at the Hebrew University of Jerusalem examined whether minor changes in appearance can affect people's judgment about "enemy" politicians and their offer to make peace. In the context of the Israeli-Palestinian conflict, the research showed that peace offers from baby-faced politicians had a better chance of winning over the opposing population than the exact same offer coming from more mature-looking leaders.

"The Face of the Enemy: The Effect of Press-reported Visual Information Regarding the Facial Features of Opponent-politicians on Support for Peace" was authored by Dr. Ifat Maoz, Associate Professor in the Noah Mozes Department of Communication and Journalism, and Head of the Smart Family Institute of Communications, at the Hebrew University of Jerusalem.

Prof. Maoz provided Jewish-Israeli respondents with a fictional news item containing a peace proposal and a fictional Palestinian leader's photograph. The photograph was manipulated to appear as either baby-faced or

mature by making a 15% change in the size of eyes and lips. Respondents were then asked to evaluate the peace offer and rate the trustworthiness of the politician who offered it.

Although both images were based on the same original, the baby-faced politician was judged as more trustworthy and his peace proposal received greater support than the same offer from the mature-faced politician.

"People generally associate a baby face with attributes of honesty, openness and acceptance," explains Prof. Maoz, "and once you trust your adversary, you have a greater willingness to reach a compromise."

Previous studies have shown that viewers can form judgments of trustworthiness after as little as 100 milliseconds of exposure to a novel face. Certain facial features evoke feelings of warmth, trust and cooperation while minimizing feelings of threat and competition. People with babyish facial characteristics like large eyes, round chin and pudgy lips are perceived as kinder, more honest and more trustworthy than mature-faced people with small eyes, square jaws, and thin lips. Baby-faced people also produce more agreement with their positions.

But while past research indicates that the appearance of politicians from one's own country affects attitudes and voting intentions, this is the first study that systematically examines the impact of politicians' faces from the opposing side in a conflict.

These conclusions are especially important as the dominance of TV and Internet, combined with the proliferation of photo-ops, photo-shopping and image consultants, means politicians' faces are seen more than ever and their appearance has a greater chance of affecting the impressions, attitudes and opinions of media consumers.

The study also gauged how manipulating facial features affected populations with different pre-existing attitudes, by overcoming hawkish and dovish participants' resistance to change and increasing their perceptions of opponents as trustworthy. Surprisingly, while study participants with hawkish positions held markedly negative initial attitudes towards peace and the opponents in a conflict -- attitudes that tend to be rigid and resistant to change -- they showed a more significant response than dovish respondents to differences in facial maturity.

The study suggests that in situations of protracted conflict, the face of the enemy matters. Visual information conveying subtle, undetected changes in facial physiognomy were powerful enough to influence perceivers' judgments of the opponent-politician and of the proposal he presented for resolving the conflict.

The findings of this study also have important practical implications regarding the mobilization of public opinion in support of conflict resolution. Previous research has shown that images of politicians are often manipulated in media coverage to appear more or less favorable and that such manipulations affect citizens' attitudes and voting intentions towards politicians from their own state and country. This study shows that manipulating the favorability of media images of opponent political leaders in intractable conflict may also have a marked effect on public attitudes, and that media coverage presenting favorable images of opponent leaders may have the potential to mobilize public support for conflict resolution through compromise.

Prof. Maoz adds that there are situations in which a baby-face is not advantageous: "Although features of this type can lend politicians an aura of sincerity, openness and receptiveness, at the same time they can communicate a lack of assertiveness. So people tend to prefer baby-faced politicians as long they represent the opposing side, while on their own side they prefer representatives who look like they know how to stand their ground."

http://www.eurekalert.org/pub_releases/2012-01/uops-fvr013012.php

4-week vaccination regimen knocks out early breast cancer tumors, Penn researchers report

Majority of patients treated develop strong, lasting immune responses

PHILADELPHIA - Researchers at the Perelman School of Medicine at the University of Pennsylvania report that a short course of vaccination with an anti-HER2 dendritic cell vaccine made partly from the patient's own cells triggers a complete tumor eradication in nearly 20 percent of women with ductal carcinoma in situ (DCIS), an early breast cancer. More than 85 percent of patients appear to have a sustained immune response after vaccination, which may reduce their risk of developing a more invasive cancer in the future. The results of the study were published online this month of Cancer and in the January issue of the Journal of Immunotherapy.

The researchers say the results provide new evidence that therapeutic breast cancer vaccines may be most effective for early, localized disease, and when the treatment goes after a protein critical to cancer cell survival.

"I think these data more than prove that vaccination works in situations where the target is right," says the study's leader, Brian Czerniecki, MD, PhD, surgical director of the Rena Rowan Breast Center at the University

of Pennsylvania and Surgical Director of the Immunotherapy Program for the Abramson Cancer Center. "Previous vaccines targeted tissue antigens that were expressed on the cancer cells, but were not necessary for tumor survival. So a vaccine response would cause the tumor to just stop expressing the antigen and the tumor would be fine. Here we're going after HER2/neu, which is critical for survival of early breast cancers. If we knock it out with the immune response, we cripple the tumor cells."

Czerniecki and colleagues enrolled 27 women with HER2-positive DCIS. They isolated specialized white cells from the patients' blood using standard apheresis techniques similar to the blood donation process. Once isolated, the researchers activated the dendritic cells, which are key regulators of the immune system, and primed them with small pieces of the HER2/neu protein. Each patient then received four shots, one week apart, of their personalized anti-HER2 vaccine. And two weeks later patients had surgery to remove any remaining disease, which is standard care for DCIS patients.

The new approach has several critical advantages, compared to testing a vaccine in patients with more advanced disease. First, the activated immune cells have fewer tumor cells to kill. Second, patients' immune systems are still responsive, unlike advanced cancer patients whose immune systems have been suppressed by their disease. Third, the investigators are able to see results quickly, by looking at serum and tumor biomarkers.

In fact, when the team compared pre-vaccination biopsy samples with post-vaccination surgical samples, they saw dramatic changes: Five patients had no disease visible at the time of surgery, indicating that their immune system had wiped out the tumor. Of the remaining 22 patients, HER2 expression was eliminated in half (11 patients), and reduced by 20 percent or more in another two. "We are continuing to see this pattern in our second, ongoing trial," Czerniecki says.

When the team looked at immune responses, they found that 85 percent of patients had HER2-reactive CD4 and CD8 T cells, suggesting that the patients developed a robust and relatively complete immune response after vaccination. Importantly, some patients maintained their immune responses as long as 52 months, which means that they continue to have some protection from recurrence of HER2-positive disease – a key insurance policy for patients, since doctors currently are unable to accurately predict which women are likely to develop invasive breast cancer following a DCIS diagnosis.

The results of the study show the vaccine is safe and relatively easy for the women, with only low-grade side effects. The most common side effects were malaise (72 percent), injection site soreness (59 percent), chills or rigors (38 percent), fever (28 percent) and headaches (24 percent).

While the numbers of patients treated in the trial are relatively small, Czerniecki thinks they will have some idea whether the vaccination reduces the risk of disease recurrence within the next two years. In the meantime, the team continues enrolling patients in a larger study, is designing another study to test the approach in women with early invasive breast cancer, and also plans to test vaccination with additional antigens, including HER3 and HER1.

"I think if we target several of the HER2 family members, we'll drive the tumor to a place where it has nowhere to go," Czerniecki says. "Basically, we'll push it over a cliff because those pathways are critical for tumor survival." Czerniecki notes that what the team is learning in DCIS is applicable to invasive breast cancer, and to other solid tumors that rely on the HER family of signaling proteins, including melanoma, lung, brain, and colon cancers.

Co-authors include Anupama Sharma, MD, Ursula Koldovsky, PhD, Shuwen Xu, MD, Rosemarie Mick, MS, Robert Roses, MD, Elizabeth Fitzpatrick, BS, Susan Weinstein, MD, Harvey Nisenbaum, MD, Bruce L. Levine, MD, Kevin Fox, MD, and Paul Zhang, MD, PhD from Penn, and Gary Koski, PhD, from Kent State University in Ohio.

This study was funded by an NIH grant (R01 CA096997), the Harrington Foundation, Pennies-in-action.org, and the Mistler Foundation.

http://www.eurekalert.org/pub_releases/2012-01/qumc-rrt012612.php

Researchers rewrite textbook on location of brain's speech processing center

New location of critical area provides hints on origin of language

Washington, D.C. - Scientists have long believed that human speech is processed towards the back of the brain's cerebral cortex, behind auditory cortex where all sounds are received - a place famously known as Wernicke's area after the German neurologist who proposed this site in the late 1800s based on his study of brain injuries and strokes. But, now, research that analyzed more than 100 imaging studies concludes that Wernicke's area is in the wrong location. The site newly identified is about 3 centimeters closer to the front of the brain and on the other side of auditory cortex — miles away in terms of brain architecture and function.

The finding, published online this week in the Early Edition of the Proceedings of the National Academy of Sciences (PNAS), means that "textbooks will now have to be rewritten," says the study's senior author, Josef

Rauschecker, Ph.D., a professor in the department of neuroscience at Georgetown University Medical Center (GUMC). "We gave old theories that have long hung - a knockout punch," says Rauschecker, who is also a member of the Georgetown Institute for Cognitive and Computational Sciences.

"If you Google 'language organization in the brain,' probably every cartoon illustration out there is wrong," says lead author Iain DeWitt, a Ph.D. candidate in Georgetown's Interdisciplinary Program in Neuroscience.

The finding matters, Rauschecker says, because the new location of Wernicke's area matches that recently found in non-human primates, suggesting the origins of language between monkeys and humans is closer than many have thought, he says.

"Scientists have long argued that speech is unique to humans. They say monkeys make communication sounds but the fact that they don't have the same elaborate language that we do is due to different brain processing centers," Rauschecker says. "This finding suggests the architecture and processing between the two species is more similar than many people thought."

Knowing that Wernicke's area is in the front of the auditory cortex could also provide clinical insights into patients suffering from brain damage, such as a stroke, or in disorders in speech comprehension. "If a patient can't speak, or understand speech, we now have a good clue as to where damage has occurred," he says.

Rauschecker and DeWitt searched the peer-reviewed, scientific literature for studies that investigated auditory speech perception in humans using different scanning methods — either from functional magnetic resonance imaging (fMRI) or positron emission tomography (PET). They found 115 brain imaging studies of speech perception, which in total had included over 1,900 participants and generated over 800 brain coordinates for speech processing. They then used a type of analysis that allowed them to measure the degree of agreement among brain coordinates from these studies.

The results pinpoint the location of Wernicke's area to be in the left temporal lobe, and specifically to be in the superior temporal gyrus, in front of the the primary auditory cortex.

This is the area that Rauschecker had found to be activated in his own studies of speech processing. He and his colleagues defined a processing "stream" in speech perception that is hierarchical, and which moves increasingly to the front of the superior temporal gyrus. It starts with simple tones and sounds that are perceived by a group of neurons. The sounds then travel to a deeper level of neurons that process phonemes (distinct units of sound), then to neurons that process words.

"Other researchers have found what we have, as well, which has caused a lot of controversy in the field as to where Wernicke's area really is," Rauschecker says. "This study provides a definitive, irrefutable answer."

DeWitt agrees. "After the 1990s, the first decade of cognitive brain imaging, it was already clear to some researchers that the anterior portion of the superior temporal gyrus was a more likely site for word recognition. The majority of imagers, however, were reluctant to overturn a century of prior understanding on account of what was then a relatively new methodology," he says. "The point of our paper is to force a reconciliation between the data and theory. It is no longer tenable to overlook or dismiss evidence supporting a central role for the anterior portion of the superior temporal gyrus in auditory word recognition."

The study was supported by National Science Foundation grants, and a National Institute on Deafness and Other Communications Disorders grant.

http://medicalxpress.com/news/2012-01-ms-drug-fatal-heart-condition.html

MS drug prevented fatal heart condition in lab study

A drug used to treat multiple sclerosis may also be effective at preventing and reversing the leading cause of heart attack, a new study has found.

Scientists found that Gilenya, a drug recently approved in the US for treating MS, was effective at reversing the symptoms of ventricular hypertrophy in mice.

Ventricular hypertrophy is a fatal cardiac disorder that can result in an abnormal heart rhythm (arrhythmia) and cardiac arrest. It is caused by sustained pressure on the heart due to stresses or diseases, such as hypertension (high blood pressure), valvular heart disease or myocardial infarction (heart attack), and is the leading cause of sudden cardiac death worldwide.

Researchers from The University of Manchester and the University of Illinois at Chicago have discovered that enhancing the activity of an enzyme molecule called Pak1 that is found naturally in our bodies using Gilenya produced remarkable results in mice with ventricular hypertrophy.

Study co-author Dr Xin Wang, a Lecturer in Molecular Cardiology in Manchester's Faculty of Life Sciences, said: "Cardiac hypertrophy is the pathological state to respond to sustained stresses on the heart resulting in increases in ventricular wall thickness and muscle mass of the heart. The condition is often associated with fatal

complications, such as, heart failure and rhythm disorders, such as ventricular arrhythmias, leading to millions of deaths worldwide each year.

"Our research had previously identified the effect of Pak1 in preventing tissue damage caused by reduced blood flow to the heart, known as cardiac ischemic injury. This latest study used mice with a genetic modification of the Pak1 gene to show how the enzyme, when stimulated by Gilenya, prevented and even reversed the symptoms of ventricular hypertrophy."

The research, led in Manchester by Dr Ming Lei, Dr Xin Wang and Dr Elizabeth Cartwright, and in Chicago by Professor John Solaro and Dr Yunbo Ke, is published in the leading cardiovascular journal, Circulation.

Dr Lei, who is based in Manchester's Faculty of Medical and Human Sciences, added: "In recent years, escalating costs, risks, and uncertainty associated with drug development for treating cardiovascular diseases have posed daunting challenges to the pharmaceutical industry. Our discovery opens up fresh avenues for developing a new class of drug for treating several fatal heart conditions. The novel effect of this existing drug means that we have the potential to accelerate the availability of a new therapy for patients with these heart conditions."

More information: *'Pak1 as a Novel Therapeutic Target for Antihypertrophic Treatment in the Heart,' published in Circulation, doi:10.1161/CIRCULATIONAHA.111.048785*

http://news.discovery.com/human/women-drinking-alcohol-miscarriage-120130.html

Moderate Drinking and Miscarriage Linked

Just two glasses of wine weekly during the first four months of pregnancy is found to increase the rate of miscarriage.

By Emily Sohn | Mon Jan 30, 2012 12:26 PM ET

Just two cocktails, beers or glasses of wine a week can increase a woman's chances of early miscarriage by 66 percent, found a surprising new study that included more than 90,000 women.

Despite some evidence that light drinking during pregnancy is OK, the new findings offer the strongest evidence yet that playing it safe might be the best strategy for women who are gestating.

Still, many questions remain, as previous studies have offered mixed results and scientists still don't have a good mechanism to explain how such small doses of alcohol might affect fetal development.

"You should never give a recommendation based on a single study," said lead author Anne-Marie Nybo Anderson, an epidemiologist at the University of Copenhagen. "But if I was to give a recommendation to my daughter, I would say that if you plan a pregnancy and if you want to be careful and do everything you can in order to not harm your future baby, then I think you should stop drinking when you start trying to become pregnant, and then after the first four months you can be a little more relaxed."

There's no doubt that heavy or binge drinking during pregnancy is dangerous to a developing fetus. But research on the effects of low levels of alcohol consumption has offered contradictory results, with conclusions depending on the way studies are designed and even the country where studies are done.

Some studies have offered reason to be concerned. Others have suggested that a regular drink or two should be just fine. A 2010 study in the Journal of Epidemiology and Community Health, for example, found no signs of cognitive or emotional harm in young kids whose moms had consumed a couple drinks a week while carrying them. That study followed children up to age five and even found that the sons of light drinkers scored slightly higher than boys whose moms had stopped drinking altogether during pregnancy.

For the new study, Nybo Andersen and colleagues took advantage of a natural experiment in Denmark. For several years in the late 1990s, the country's national health board loosened its recommendations for pregnant women, suggesting that they generally avoid alcohol but if they decided to drink, they should not have more than a drink a day and they should not drink every single day.

For Danish women, the new guidelines had the effect of turning moderate drinking during pregnancy into standard and permissible behavior. No longer was having a glass of wine with a baby on board connected to depression or other negative health habits. It was just a normal thing to do, and many women indulged -- before the health board reversed its guidelines and became stricter again after a few years.

During that period of societal permissiveness, a national program enrolled more than 100,000 women during their pregnancies to take part in a Birth Cohort study. Among the many questions asked of them about their lifestyles, health behaviors and pregnancies during digital telephone interviews, women reported how much alcohol they had drunk before and how much they drank after getting pregnant. Mothers entered the study as early as six weeks into their pregnancies, and follow-up interviews recorded the eventual outcomes of their births.

Overall, about 55 percent of the Danish women continued to drink alcohol while pregnant during the study period, the researchers reported in the International Journal of Epidemiology. Just 2 percent averaged more than four drinks a week, and most drank far more moderately. But, the study found, it only took two drinks a week to raise the risk of miscarriage during the first 16 weeks by 66 percent.

Women who drank between half a drink and one and a half drinks each week showed a 19 percent increased risk in pregnancy loss, but only at the beginning of the second trimester. After the first four months, light drinking didn't seem to make a difference in rates of miscarriage or stillbirth.

An average of about 15 percent of pregnancies that get as far as week six end in miscarriage, Nybo Andersen said, and rates are higher than that for older moms - making low to moderate amounts of alcohol a potentially significant risk. The new findings surprised even the experts.

"I was pretty sure that alcohol intake at such low amounts in pregnancy would not have dramatic effects," Andersen said. "But what we found was that there was quite a high risk for miscarriage with moderate alcohol intake, and there was a stronger risk the earlier in pregnancy we looked."

The study could not address whether one drink once in a while makes a difference. And, so far, science has no explanation for how, exactly, such a small amount of alcohol might harm a fetus.

With so many unknowns, it's possible for seemingly contradictory findings to be simultaneously true, said Fred Bookstein, an applied statistician who has studied fetal alcohol spectrum disorders at the University of Washington, Seattle, and the University of Vienna.

Fetuses might just fall into two groups, he offered: Some that are vulnerable to low-dose alcohol exposure in the early weeks and some that aren't. The first group would be the ones that would account for higher miscarriage rates in mothers who drank moderately during pregnancy. The second group would make it to birth undamaged despite the exposure, and those children would show no adverse effects into childhood.

It's hard to turn a study like this into universal recommendations, Bookstein added. Statistically, for example, it appears to be safe to drink up to one and a half drinks each week during the first four months and then responsibly after that. But nuanced messages about drinking during pregnancy are often too easily interpreted as either a license to drink freely, or in this case, as permission to drink as a tool for ending unwanted pregnancies. Both interpretations would be inaccurate and dangerous. "So, no, I wouldn't use this paper as the basis of any sort of public-health advisory," Bookstein said. "It's just too fraught."

http://medicalxpress.com/news/2012-01-music-biological-impact-aging.html

Music training has biological impact on aging process

Age-related delays in neural timing are not inevitable and can be avoided or offset with musical training, according to a new study from Northwestern University.

The study is the first to provide biological evidence that lifelong musical experience has an impact on the aging process. Measuring the automatic brain responses of younger and older musicians and non-musicians to speech sounds, researchers in the Auditory Neuroscience Laboratory discovered that older musicians had a distinct neural timing advantage.

"The older musicians not only outperformed their older non-musician counterparts, they encoded the sound stimuli as quickly and accurately as the younger non-musicians," said Northwestern neuroscientist Nina Kraus. "This reinforces the idea that how we actively experience sound over the course of our lives has a profound effect on how our nervous system functions."

Kraus, professor of communication sciences in the School of Communication and professor of neurobiology and physiology in the Weinberg College of Arts and Sciences, is co-author of "Musical experience offsets age-related delays in neural timing" published online in the journal Neurobiology of Aging.

"These are very interesting and important findings," said Don Caspary, a nationally known researcher on age-related hearing loss at Southern Illinois University School of Medicine. "They support the idea that the brain can be trained to overcome, in part, some age-related hearing loss."

"The new Northwestern data, with recent animal data from Michael Merzenich and his colleagues at University of California, San Francisco, strongly suggest that intensive training even late in life could improve speech processing in older adults and, as a result, improve their ability to communicate in complex, noisy acoustic environments," Caspary added.

Previous studies from Kraus' Auditory Neuroscience Laboratory suggest that musical training also offset losses in memory and difficulties hearing speech in noise -- two common complaints of older adults. The lab has been extensively studying the effects of musical experience on brain plasticity across the life span in normal and clinical populations, and in educational settings.

However, Kraus warns that the current study's findings were not pervasive and do not demonstrate that musician's have a neural timing advantage in every neural response to sound. "Instead, this study showed that musical experience selectively affected the timing of sound elements that are important in distinguishing one consonant from another."

The automatic neural responses to speech sounds delivered to 87 normal-hearing, native English-speaking adults were measured as they watched a captioned video. "Musician" participants began musical training before age 9 and engaged consistently in musical activities through their lives, while "non-musicians" had three years or less of musical training. *Provided by Northwestern University*

http://www.eurekalert.org/pub_releases/2012-01/cu-cro013012.php

College reduces odds for marriage among disadvantaged

For those with few social advantages, college is a prime pathway to financial stability, but it also unexpectedly lowers their odds of ever marrying

ITHACA, N.Y. - For those with few social advantages, college is a prime pathway to financial stability, but it also unexpectedly lowers their odds of ever marrying, according to a study by Cornell University sociologist Kelly Musick being published in the February issue of the Journal of Marriage and Family ***(available online)***.

The findings suggest that social and cultural factors, not just income, are central to marriage decisions. Men and women from the least advantaged backgrounds who attend college appear to be caught between social worlds - reluctant to "marry down" to partners with less education and unable to "marry up" to those from more privileged upbringings. Lower marriage chances appear to stem from men's and women's mismatched social origins and educational attainment - a phenomenon Musick and co-authors refer to as "marriage market mismatch."

"College students are becoming more diverse in their social backgrounds, but they nonetheless remain a socio-economically select group," said Musick, associate professor of policy analysis and management in the College of Human Ecology. "It may be difficult for students from less privileged backgrounds to navigate social relationships on campus, and these difficulties may affect what students ultimately gain from the college experience."

Musick hoped the findings could raise awareness of potential social barriers faced by first-generation college students – barriers that could be keeping students from participating fully in the academic and social opportunities colleges have to offer.

For the study, Musick and sociologists at the University of California-Los Angeles estimated the propensity of men's and women's college attendance based on family income, parental education and other indicators of social background and early academic achievement. They then grouped their subjects into social strata based on these propensity scores and compared marriage chances of college- and non-college-goers within each stratum. Estimates were based on a sample of about 3,200 Americans from the 1979 National Longitudinal Survey of Youth, followed from adolescence into adulthood.

They found that college attendance negatively affected marriage chances for the least advantaged individuals -- lessening men's and women's odds by 38 percent and 22 percent, respectively. By comparison, among those in the highest social stratum, men who attend college increase their marrying chances by 31 percent and women by 8 percent.

Musick said that past studies have shown "college is the great equalizer" in the labor market, dampening social class differences. But the same can't be said for the marriage market. "This research demonstrates the importance of differentiating between social background and educational achievement," she said. "Educational achievement may go far in reducing income differences between men and women from different social backgrounds, but social and cultural distinctions may persist in social and family relationships."

http://nyti.ms/z9ask9

DNA Turning Human Story Into a Tell-All

The tip of a girl's 40,000-year-old pinky finger found in a cold Siberian cave, paired with faster and cheaper genetic sequencing technology, is helping scientists draw a surprisingly complex new picture of human origins.

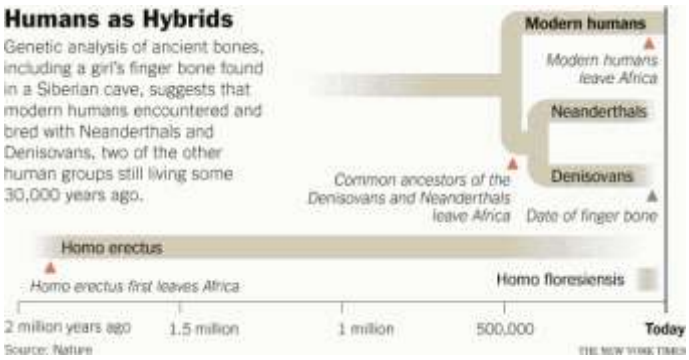
By ALANNA MITCHELL

The new view is fast supplanting the traditional idea that modern humans triumphantly marched out of Africa about 50,000 years ago, replacing all other types that had gone before. Instead, the genetic analysis shows, modern humans encountered and bred with at least two groups of ancient humans in relatively recent times: the Neanderthals, who lived in Europe and Asia, dying out roughly 30,000 years ago, and a mysterious group known as the Denisovans, who lived in Asia and most likely vanished around the same time.

Their DNA lives on in us even though they are extinct. “In a sense, we are a hybrid species,” Chris Stringer, a paleoanthropologist who is the research leader in human origins at the Natural History Museum in London, said in an interview.

The Denisovans (pronounced dun-EE-suh-vinz) were first described a year ago in a groundbreaking paper in the journal Nature made possible by genetic sequencing of the girl’s pinky bone and of an oddly shaped molar from a young adult. Those findings have unleashed a spate of new analyses.

Scientists are trying to envision the ancient couplings and their consequences: when and where they took place, how they happened, how many produced offspring and what effect the archaic genes have on humans today. Other scientists are trying to learn more about the Denisovans: who they were, where they lived and how they became extinct.



A revolutionary increase in the speed and a decline in the cost of gene-sequencing technology have enabled scientists at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, to map the genomes of both the Neanderthals and the Denisovans.

Comparing genomes, scientists concluded that today’s humans outside Africa carry an average of 2.5 percent Neanderthal DNA, and that people from parts of Oceania also carry about 5 percent Denisovan DNA. A study published in November found that Southeast Asians carry about 1 percent Denisovan DNA in addition to their Neanderthal genes. It is unclear whether Denisovans and Neanderthals also interbred.

A third group of extinct humans, Homo floresiensis, nicknamed “the hobbits” because they were so small, also walked the earth until about 17,000 years ago. It is not known whether modern humans bred with them because the hot, humid climate of the Indonesian island of Flores, where their remains were found, impairs the preservation of DNA.

This means that our modern era, since H. floresiensis died out, is the only time in the four-million-year human history that just one type of human has been alive, said David Reich, a geneticist at Harvard Medical School who was the lead author of the Nature paper on the Denisovans.

For many scientists, the epicenter of the emerging story on human origins is the Denisova cave in the Altai Mountains of Siberia, where the girl’s finger bone was discovered. It is the only known place on the planet where three types of humans — Denisovan, Neanderthal and modern — lived, probably not all at once.

John Hawks, a paleoanthropologist at the University of Wisconsin-Madison, whose lab is examining the archaic genomes, visited the cave in July. It has a high arched roof like a Gothic cathedral and a chimney to the sky, he said, adding that being there was like walking in the footsteps of our ancestors.

The cave has been open to the elements for a quarter of a million years and is rich with layers of sediments that may contain other surprises. Some of its chambers are unexplored, and excavators are still finding human remains that are not yet identified. The average temperature for a year, 32 degrees Fahrenheit, bodes well for the preservation of archaic DNA. Could this cave have been one of the spots where the ancient mating took place? Dr. Hawks said it was possible.

But Dr. Reich and his team have determined through the patterns of archaic DNA replications that a small number of half-Neanderthal, half-modern human hybrids walked the earth between 46,000 and 67,000 years ago, he said in an interview. The half-Denisovan, half-modern humans that contributed to our DNA were more recent.

And Peter Parham, an immunologist at the Stanford University School of Medicine, has used an analysis of modern and ancient immune-system genetic components - alleles - to figure out that one of the Denisovan-modern couplings most likely took place in what is now southeastern China. He has also found some evidence that a Neanderthal-modern pair mated in west Asia. He stressed, however, that his study was just the first step in trying to reconstruct where the mating took place.

Dr. Parham’s analysis, which shows that some archaic immune alleles are widespread among modern humans, concludes that as few as six couplings all those tens of thousands of years ago might have led to the current level of ancient immune alleles.

Another paper, by Mathias Currat and Laurent Excoffier, two Swiss geneticists, suggests that breeding between Neanderthals and modern humans was rare. Otherwise, they say, modern humans would have far more Neanderthal DNA.

Were they romantic couplings? More likely they were aggressive acts between competing human groups, Dr. Stringer said. For a model, he pointed to modern hunter-gatherer groups that display aggressive behavior among tribes.

The value of the interbreeding shows up in the immune system, Dr. Parham's analysis suggests. The Neanderthals and Denisovans had lived in Europe and Asia for many thousands of years before modern humans showed up and had developed ways to fight the diseases there, he said in an interview.

When modern humans mated with them, they got an injection of helpful genetic immune material, so useful that it remains in the genome today. This suggests that modern humans needed the archaic DNA to survive.

The downside of archaic immune material is that it may be responsible for autoimmune diseases like diabetes, arthritis and multiple sclerosis, Dr. Parham said, stressing that these are preliminary results.

Although little is known about the Denisovans — the only remains so far are the pinky bone and the tooth, and there are no artifacts like tools. Dr. Reich and others suggest that they were once scattered widely across Asia, from the cold northern cave to the tropical south. The evidence is that modern populations in Oceania, including aboriginal Australians, carry Denisovan genes.

Dr. Reich and others suggest that the interbreeding that led to this phenomenon probably occurred in the south, rather than in Siberia. If so, the Denisovans were more widely dispersed than Neanderthals, and possibly more successful. But the questions of how many Denisovans there were and how they became extinct have yet to be answered. Right now, as Dr. Reich put it, they are "a genome in search of an archaeology."

http://www.eurekalert.org/pub_releases/2012-01/uoc-fcg013112.php

Facebook can get you fired: UC research reveals the perils of social networking for school employees

School administrators are facing a growing dilemma resulting from social networking that goes beyond preventing cyber-bullying among students.

They're also faced with balancing the rights of privacy and free speech of educators with what should be the appropriate behavior of teachers as role models.

Janet Decker, a University of Cincinnati assistant professor in UC's Educational Leadership Program, reveals more on the dilemma in an article published in the January issue of Principal Navigator, a professional magazine by the Ohio Association of Elementary School Administrators.

Decker explains that a large number of educators have been fired for Internet activity. She says that some teachers have been dismissed for behavior such as posting a picture of themselves holding a glass of wine.

"Despite the evolving issues, the courts have not provided extensive guidance for administrators," writes Decker. "Part of the difficulty is that technology advances at a quicker pace than legal precedent, leaving school employees and administrators unsure of their legal responsibilities."

Decker's article highlights cases that have landed in court as a result of school policies on social networking that "were not clear or effective." The article also examines the law surrounding sexual harassment or abuse of students and freedom of speech for public employees and employee privacy.

"In general, it is important to understand that school employees are expected to be role models both inside and outside of school – even while on Facebook," concludes Decker.

Decker's article features the following 10 recommendations as she encourages school administrators to implement technology policies for school employees:

1. Educate! It's not enough to have written policies; schools should also offer professional development about these issues. By doing so, staff is notified about the expectations and they have a chance to digest and ask questions about the content of the policies.
2. Be empathetic in policies and actions. Administrators may wish that the school's computers will only be used for educational purposes; however, an expectation such as this is unrealistic.
3. Create separate student and staff policies. Much of the law pertaining to students and staff differs greatly.
4. Involve staff in policy creation. This process will help school employees comprehend the policies and will also likely foster staff buy-in.
5. Be clear and specific. Policies should include rationales, legal support and commentary with examples.
6. Ensure your policies conform to state and federal law.
7. Include consequences for violations in policies and implement the consequences.
8. Provide an avenue for appeal and attend to employees' due process rights.
9. Implement policies in an effective and non-discriminatory manner. 10. Amend policies as the law evolves. Much of the law related to technology is in flux. What is legal today may not be tomorrow.

http://www.eurekalert.org/pub_releases/2012-01/plos-sdb012612.php

Scientists decode brain waves to eavesdrop on what we hear

Neuroscientists may one day be able to eavesdrop on the constant, internal monologs that run through our minds

Neuroscientists may one day be able to eavesdrop on the constant, internal monologs that run through our minds, or hear the imagined speech of a stroke or a locked-in patient with inability to speak, according to researchers at the University of California, Berkeley. The work, conducted in the labs of Robert Knight at Berkeley and Edward Chang at UCSF, is reported Jan 31 in the open-access journal PLoS Biology. The report will be accompanied by an interview with the authors for the PLoS Biology Podcast.

The scientists have succeeded in decoding electrical activity in a region of the human auditory system called the superior temporal gyrus (STG). By analyzing the pattern of STG activity, they were able to reconstruct words that subjects listened to in normal conversation.

"This is huge for patients who have damage to their speech mechanisms because of a stroke or Lou Gehrig's disease and can't speak," said Knight, Professor of Psychology and Neuroscience at UC Berkeley. "If you could eventually reconstruct imagined conversations from brain activity, thousands of people could benefit."

"This research is based on sounds a person actually hears, but to use this for a prosthetic device, these principles would have to apply to someone who is imagining speech," cautioned first author Brian N. Pasley, a post-doctoral researcher at UC Berkeley. "There is some evidence that perception and imagery may be pretty similar in the brain. If you can understand the relationship well enough between the brain recordings and sound, you could either synthesize the actual sound a person is thinking, or just write out the words with a type of interface device."

Pasley tested two different methods to match spoken sounds to the pattern of activity in the electrodes. The patients then heard a single word and Pasley used two different computational models to predict the word based on electrode recordings. The better of the two methods was able to reproduce a sound close enough to the original word for him and fellow researchers to correctly guess the word better than chance.

"We think we would be more accurate with an hour of listening and recording and then repeating the word many times," Pasley said. But because any realistic device would need to accurately identify words the first time heard, he decided to test the models using only a single trial.

"I didn't think it could possibly work, but Brian did it," Knight said. "His computational model can reproduce the sound the patient heard and you can actually recognize the word, although not at a perfect level."

The ultimate goal of the study was to explore how the human brain encodes speech and determine which aspects of speech are most important for understanding.

"At some point, the brain has to extract away all that auditory information and just map it onto a word, since we can understand speech and words regardless of how they sound," Pasley said. "The big question is, what is the most meaningful unit of speech? A syllable, a phone, a phoneme? We can test these hypotheses using the data we get from these recordings."

In ***the accompanying Podcast***, PLoS Biology Editor Ruchir Shah sits down with Brian Pasley and Robert Knight to discuss their main findings, the applications for neural prosthetics, as well as the potential ethical implications for "mind-reading".

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http://www.sciencedaily.com/releases/2012/01/120131092746.htm

Are Diet Soft Drinks Bad for You?

A new study finds a potential link between daily consumption of diet soft drinks and the risk of vascular events.

ScienceDaily - Individuals who drink diet soft drinks on a daily basis may be at increased risk of suffering vascular events such as stroke, heart attack, and vascular death. This is according to a new study by Hannah Gardener and her colleagues from the University of Miami Miller School of Medicine and at Columbia University Medical Center. However, in contrast, they found that regular soft drink consumption and a more moderate intake of diet soft drinks do not appear to be linked to a higher risk of vascular events. The research appears online in the Journal of General Internal Medicine published by Springer.

In the current climate of escalating obesity rates, artificially sweetened soft drinks are marketed as healthier alternatives to sugar-sweetened beverages, due to their lack of calories. However, the long-term health consequences of drinking diet soft drinks remain unclear.

Gardener and team examined the relationship between both diet and regular soft drink consumption and risk of stroke, myocardial infarction (or heart attack), and vascular death. Data were analyzed from 2,564 participants in the NIH-funded Northern Manhattan Study, which was designed to determine stroke incidence, risk factors and prognosis in a multi-ethnic urban population. The researchers looked at how often individuals drank soft drinks -- diet and regular -- and the number of vascular events that occurred over a ten-year period.

They found that those who drank diet soft drinks daily were 43 percent more likely to have suffered a vascular event than those who drank none, after taking into account pre-existing vascular conditions such as metabolic syndrome, diabetes and high blood pressure. Light diet soft drink users, i.e. those who drank between one a month and six a week, and those who chose regular soft drinks were not more likely to suffer vascular events.

Gardener concludes: "Our results suggest a potential association between daily diet soft drink consumption and vascular outcomes. However, the mechanisms by which soft drinks may affect vascular events are unclear. There is a need for further research before any conclusions can be drawn regarding the potential health consequences of diet soft drink consumption."

http://www.wired.com/wiredscience/2012/01/gorilla-grins/

Gorilla Grins Hint at Origin of Human Smiles

Psychologists from the University of Portsmouth have published a paper suggesting gorillas use human-like facial expressions to communicate moods with one another.

By Dan Smith, Wired UK

Not only that, but two of the expressions, both of which resemble grinning, could show the origins of the human smile. However, the findings published in the American Journal of Primatology show their smiles mean different things. The Portsmouth researchers found these expressions, observed in Western Lowland gorillas, expressed a number of emotions.

One, a “play face”, featuring an open mouth and showing no teeth, denotes a playful mood, usually accompanied with physical contact. Another, which is open-mouthed and displaying top teeth, could be a submissive smile — as it mixes the play face and a bared-teeth expression, which indicates appeasement.

“Many primate species also show their teeth when they scream,” Bridget Waller, the lead researcher told Wired.co.uk in an e-mail. “These expressions tend to look different to the expressions I studied in gorillas, as the upper and lower teeth are both exposed, and the mouth widely open. The expression is more tense, and accompanied by very different vocalisations. The vocalised element of the scream can differ depending on whether the screamer is an aggressor or a victim.”

In short: subtle differences in facial expression and vocals mean quite different things in primate posturing — one is obedient and appeasing, the other screaming and aggressive. But does this mean that our own smile is inherently passive and submissive?

“In some primate species the bared-teeth display (the expression similar to the human smile) is used only by subordinates, but these species have a very different social organisation to humans,” says Waller. “They tend to have very strict dominance hierarchies, whereas we have a more relaxed social structure. So, in some circumstances humans might use smiling as a subordinate signal, but is can also be used as a genuine signal of friendliness.”

No need to worry about smiling then. Grin away; you won’t be doing your social status any harm.

http://www.physorg.com/news/2012-01-plausibility-pathway-life-chemical-blocks.html

Study proves plausibility of new pathway to life's chemical building blocks

The formose reaction was thought the only route for producing sugars essential for life to begin, but a group has proven the glyoxylate scenario, may push the field of pre-life chemistry past the formose reaction hurdle.

For decades, chemists considered a chemical pathway known as the formose reaction the only route for producing sugars essential for life to begin, but more recent research has called into question the plausibility of such thinking. Now a group from The Scripps Research Institute has proven an alternative pathway to those sugars called the glyoxylate scenario, which may push the field of pre-life chemistry past the formose reaction hurdle.

The team is reporting the results of their highly successful experiments online ahead of print in the Journal of the American Chemical Society.

"We were working in uncharted territory," says Ramanarayanan ("Ram") Krishnamurthy, a Scripps Research chemist who led the research, "We didn't know what to expect but the glyoxylate scenario with respect to formation of carbohydrates is not a hypothesis anymore, it's an experimental fact."

The quest to recreate the chemistry that might have allowed life to emerge on a prehistoric Earth began in earnest in the 1950s. Since that time researchers have focused on a chemical path known as the formose reaction as a potential route from the simple, small molecules that might have been present on the Earth before life began to the complex sugars essential to life, at least life as we know it now.

The formose reaction begins with formaldehyde, thought to be a plausible constituent of a prebiotic world, going through a series of chemical transformation leading to simple and then more complex sugars, including ribose, which is a key building block in DNA and RNA.

But as chemists continued to study the formose reaction they realized that the chemistry involved is quite messy, producing lots of sugars with no apparent biological use and only the tiniest bit of ribose. As such experimental results mounted, the plausibility of the formose reaction as the prebiotic sugar builder came into question. But the problem was that no one had established a reasonable alternative.

A New Pathway

Then in 2007, Albert Eschenmoser, an organic chemist who recently retired from Scripps Research, proposed a new pathway he dubbed the glyoxylate scenario. This involved glyoxylate as an alternative starting point to formaldehyde, and reactions with dihydroxyfumarate (DHF) that Eschenmoser hypothesized could launch a cascade of reactions that would lead to sugars. Glyoxylate was a good starting point because of the possibility that it could be produced by oligomerization of carbon monoxide under potentially prebiotic conditions.

Eschenmoser and Krishnamurthy began developing the experiments to test the hypothesis. At the time, very little was known about relevant reactions involving DHF, and nothing beyond theory about how it reacted with glyoxylate.

The idea that DHF might be involved in a plausible biosynthetic pathway to sugars (via a decarboxylative conversion to glycolaldehyde which aldolizes to sugars) dates back about as far as work on the formose reaction, but the experiments proved otherwise, causing DHF to fall from focus.

Success

"We were thrown a lot of curve balls we had to really think through," said Krisnamurthy of the years he spent working with postdoctoral fellow Vasu Sagi, who is lead author of the new paper. The team's experiments revealed that under the right conditions, DHF and glyoxylate, when in the presence of a few other plausible prebiotic chemicals including formaldehyde, would produce sugars known as ketoses. Ketoses in turn can be converted to critical sugars, including some essential to forming certain amino acids, the DNA and RNA building blocks such as ribose.

In remarkable contrast to the formose reaction, which might only convert a fraction of a percent of its starting materials into ribose, the experiments Sagi slaved over, sometimes monitoring them 24 hours a day, converted virtually 100 percent of the glyoxylategave clean conversion of DHF to ketoses.

Such efficiency is so rare in prebiotic chemistry, and was so unexpected in the glyoxylate dihydroxyfumarate experiments, that the scientists were leery at first of their results. "We had to prove it by repeating the experiments many times," said Sagi, but the results held.

"Prebiotic reactions are usually pretty messy, so when we saw how clean this was we were really pleasantly surprised," said Krishnamurthy.

Interestingly, during the course of the work, Sagi and Krishnamurthy discovered DHF can react with itself to produce a new compounds never before documented, which the group reported separately late last year.

The Rest of the Story

Though the new research soundly proves the plausibility of one of the facets of the glyoxylate scenario, the chemistry involved is only one of three key series of reactions researchers will have to identify in order to complete a viable path from a primordial soup to life's building blocks.

While glyoxylate is a plausible prebiotic component, there's not yet a known prebiotic pathway to DHF, so the Krishnamurthy team is already working to identify possibilities.

A third critical conversion would have to occur after production of ketoses. Right now, the only known paths for the conversion of ketoses to ribose and other critical sugars are transformations by living organisms. Whether and how such conversion might have proceeded before life arose remains an open research question.

More information: *"Exploratory Experiments on the Chemistry of the Glyoxylate Scenario: Formation of Ketosugars from Dihydroxyfumarate," Provided by The Scripps Research Institute*

http://bit.ly/zdVbUu

Hayabusa's asteroid-sampling mission, take two

Japan is hoping the second time will be the charm for a mission to collect samples from an asteroid.

23:11 31 January 2012 by Lisa Grossman

The government has just given the green light for the Hayabusa 2 mission to aim for launch in 2014. An earlier mission visited the asteroid Itokawa in 2005 but suffered a string of failures. It was supposed to fire bullets into the space rock at close range and scoop up the resulting debris, but the bullets never fired. Luckily, some dust slipped into the probe's collectors and was brought back to Earth in 2010.

Hayabusa 2 will try to avoid its predecessor's mistakes when it lands on the kilometre-wide asteroid 1999 JU3. "We have learned a lot from Hayabusa," says mission leader Makoto Yoshikawa of the Japan Aerospace Exploration Agency in Sagamihara. "We modified all the parts where Hayabusa had troubles."

Hayabusa 2 will have backup software in case of failures, and instead of using bullets, the probe will drop an impactor from an altitude of 300 metres before landing and gathering the shrapnel.

"The new thing is the impactor," says Yoshikawa. "The impactor will make a small crater on the surface of the asteroid, and we will try to get the material inside the crater, which means we try to get subsurface material." That will allow scientists to compare the asteroid's radiation-scorched surface to its pristine interior.

Two approaches

Hayabusa 2 is not the only asteroid-grabbing mission in the works. In 2016, NASA plans to launch a spacecraft called OSIRIS-Rex to scoop up samples from a space rock. Osiris-Rex will orbit its target asteroid for months, taking high-resolution images to determine where it should collect a sample. But rather than landing on its quarry like the Hayabusa missions, it will stick out an arm and grab what it can.

Yoshikawa says Osiris-Rex aims to collect much more rocky debris than Hayabusa 2, which is expected to bring back no more than about 1 gram. But he says Osiris-Rex will only be successful if the surface of its target asteroid is covered with soil-like particles of rock called regolith. If it's a solid body, the spacecraft might not be able to collect samples.

"I think the method of Hayabusa 2 is best, if we do not know the surface condition of the target asteroid," Yoshikawa says. "In our case, we can get the sample even if there is no regolith on the surface."

Both missions will target asteroids rich in minerals that formed in water. Isotopic studies of that water could shed light on whether Earth's water came from asteroids, comets or from the planet's own rocky building blocks.

http://www.eurekalert.org/pub_releases/2012-02/s-bcl020112.php

Brain capacity limits exponential online data growth

Study of internet file sizes shows that information growth is self-limited by the human mind

Scientists have found that the capacity of the human brain to process and record information - and not economic constraints - may constitute the dominant limiting factor for the overall growth of globally stored information. These findings have just been published in an article in EPJ B[1] by Claudius Gros and colleagues from the Institute for Theoretical Physics at Goethe University Frankfurt in Germany.

The authors first looked at the distribution of 633 public internet files by plotting the number of videos, audio and image files against the size of the files. They gathered files which were produced by humans or intended for human use with the spider file search engine Findfiles.net. They chose to focus on files which are hosted on domains pointing from the online encyclopaedia Wikipedia and the open web directory dmoz.

Assuming that economic costs for data production are proportional to the amount of data produced, these costs should be driving the generation of information exponentially. However, the authors found that, in fact, economic costs were not the limiting factors for data production. The absence of exponential tails for the graph representing the number of files indicates this conclusion.

They found that underlying neurophysiological processes influence the brain's ability to handle information. For example, when a person produces an image and attributes a subjective value to it, for example, a given resolution, he or she is influenced by his or her perception of the quality of that image. Their perception of the amount of information gained when increasing the resolution of a low-quality image is substantially higher than when increasing the resolution of a high-quality photo by the same degree. This relation is known as the Weber-Fechner law. The authors observed that file-size distributions obey this Weber-Fechner law. This means that the total amount of information cannot grow faster than our ability to digest or handle it.

References *1. Gros C., Kaczor G., Marković D., (2012) Neuropsychological constraints to human data production on a global scale, European Physical Journal B (EPJ B) 85: 28, DOI 10.1140/epjb/e2011-20581-3*

http://www.eurekalert.org/pub_releases/2012-02/bc-nmp012712.php

New map pinpoints areas of highest human risk for lyme disease in eastern United States

Band of tick hunters gathered evidence for most extensive field study ever conducted. Given frequent over- and under-diagnosis of Lyme disease, map offers officials new tool for assessing risk and tracking disease spread

Deerfield, Ill. -- A new map pinpoints well-defined areas of the Eastern United States where humans have the highest risk of contracting Lyme disease, one of the most rapidly emerging infectious diseases in North America, according to the U.S. Centers for Disease Control and Prevention. As part of the most extensive Lyme-related field study ever undertaken, researchers found high infection risk confined mainly to the Northeast, Mid-Atlantic and Upper Midwest and low risk in the South. The results were published in the February issue of the American Journal of Tropical Medicine and Hygiene. Given frequent over- and under-diagnosis of Lyme disease, the new map could arm the public and health officials with critical information on actual local risk.

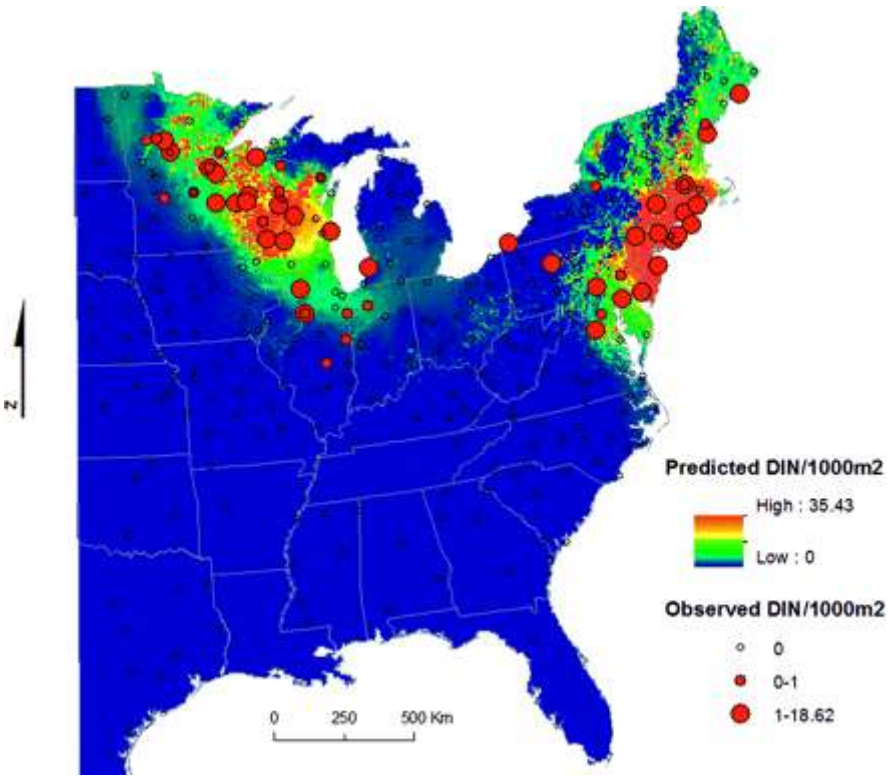
"There has been a lot of discussion of whether Lyme disease exists outside of the Northeast and the upper Midwest, but our sampling of tick populations at hundreds of sites suggests that any diagnosis of Lyme disease in most of the South should be put in serious doubt, unless it involves someone who has traveled to an area where the disease is common," said Dr. Maria A. Diuk-Wasser, Assistant Professor at the Yale School of Public Health and the lead author of the study. "We can't completely rule out the existence of Lyme disease in the South," she added, "but it appears highly unlikely."

The Lyme disease risk map was developed by researchers at the Yale School of Public Health in collaboration with Michigan State University, University of Illinois and University of California, Irvine, through a cooperative agreement with the CDC, which is seeking a better understanding of where Lyme disease poses a public health menace. Lyme disease is a tick-borne ailment with symptoms that range from a rash, headaches and fever to arthritis and Bell's palsy.

Mobilizing Tick Hunters

The scientists involved in the study assembled a large field staff of more than 80 tick hunters. From 2004 to 2007, they combed through 304 individual sites from Maine to Florida and across the Midwest, dragging a one-meter by one-meter square of corduroy cloth in hopes of snagging the black legged tick Ixodes scapularis that is the main carrier of the Lyme disease pathogen, Borrelia burgdorferi. (The study did not examine risk in the West where Lyme disease is believed to be confined to areas along the Pacific Coast where a different tick species, known as Ixodes pacificus or the western blacklegged tick, carries Lyme.)

The goal of the field work was to provide doctors and public health officials with a better sense of where people are at risk of Lyme disease by using the presence of known Lyme-carrying ticks as the main indicator of danger.



Current geographical assessments of Lyme disease risk are heavily reliant on reports of human infections, which the study notes can be a poor predictor of risk. The researchers point out that using human cases to determine areas of risk can be misleading due to the high level of "underreporting and misdiagnosis" of Lyme disease. They also note that where someone is diagnosed with the disease is not necessarily where they contracted it.

In addition, the study found that infected I. scapularis ticks may colonize a region long before they actually infect a human with Lyme disease, which means risk can be significant even without a confirmed case.

"A better understanding of where Lyme disease is likely to be endemic is a significant factor in improving prevention, diagnosis and treatment,"

Diuk-Wasser said. "People need to know where to take precautions to avoid tick bites. Also, doctors may be less likely to suspect and test for Lyme disease if they are unaware a patient was in a risky area and, conversely, they may act too aggressively and prescribe unneeded and potentially dangerous treatments if they incorrectly believe their patient was exposed to the pathogen."

The study notes that "accurate and timely" diagnosis is crucial to initiating antibiotic treatments that can help patients avoid the more serious complications of Lyme disease. At the same time, the authors point out that incorrectly suspecting Lyme disease has its own consequences, including potentially life-threatening complications from the antibiotics typically used to treat infections. (While the laboratory test for Lyme disease can produce both false-positives and false-negatives, false-positives are far more likely in non-endemic areas.)

Establishing a Map for Lyme Disease Risk in the Eastern United States

The maps that emerged from the tick survey show a clear risk of Lyme disease in large parts of the Northeast (including eastern Pennsylvania) from Maine going as far south as Maryland and northern Virginia, which is in the Washington, DC, metropolitan area. But while conditions could be favorable for the disease to spread into the Tidewater region of Virginia – the data collected for the study indicates the bulk of the South is free of Lyme disease-carrying ticks.

The researchers also identify a separate and distinct Lyme disease risk region in the upper Midwest. It includes most of Wisconsin, a large area in northern Minnesota, and a sliver of northern Illinois.

However, the scientists confirm that Lyme disease remains on the move as its preference for forests and deer is aided by a century-long re-planting of trees inland once cleared for agriculture, along with a resurgence of deer populations. Diuk-Wasser and her colleagues found evidence to support an "emerging risk" for Lyme disease along the Illinois/Indiana border, the New York/Vermont border, southwestern Michigan, and eastern North Dakota. Also, Diuk-Wasser said new, unpublished field work now underway indicates Lyme disease is probably moving into central Virginia.

Lyme Disease: the Southern Challenge

While the scientists involved in mapping the Lyme disease risk believe most of the South is relatively free of the disease, one challenge to delineating a southern risk frontier is the fact that there are I. scapularis ticks in the region. They were once thought to be a distinct species, Diuk-Wasser said, but scientists now consider them to be the same species, although there are biological differences.

Most notably, tick experts find the Southern I. scapularis exhibit a feeding behavior in the immature stages that is different than that of its northern cousins. The Southern ticks prefer, it appears, the blood of lizards and skinks to small mammals that are more likely to carry the bacteria and show no interest in feeding on humans, which scientists believe makes it unlikely they play an important role as Lyme disease carriers.

Diuk-Wasser noted that one reason some people in the South may believe Lyme disease is a risk in their region is that they may frequently encounter a species known as the lone star tick (Amblyomma americanum) that is "very aggressive, very abundant" and whose bite can cause a rash that looks similar to the "bull's eye" lesion caused by Lyme disease. However, this disease, known as Southern Tick-Associated Rash Illness or STARI, does not feature the neurological and arthritis problems associated with Lyme disease.

Nonetheless, Diuk-Wasser stresses that scientists cannot rule out completely that Lyme disease exists outside of the areas identified in the mapping project. And she pointed out there are limitations to the tick sampling techniques she and her colleagues employed to create the risk map. For example, the field teams conducted their tick collecting in late May, June, July, and August, which is considered peak feeding time. But she said some areas might experience a population surge in early May or earlier. (The climate in April in parts of Tennessee is likely tick friendly, but Diuk-Wasser said other field studies conducted in Tennessee during the spring have not found any Lyme-infected ticks.)

"This is a useful tool that can help physicians, nurses and policymakers make realistic resource decisions," said James W. Kazura, MD, President of the American Society of Tropical Medicine and Hygiene, which publishes the journal, and director of the Center for Global Health and Diseases at Case Western Reserve University. "The scientific research done to create this new risk map for Lyme disease is an example of what is needed in the U.S. today for a variety of diseases given its immense value in making clinical decisions and allocating scarce resources."

http://www.eurekalert.org/pub_releases/2012-02/aha-cda012312.php

Clot-busting drugs appear safe for treating 'wake-up' stroke patients

Clot-busting drugs may be safe for patients who wake up experiencing stroke symptoms

Clot-busting drugs may be safe for patients who wake up experiencing stroke symptoms, according to preliminary research presented at the American Stroke Association's International Stroke Conference 2012.

In "wake-up" stroke, the person wakes up with symptoms after going to sleep with none. Not knowing when the stroke began excludes these patients from anti-clotting drugs that must be given within 4.5 hours of the beginning of the stroke.

"Because wake-up strokes are common, occurring in up to a quarter of stroke sufferers, more research is needed on how to treat these patients," said Dulka Manawadu, M.D., lead researcher and a stroke medical consultant at King's College Hospital in London, U.K. "Patients who experience stroke symptoms should call Emergency Medical Services urgently and get to the hospital fast, regardless of the time of onset. This will help specialists decide if novel interventions are appropriate and feasible."

In the study, researchers used a stroke registry to compare clot busting treatments received by 326 patients within 4.5 hours of symptom onset to 68 wake-up stroke patients, with unknown onset.

All the patients were treated in the same London medical center, where 20 percent suffered wake-up stroke. Researchers didn't randomly assign patients to receive different treatments for comparison, which is the gold standard and, thus, a limitation of the study.

"Our study shows that administering clot-busting drugs to patients with wake-up stroke who have the same clinical and imaging features as those treated within current guidelines is feasible and safe," Manawadu said.

Researchers analyzed information on patients who received the clot-buster alteplase, sold under the name Activase, between January 2009 and December 2010. Wake-up stroke patients received clot-busting treatments if their clinical presentation and early stroke changes on CT scan images were comparable to those treated with a known time of onset. Both groups had similar blood pressure, blood sugar levels and scores on the National Institutes of Health Stroke Scale, which is a standardized method used by healthcare professionals to measure the level of impairment caused by a stroke.

After three months, the researchers found the wake-up stroke patients' death rates, risk of bleeding inside the brain, and the proportion that made a good recovery were similar to those patients treated within a known 4.5 hours of stroke onset.

Sometimes, doctors are reluctant to give clot-busting drugs to patients in whom the time of stroke onset is not known, because the risks of bleeding are not known, Manawadu said. However, a significant proportion of patients who have stroke symptoms on waking may have suffered stroke in the early hours of the morning and may still be within the window of time where clot-busting treatments are known to be effective. It is also likely that advanced imaging techniques may help to identify patients with wake-up stroke who have the potential to benefit from clot-busting drugs.

"This is an area of growing importance because it may allow us to extend the indication for this effective treatment," Manawadu said. "Research has been limited to date but the time is ripe to investigate effective treatments in this group of patients." *Co-authors are Shankaranand Bodla, M.D.; Jozef Jarosz, M.D.; and Lalit Kalra, Ph.D. The Institutional Research and Development Board at King's College Hospital in London funded the study.*

http://www.scientificamerican.com/article.cfm?id=plants-created-earth-landscapel

Thanks to Plants, We Will Never Find a Planet Like Earth

Earth's flora is responsible for the glaciers and rivers that have created this planet's distinctive landscape

By Mark Fischetti | Wednesday, February 1, 2012 | 65

Astronomers are finding lots of exoplanets that are orbiting stars like the sun, significantly raising the odds that we will find a similar world. But if we do, the chance that the surface of that planet will look like ours is very small, thanks to an unlikely culprit: plants.

We all know how Earth's landscape came about, right? Oceans and land masses formed, mountains rose, and precipitation washed over its surface; rivers weathered bare rock to create soil and plants took root. Well, new research indicates that the last stage of this scenario is not right. Vascular plants—those with structures such as xylem and phloem that can conduct water—are what created the rivers and muds that built the soils that led to forests and farmland.

The evidence that vascular plants were a primary force that shaped Earth's surface is laid out in a special issue of Nature Geoscience, posted online today. (Scientific American is part of Nature Publishing Group.) In one article, Timothy Lenton, an Earth systems scientist at the University of Exeter in England, presents data

from the biogeochemical record showing that the evolution of vascular plants around 450 million years ago is what really began to soak up carbon dioxide from the atmosphere, more so than organisms in the oceans. As a result, global temperatures dropped, initiating a cycle of widespread glaciation and melting that, over millions more years, would significantly grind Earth's surface.

Perhaps even more surprisingly, vascular plants formed the kinds of rivers we see around us today, according to another article by Martin Gibling of Dalhousie University in Nova Scotia and Neil Davies of the University of Ghent in Belgium, who analyzed sediment deposition going back hundreds of millions of years. Before the era of plants, water ran over Earth's landmasses in broad sheets, with no defined courses. Only when enough vegetation grew to break down rock into minerals and mud, and then hold that mud in place, did river banks form and begin to channel the water. The channeling led to periodic flooding that deposited sediment over broad areas, building up rich soil. The soil allowed trees to take root. Their woody debris fell into the rivers, creating logjams that rapidly created new channels and caused even more flooding, setting up a feedback loop that eventually supported forests and fertile plains.

"Sedimentary rocks, before plants, contained almost no mud," explains Gibling, a professor of Earth science at Dalhousie. "But after plants developed, the mud content increased dramatically. Muddy landscapes expanded greatly. A new kind of eco-space was created that wasn't there before."

Which brings us to the cosmic consequences. "Plants are not passive passengers on the planet's surface system," Gibling says. "They create the surface system. Organisms tool the environment: the atmosphere, the landscapes, the oceans all develop incredible complexity once plant life grows." So as Nature Geoscience's editors state in an editorial for their special edition, "Even if there are a number of planets that could support tectonics, running water and the chemical cycles that are essential for life as we know it, it seems unlikely that any of them would look like Earth." Because even if plants do sprout, they will evolve differently, crafting a different surface on the orb they call home.

http://www.scientificamerican.com/article.cfm?id=mind-the-animals

Certain Neurons Respond Specifically to Animals

Discovery hints at evolutionary importance of animals to human survival

By Andrea Anderson | Wednesday, February 1, 2012

Whether cute and cuddly or fierce and frightening, animals affect the brain in ways scientists are just starting to appreciate. In a study of people who had electrodes implanted in their brain for the treatment of epilepsy, an international team discovered neurons that respond specifically to animals. The 41 individuals in the study were shown picturesof recognizable landmarks, objects, animals and people for about one second each as tiny electrodes measured the activity of individual neurons in three regions of their brain. When the researchers analyzed the electrical data from the 400 to 550 neurons in each region, they found a marked jump in the activity of neurons in the right amygdala that was not seen in the other brain regions tested—and only after viewing the pictures of animals. The report by senior author Christof Koch, a neuroscientist at the Allen Institute for Brain Science, and his colleagues appeared this past August online in Nature Neuroscience. (Koch also writes the monthly column Consciousness Redux for Scientific American Mind.)

Previous studies in animals hinted that the right hemi-sphere might be specialized for detecting prey or threats. Given the amygdala's proposed role in emotion and arousal, this finding led the team to speculate that the right-amygdala response might have evolutionary roots. More broadly, the fact that only the right side of the amygdala responds specifically to animals is tantalizing, Koch explains, because it is the first time this kind of hemispheric asymmetry has been found at the cellular level in the human brain. Imaging studies can detect only much larger shifts in activity. In this case, the patients being treated for epilepsy offered scientists a unique opportunity to examine such subtle brain responses.

http://www.sciencedaily.com/releases/2012/02/120201104516.htm

Encouraging Results With Stem Cell Transplant for Brain Injury

Experiments in brain-injured rats show that stem cells injected via the carotid artery travel directly to the brain, where they greatly enhance functional recovery

ScienceDaily - Experiments in brain-injured rats show that stem cells injected via the carotid artery travel directly to the brain, where they greatly enhance functional recovery, reports a study in the February issue of Neurosurgery, official journal of the Congress of Neurological Surgeons. The journal is published by Lippincott Williams & Wilkins, a part of Wolters Kluwer Health.

The carotid artery injection technique -- along with some form of in vivo optical imaging to track the stem cells after transplantation -- may be part of emerging approaches to stem cell transplantation for traumatic brain

injury (TBI) in humans, according to the new research, led by Dr Toshiya Osanai of Hokkaido University Graduate School of Medicine, Sapporo, Japan.

Advanced Imaging Technology Lets Researchers Track Stem Cells

The researchers evaluated a new "intra-arterial" technique of stem cell transplantation in rats. Within seven days after induced TBI, stem cells created from the rats' bone marrow were injected into the carotid artery. The goal was to deliver the stem cells directly to the brain, without having them travel through the general circulation. Before injection, the stem cells were labeled with "quantum dots" -- a biocompatible, fluorescent semiconductor created using nanotechnology. The quantum dots emit near-infrared light, with much longer wavelengths that penetrate bone and skin. This allowed the researchers to noninvasively monitor the stem cells for four weeks after transplantation.

Using this in vivo optical imaging technique, Dr Osanai and colleagues were able to see that the injected stem cells entered the brain on the "first pass," without entering the general circulation. Within three hours, the stem cells began to migrate from the smallest brain blood vessels (capillaries) into the area of brain injury.

After four weeks, rats treated with stem cells had significant recovery of motor function (movement), while untreated rats had no recovery. Examination of the treated brains confirmed that the stem cells had transformed into different types of brain cells and participated in healing of the injured brain area.

Further Progress toward Stem Cell Therapy for Brain Injury in Humans

Stem cells are likely to become an important new treatment for patients with brain injuries, including TBI and stroke. Bone marrow stem cells, like the ones used in the new study, are a promising source of donor cells. However, many questions remain about the optimal timing, dose, and route of stem cell delivery.

In the new animal experiments, stem cell transplantation was performed one week after TBI -- a "clinically relevant" time, as it takes at least that long to develop stem cells from bone marrow. Injecting stem cells into the carotid artery is a relatively simple procedure that delivers the cells directly to the brain.

The experiments also add to the evidence that stem cell treatment can promote healing after TBI, with significant recovery of function. With the use of in vivo optical imaging, "The present study was the first to successfully track donor cells that were intra-arterially transplanted into the brain of living animals over four weeks," Dr Osanai and colleagues write.

Some similar form of imaging technology might be useful in monitoring the effects of stem cell transplantation in humans. However, tracking stem cells in human patients will pose challenges, as the skull and scalp are much thicker in humans than in rats. "Further studies are warranted to apply in vivo optical imaging clinically," the researchers add.

http://www.bbc.co.uk/news/science-environment-16843096

Trumpets of outrage in the outback

An Australian biology professor is causing a rumble in the academic jungle by suggesting that his country should import elephants and other foreign species into its wild interior.

Rhinos and even giant Komodo dragon lizards could be imported, David Bowman suggests in an article in Nature. He says Australia is just not managing its most pressing ecological problems, and something radical is needed. But some fellow scientists say it is just a bad and dangerous idea. Others, however, are supportive, seeing potential for helping beleaguered Aboriginal communities and reducing the risk of forest fires, as repairing some damaged ecology.

The problems Prof Bowman proposes solving with his radical zoological armoury stem from the huge changes wrought by the two waves of human arrival - the first by forebears of the Aborigines about 50,000 years ago, and the second by European settlers a few hundred years ago.

The first initiated the slow demise of the spectacular megafauna that once bestrode the giant continent.

They included the marsupial lion, a metre and a half long and a powerful predator; the diprotodon, a wombat bigger than a cow; giant birds such as the Dromornidae family that once boasted Stirton's Thunder Bird, three metres high; and crocodiles, lizards and turtles bigger than any still walking this Earth.

Take so many big species out of an ecosystem, and there are bound to be changes all the way down to its bottom. If you throw in land clearance across enormous swathes of the continent and the subsequent introduction of rabbits, camels, cane toads, rats, pigs and everything else that came with the European settlers, you have an ecology in profound turmoil.

Attempts have been made to control rabbits, pigs, buffalo and lots of other alien species; but they haven't really worked. "We have a very unbalanced ecology and it's all just spiralling into a trajectory," lamented Prof Bowman when I spoke to him earlier in the week. "We're not managing actively, we're just managing bits of the problem - so it's a big mess."

So the root of his idea is that if you can't restore the animals themselves, bring in something that can fulfil a similar ecological role.

Grassed up

What's on his mind particularly is gamba grass, an African species growing up to 4m tall that's been introduced into Queensland and the Northern Territory.

The Queensland government lists it as a "pest plant", as it's out-competing native varieties and also raises the risk of fires - a hazard that causes huge damage routinely in many parts of Australia. Machines and herbicides could be used to control it, and have been in some places - but not enough to stop its advance.

Growing so big, mature gamba grass is beyond the grazing capacity of any animal currently in Australia, whether native kangaroos or introduced cattle. But it wouldn't be beyond a really big herbivore like an elephant.

"Imagine bringing in an elephant with a GPS collar on and sterile, so you know where it is all the time and it can't reproduce," he says. "So I'm not saying 'let's randomly get animals and throw them into Australia', because strangely enough that's what Australians have done. "I'm trying to say 'let's imagine that we're going to be more co-ordinated and more intelligent about it - where would you start on that process?'"

Deliberate introductions could even help preserve species that are set to go extinct in other more densely-populated parts of the world, he says.

Dingo dealing

Prof Bowman's vision isn't only about introducing novel species. He's also keen to restore those that still exist to something like their original ecological role. So the dingo culling programmes instigated by sheep farmers should be ended, he feels, and the animals encouraged back into areas where they've been wiped out. Studies show this could benefit native small mammals. The irony here, of course, is that the dingo isn't truly ancestral, having been brought over from Asia relatively recently - probably just a few thousand years ago.

The proposals contain a strongly social aspect too, in that Aboriginal communities could be empowered to hunt some of the large animals that could be introduced. They could also be tasked with carrying out controlled burning of forests and grasslands in order to reduce the ever-present fire risk.

"The answer is hiring Aboriginal people who are disadvantaged, who want to spend time in the bush, and get them to do burning and hunting," he says. "And ok it might cost a lot of money, but it's also a health intervention, because it's been discovered that Aboriginal people, who have shocking health status - their health improves fantastically when they do outdoor work. "The health stats are a blot on our reputation internationally, there's so much disadvantage, and Australians do want to improve that, and this is one of those rare situations where everyone can get a win."

Even without elephants or Komodo dragons, he believes there's no reason why Aboriginal hunters shouldn't be encouraged and even funded right now to tackle camels.

On the table

So what's provoked the positive and negative comments that have come in on these ideas?

"His comments are careless given recent proposals for the establishment of game reserves in New South Wales and introduction of new potential feral animals into these reserves," says Dr Ricky Spencer from the Native and Pest Animal Unit at the University of Western Sydney. "If we did go down the road of introducing elephants to Australia, we had better develop the technology to clone sabre-tooth tigers to eventually control the elephants."

Given Australia's difficult hisory of disastrous species introductions, you'd think some academics would slam the idea simply on the basis that you shouldn't do any more of them - and this was a point picked up by Prof Patricia Werner from the Australian National University (ANU).

"Are we in Australia prepared to try yet another landscape-scale experiment as we did with foxes, rabbits, etc, and merely hope that the elephants don't find our native Australian trees tasty?" she asks. "There are countless studies in Africa showing that when elephants are removed from an area, tree cover increases. Can we somehow command them to eat only introduced African grasses?"

However, her ANU colleague Dr Don Driscoll says it's right to acknowledge that Australian ecosystems are in a dire state. "Because of this ongoing environmental catastrophe, we need to put all of the management options on the table to try to find ways of reducing the rate at which our biodiversity succumbs to the impacts of invasive alien species," he says. "We should therefore consider introducing elephants and rhinoceros to Australia. We should also reconsider widely implemented practices such as culling dingos or burning forests to reduce fuels in southern Australia as an asset-protection measure."

Once these options are put on the table and properly evaluated, he says, some will be accepted and others rejected. He believes that elephants, for example, would not be approved - but the idea should be discussed.

And at the most fundamental level, this is what Prof Bowman is aiming for - to raise the severity of the ecological decline, and get people to think outside the accepted boxes.

"We're not talking about turning up with a barge and unleashing a whole lot of animals and watching the show - that's already happened," he says. "If people can go through these options carefully and seriously and rule them out and tell me how we're going to manage gamba grass then I'll be very happy; but just to be laughed at and told 'that's a ridiculous idea' - well ok, tell me a good idea."

http://medicalxpress.com/news/2012-02-first-of-its-kind-patch-brain-blood-oxygen.html

First-of-its-kind head patch monitors brain blood flow and oxygen

A research team led by investigators at Mayo Clinic in Florida has found that a small device worn on a patient's brow can be useful in monitoring stroke patients in the hospital.

The device measures blood oxygen, similar to a pulse oximeter, which is clipped onto a finger.

Their study, published in the Feb. 1 issue of Neurosurgical Focus, suggests this tool, known as frontal near-infrared spectroscopy (NIRS), could offer hospital physicians a safe and cost-effective way to monitor patients who are being treated for a stroke, in real time.

"About one-third of stroke patients in the hospital suffer another stroke, and we have few options for constantly monitoring patients for such recurrences," says the study's senior investigator, neurocritical care specialist William Freeman, M.D., an associate professor of neurology at Mayo Clinic.

"This was a small pilot study initiated at Mayo Clinic's campus in Florida, but we plan to study this device more extensively and hope that this bedside tool offers significant benefit to patients by helping physicians detect strokes earlier and manage recovery better," he says.

Currently, at most hospitals nurses monitor patients for new strokes and, if one is suspected, patients must be moved to a hospital's radiology unit for a test known as a CT perfusion scan, which is the standard way to measure blood flow and oxygenation. This scan requires that a contrast medium be used, and the entire procedure can sometimes cause side effects such as excess radiation exposure if repeated scans are required. Also, potential kidney and airway damage can result from the contrast medium.

Alternately, for the sickest patients, physicians can insert an oxygen probe inside the brain to measure blood and oxygen flow, but this procedure is invasive and measures only a limited brain region, Dr. Freeman says.

This NIRS device, which emits near-infrared light that penetrates the scalp and underlying brain tissue, has been used in animals to study brain blood, so the Mayo Clinic team thought that measuring the same parameters in stroke patients might be useful. They set up a study to compare measurements from NIRS with CT perfusion scanning in eight stroke patients. The results show that both tests offer statistically similar results, although NIRS has a more limited field for measuring blood oxygen and flow. "That suggests that perhaps not all patients would benefit from this kind of monitoring," he says.

The device sticks like an adhesive bandage onto each of the patient's eyebrows and works like the pulse oximeter that is usually used on a patient's finger to monitor health or brain perfusion during surgery.

If the device is successfully tested in upcoming studies and miniaturized, the NIRS might also be useful in military settings to assess and monitor blood functioning due to brain injuries, Dr. Freeman says.

Researchers from the University of South Florida College of Medicine and the University of North Florida College of Medicine participated in the study, along with several college students who were participating in Mayo Clinic's Clinical Research Scholar Program (CRISP).

"This research could not have been accomplished without the dedication and assistance from our CRISP premedical student Brandon O'Neal, and vascular neurosurgery fellow Philipp Taussky, M.D.," notes Dr. Freeman. "We are excited about the future possibilities in which this tool would be very useful."

The study was approved by the Mayo Clinic IRB and not sponsored or funded by any company. The authors declare no conflicts of interest. Provided by Mayo Clinic

http://medicalxpress.com/news/2012-02-alzheimer-disease-brain-region.html

Study shows Alzheimer's disease may spread by 'jumping' from one brain region to another

A new study demonstrates that abnormal tau protein, propagates along linked brain circuits, "jumping" from neuron to neuron

For decades, researchers have debated whether Alzheimer's disease starts independently in vulnerable brain regions at different times, or if it begins in one region and then spreads to neuroanatomically connected areas. A new study by Columbia University Medical Center (CUMC) researchers strongly supports the latter, demonstrating that abnormal tau protein, a key feature of the neurofibrillary tangles seen in the brains of those with Alzheimer's, propagates along linked brain circuits, "jumping" from neuron to neuron.

The findings, published today in the online journal PloS One, open new opportunities for gaining a greater understanding of Alzheimer's disease and other neurological diseases and for developing therapies to halt its progression, according to senior author Karen E. Duff, PhD, professor of pathology (in psychiatry and in the Taub Institute for Research on Alzheimer's Disease and the Aging Brain) at CUMC and at the New York State Psychiatric Institute.

Alzheimer's disease, the most common form of dementia, is characterized by the accumulation of plaques (composed of amyloid-beta protein) and fibrous tangles (composed of abnormal tau) in brain cells called neurons. Postmortem studies of human brains and neuroimaging studies have suggested that the disease, especially the neurofibrillary tangle pathology, begins in the entorhinal cortex, which plays a key role in memory. Then as Alzheimer's progresses, the disease appears in anatomically linked higher brain regions.

"Earlier research, including functional MRI studies in humans, have also supported this pattern of spread," said study coauthor Scott A. Small, MD, professor of neurology in the Sergievsky Center and in the Taub Institute for Research on Alzheimer's Disease and the Aging Brain at CUMC. "But these various findings do not definitively show that Alzheimer's spreads directly from one brain region to another."

To look further into this issue, the CUMC researchers developed a novel transgenic mouse in which the gene for abnormal human tau is expressed predominantly in the entorhinal cortex. The brains of the mice were analyzed at different time points over 22 months to map the spread of abnormal tau protein.

The researchers found that as the mice aged, the abnormal human tau spread along a linked anatomical pathway, from the entorhinal cortex to the hippocampus to the neocortex. "This pattern very much follows the staging that we see at the earliest stages of human Alzheimer's disease," said Dr. Duff.

The researchers also found evidence suggesting that the abnormal tau protein was moving from neuron to neuron across synapses, the junctions that these cells use to communicate with each other.

The findings of the study have important implications for therapy.

"If, as our data suggest, tau pathology starts in the entorhinal cortex and emanates from there, the most effective approach may be to treat Alzheimer's the way we treat cancer—through early detection and treatment, before it has a chance to spread," said Dr. Small. "The best way to cure Alzheimer's may be to identify and treat it when it is just beginning, to halt progression. It is during this early stage that the disease will be most amenable to treatment. That is the exciting clinical promise down the road."

Treatments could conceivably target tau during it extracellular phase, as it moves from cell to cell, added Dr. Duff. "If we can find the mechanism by which tau spreads from one cell to another, we could potentially stop it from jumping across the synapses — perhaps using some type of immunotherapy. This would prevent the disease from spreading to other regions of the brain, which is associated with more severe dementia."

More information: The paper is titled, "Trans-synaptic Spread of Tau Pathology in vivo." Provided by Columbia University Medical Center

http://www.wired.com/wiredscience/2012/01/the-persistence-of-memory/

The Persistence Of Memory

The great mystery of memory is how it endures. The typical neural protein only lasts for a few weeks, the cortex in a constant state of reincarnation.

By Jonah Lehrer

How, then, do our memories persist? It's as if our remembered past can outlast the brain itself.

But wait: the mystery gets even more mysterious. A neuronal memory cannot simply be strong: it must also be specific. While each neuron has only a single nucleus, it has a teeming mass of dendritic branches. These twigs wander off in every direction, connecting to other neurons at dendritic synapses (imagine two trees whose branches touch in a dense forest). It is at these tiny crossings that our memories are made: not in the trunk of the neuronal tree, but in its sprawling canopy. This means that every memory – represented as an altered connection between cells – cannot simply endure. It must endure in an incredibly precise way, so that the wiring diagram remains intact even as the mind gets remade, those proteins continually recycled.

The paradox of long-term memory has led neuroscientists to search for a so-called synaptic marker, a protein that would mark a particular synapse as a long-term memory and thus allow that synapse to maintain its strengthened connection for years at a time. As a result, Proust could remember his madeleine and I can recall that delicious Baskin Robbins ice cream cake, served at my 8th birthday party.

A new paper in Cell provides a fascinating glimpse into how this marking process might happen. According to research led by Kausik Si at the Stowers Institute in Kansas City, it appears that one of the essential regulators of long-term memory – an ingredient that provides both persistence and specificity – is a protein called CPEB, or cytoplasmic polyadenylation element-binding protein.

In his latest paper, Si and colleagues have shown that this awkwardly named neural protein has a rather special quality, in that forms oligomers, or self-copying clusters. (In essence, the protein can cut and paste itself over and over again, like a biological version of command-V.) Interestingly, these oligomers are incredibly sturdy, proving resistant to all the usual lab solvents. While most proteins are easily unraveled, these repeating knots of CPEB can survive even the harshest environments. Furthermore, they also seem able to actively sustain themselves, serving as templates for the formation of new oligomers in the vicinity. It's as if they're infectious.

While Si has previously studied CPEB in sea slugs (Aplysia) and yeast, he's now moved on to fruit flies, looking at an insect version of the CPEB protein known as Orb2. Like its counterpart in Aplysia, Orb2 also forms oligomers within neurons. Furthermore, by selectively disrupting the ability of Orb2 to copy itself, the scientists were able to show that this copying process (and not the concentration of Orb2 in neurons) was the key to forming long-term memories. Although the mutant flies could maintain a memory for twenty-four hours, they were unable to remember anything beyond that time frame; the past did not persist.

This research builds on a decade of work, largely by Si, showing the importance of CPEB for the maintenance of long-term memories. Si's most controversial claim has to do with the sturdiness of the protein, or why it can endure while every other neural protein experiences such rapid turnover. His first clue came largely by accident, as he was decoding the protein's amino acid sequence. Most proteins read like a random list of letters, their structures a healthy mix of different amino acids. CPEB, however, looked quite peculiar. One end of the protein had a weird series of amino acid repetitions, as if its DNA had had a stuttering fit (Q stands for the amino acid Glutamine): QQQLQQQQQQBQLQQQQ

Immediately, Si began looking for other molecules with similarly odd repetitions. In the process, he stumbled into one of the most controversial areas of biology: He found what looks like a prion. Prions were once regarded as the nasty pathogen for a tribe of the worst diseases on earth: Mad-cow disease, fatal familial insomnia (where you stop being able to fall asleep and after three months die of insomnia) and a host of other neuro-degenerative diseases.

Prions are still guilty of causing these horrific deaths. In recent years, however, it's become clear that proteins with prion-like properties might play an important biological role in healthy tissue. First, a definition: Prions are roughly defined as a class of proteins that can exist in two functionally distinct states (every other protein has only one natural state). One of these states is "active" and one is "inactive". Furthermore, Prions can switch states (turning themselves on) without any guidance from above; they can change their proteomic structure without undergoing any genetic changes. And once a prion is turned on, it can transmit its new, infectious structure to neighboring cells with no actual transfer of genetic material.

In other words, prions violate most of biology's sacred rules. They are one of those annoying reminders of how much we don't know. (It's important, I think, to not get too caught up for now in the nomenclature. CPEB might not be a prion in the most literal sense, but it certainly has properties that are prion-esque.) In fact, prion-like proteins in neurons may provide an important key to understanding the mysterious endurance of memory. Take CPEB, this synaptic ingredient that can copy itself, with additional copies serving as an indicator of synaptic strength. Like a prion, this "active" version of CPEB is virtually indestructible. It's also "infectious," able to recruit single copies of the protein to join its cut-and-pasting party. Lastly, CPEB seems to be regulated by neural stimulation, so that training fruit flies with a simple learning paradigm triggers the start of the oligomerization, or copying, process. The protein has been flicked on; the synapse has been marked as a memory.

What's astonishing, of course, is that no further action is required. Thanks to the strange properties of CPEB, this tangle can last as long as we do, suriving the withering acids of time. Perhaps we remember because this protein cannot be undone.

Full disclosure: I worked with Dr. Si in the Kandel lab several years ago. He remains a friend.

http://www.eurekalert.org/pub_releases/2012-02/uol-asb020212.php

A silver bullet to beat cancer?

The internet is awash with stories of how silver can be used to treat cancer. Now, lab tests have shown that it is as effective as the leading chemotherapy drug - and may have fewer side-effects.

Results from the study at the University of Leeds, published in Dalton Transactions, show that particular silver compounds are as toxic to cancer cells as the platinum-based drug Cisplatin, which is widely used to treat a range of cancers.

But the crucial difference is that silver is thought to be much less toxic to healthy human cells, and in some cases, can be beneficial. Silver is currently used for its antiseptic and antibiotic properties, in bandages, wound dressings and water purification filters in the third world.

Nausea and vomiting, kidney damage and an increased risk of infection are common side effects of Cisplatin which is used to treat cancer of the lungs, breast, bladder, testicles, head and neck, ovaries and lymph nodes.

Dr Charlotte Willans who is leading the study said: "As many are unfortunately aware, chemotherapy can be a very gruelling experience for the patient. Finding effective, yet non-toxic drugs is an ongoing problem, but these preliminary results are an important step in solving it."

"Our research has looked at the structure which surrounds a central silver atom. This 'shrubbery' is what determines how reactive it is and what it will interact with. Our research has used different types of these ligands to see which is the most effective against cancer cells," adds Dr Willans.

The research, still the first phase of drug development, involved exposing breast and colon cancer cells with different silver-based chemicals for six day periods. It has been shown that ligands which are coordinately bonded to the central silver atom through two sites are more effective than those coordinated through only one site. This may be due to the release of silver being much slower and make these compounds more effective over a longer period of time.

A major barrier to the continued development of these compounds is a lack of understanding of how they work. Over the next 12 months, research will focus on investigating how the compounds damage cancerous cells and what effects they have on healthy cells. This will establish whether these silver complexes are in fact less toxic to ordinary human tissue, and will help to design and develop the next-generation of chemotherapy drugs. This work is been carried out in collaboration with Dr. Roger Phillips at the University of Bradford and is funded by Yorkshire Cancer Research.

The paper Enhanced cytotoxicity of silver complexes bearing bidentate N-heterocyclic carbene ligands will be published in Dalton Transactions and can be found online here: http://pubs.rsc.org/en/content/articlelanding/2012/dt/c2dt12399a .

http://www.eurekalert.org/pub_releases/2012-02/w-ccr020212.php

Coffee consumption reduces fibrosis risk in those with fatty liver disease

Increased coffee intake significantly decreases risk in nonalcoholic steatohepatitis patients

Caffeine consumption has long been associated with decreased risk of liver disease and reduced fibrosis in patients with chronic liver disease. Now, newly published research confirms that coffee caffeine consumption reduces the risk of advanced fibrosis in those with nonalcoholic fatty liver disease (NAFLD). Findings published in the February issue of Hepatology, a journal of the American Association for the Study of Liver Diseases, show that increased coffee intake, specifically among patients with nonalcoholic steatohepatitis (NASH), decreases risk of hepatic fibrosis.

The steady increase in rates of diabetes, obesity, and metabolic syndrome over the past 20 years has given rise to greater prevalence of NAFLD. In fact, experts now believe NAFLD is the leading cause of chronic liver disease in the U.S., surpassing both hepatitis B and C. The majority of patients will have isolated fatty liver which has a very low likelihood of developing progressive liver disease. However, a subset of patients will have NASH, which is characterized by inflammation of the liver, destruction of liver cells, and possibly scarring of the liver. Progression to cirrhosis (advanced scarring of the liver) may occur in about 10-11% of NASH patients over a 15 year period, although this is highly variable.

To enhance understanding of the correlation between coffee consumption and the prevalence and severity of NAFLD, a team led by Dr. Stephen Harrison, Lieutenant Colonel, U.S. Army at Brooke Army Medical Center in Fort Sam Houston, Texas surveyed participants from a previous NAFLD study as well as NASH patients treated at the center's hepatology clinic. The 306 participants were asked about caffeine coffee consumption and categorized into four groups: patients with no sign of fibrosis on ultrasound (control), steatosis, NASH stage 0-1, and NASH stage 2-4.

Researchers found that the average milligrams in total caffeine consumption per day in the control, steatosis, Nash 0-1, and Nash 2-4 groups was 307, 229, 351 and 252; average milligrams of coffee intake per day was 228, 160, 255, and 152, respectively. There was a significant difference in caffeine consumption between patients in the steatosis group compared to those with NASH stage 0-1. Coffee consumption was significantly greater for patients with NASH stage 0-1, with 58% of caffeine intake from regular coffee, than with NASH stage 2-4 patients at only 36% of caffeine consumption from regular coffee.

Multiple analyses showed a negative correlation between coffee consumption and risk of hepatic fibrosis. "Our study is the first to demonstrate a histopatholgic relationship between fatty liver disease and estimated coffee intake," concludes Dr. Harrison. "Patients with NASH may benefit from moderate coffee consumption that decreases risk of advanced fibrosis. Further prospective research should examine the amount of coffee intake on clinical outcomes."

Full Citation: "Association of Coffee and Caffeine Consumption with Fatty Liver Disease, Non-alcoholic Steatohepatitis, and Degree of Hepatic Fibrosis." Jeffrey W Molloy, Christopher J Calcagno, Christopher D Williams, Frances J Jones, Dawn M Torres, Stephen A Harrison. Hepatology; December 22, 2011 (DOI: 10.1002/hep.24731); Print Issue Date: February 2012. http://onlinelibrary.wiley.com/doi/10.1002/hep.24731/abstract.

http://www.eurekalert.org/pub_releases/2012-02/bc-htt020112.php

How to tell apart the forgetful from those at risk of Alzheimer's disease

It can be difficult to distinguish between people with normal age-associated memory loss and those with amnestic mild cognitive impairment (aMCI).

However people with aMCI are at a greater risk of developing Alzheimer's disease (AD), and identification of these people would mean that they could begin treatment as early as possible. New research published in BioMed Central's open access journal BMC Geriatrics shows that specific questions, included as part of a questionnaire designed to help diagnose AD, are also able to discriminate between normal memory loss and aMCI.

Loss of memory can be distressing for the person affected and their families and both the patient and people who know them may complain about their memory as well as difficulties in their daily lives. However memory problems can be a part of normal aging and not necessarily an indicator of incipient dementia. A pilot study had indicated that a simple, short, questionnaire (AQ), designed to identify people with AD by using informant-reported symptoms, was also able to recognize people with aMCI.

The AQ consists of 21 yes/no questions designed to be answered by a relative or carer in a primary care setting. The questions fall into five categories: memory, orientation, functional ability, visuospatial ability, and language. Six of these questions are known to be predictive of AD and are given extra weighting, resulting in a score out of 27. A score above 15 was indicative of AD, and between 5 and 14 of aMCI. Scores of 4 or lower indicate that the person does not have significant memory problems.

While validating the AQ researchers from Banner Sun Health Research Institute discovered that four of the questions were strong indicators of aMCI. Psychometrist Michael Malek-Ahmadi, who led the study, explained, "People with aMCI were more often reported as repeating questions and statements, having trouble knowing the date or time, having difficulties managing their finances and a decreased sense of direction." He continued, "While the AQ cannot be used as a definitive guide to diagnosing AD or aMCI, it is a quick and simple-to-use indicator that may help physicians determine which individuals should be referred for more extensive testing."

Informant-reported cognitive symptoms that predict amnestic mild cognitive impairment

http://www.eurekalert.org/pub_releases/2012-02/wih-dtt020212.php

DNA test that identifies Down syndrome in pregnancy can also detect trisomy 18 and trisomy 13

Research by Drs. Glenn Palomaki and Jacob Canick published in Genetics in Medicine

A newly available DNA-based prenatal blood test that can identify a pregnancy with Down syndrome can also identify two additional chromosome abnormalities: trisomy 18 (Edwards syndrome) and trisomy 13 (Patau syndrome). The test for all three defects can be offered as early as 10 weeks of pregnancy to women who have been identified as being at high risk for these abnormalities.

These are the results of an international, multicenter study published on-line today in the journal Genetics in Medicine. The study, the largest and most comprehensive done to date, adds to the documented capability (study published in Genetics in Medicine in October 2011) of the tests by examining results in 62 pregnancies with trisomy 18 and 12 pregnancies with trisomy 13. Together with the Down syndrome pregnancies reported earlier, 286 trisomic pregnancies and 1,702 normal pregnancies are included in the report.

The research was led by Glenn Palomaki, PhD, and Jacob Canick, PhD, of the Division of Medical Screening and Special Testing in the Department of Pathology and Laboratory Medicine at Women & Infants Hospital of Rhode Island and The Warren Alpert Medical School of Brown University, and included scientists at Sequenom Inc. and Sequenom Center for Molecular Medicine, San Diego, CA, and an independent academic laboratory at the University of California at Los Angeles.

The test identified 100% (59/59) of the trisomy 18 and 91.7% (11/12) of the trisomy 13 pregnancies. The associated false positive rates were 0.28 and 0.97%, respectively. Overall, testing failed to provide a clinical interpretation in 17 women (0.9%); three of these women had a trisomy 18 pregnancy. By slightly raising the definition of a positive test for chromosome 18 and 13, the detection rate remained constant, but the false positive rate could be as low as 0.1%. These findings, along with the detailed information learned from testing such a large number of samples, demonstrate that the new test will be highly effective when offered to women considering invasive testing.

"Our previous work demonstrated the ability to identify Down syndrome, the most common trisomy. These new data extend the finding to the next two most common trisomies and will allow for wider use of such testing with the ability to identify all three common trisomies," said Dr. Palomaki. "The new DNA test can now also be offered to women identified as being as high risk for trisomy 18 or trisomy 13, as well those at high risk for Down syndrome."

"This highly sensitive and specific DNA test has the potential to impact on couples' decision-making," says Dr. Canick. "A woman whose pregnancy was identified as high risk who earlier would have chosen not to have invasive diagnostic testing, might now consider the DNA test as a safe way to obtain further information, before making a final decision." The US Centers for Disease Control and Prevention estimated in 1995 that about one in every 200 invasive diagnostic procedures will cause a pregnancy miscarriage.

Trisomy 18, also called Edwards syndrome, is a serious disorder with up to 70% of first trimester affected fetuses being spontaneously lost during pregnancies. Among those born alive, half die within a week with only 5% surviving the first year. All have serious medical and developmental problems. About 1,330 infants with trisomy 18 would be born in the US each year in the absence of prenatal diagnosis. Trisomy 13, also called Patau syndrome, is less common but equally serious. About 600 infants with trisomy 13 would be born in the US each year in the absence of prenatal diagnosis. Like Down syndrome, trisomy 18 and trisomy 13 are more common as maternal age increases. For comparison, about 7,730 Down syndrome cases would be born each year in the absence of prenatal diagnosis. Current prenatal screening tests for trisomy 18 and trisomy 13 rely on both biochemical and ultrasound markers. For more information visit the US National Library of Medicine PubMed Health.

This industry-sponsored project, awarded to Drs. Palomaki and Canick and Women & Infants Hospital in 2008, enrolled 4,500 women at 27 prenatal diagnostic centers throughout the world. Women & Infants also served as one of the enrollment centers under the direction of maternal-fetal medicine specialist and director of Perinatal Genetics, Barbara O'Brien, MD.

"It is clinically more relevant that all three trisomies can be detected by this test," said Dr. O'Brien. "Having access to such a comprehensive, DNA-based test that can be done early in pregnancy will give us more information so that we can better guide which patients should consider diagnostic testing."

http://news.sciencemag.org/sciencenow/2012/02/massages-mystery-mechanism-unmas.html?ref=hp

Massage's Mystery Mechanism Unmasked

Massage's healing touch may have more to do with DNA than with good hands.

by Gisela Telis on 1 February 2012, 2:00 PM | 15 Comments

A new study has revealed for the first time how kneading eases sore muscles—by turning off genes associated with inflammation and turning on genes that help muscles heal. The discovery contradicts popular claims that massage squeezes lactic acid or waste products out of tired muscles and could bring new medical credibility to the practice.

Despite massage's widespread popularity, researchers know surprisingly little about its effects on muscles. Past studies have managed to show only that a well-administered rub can reduce pain, but none has ever pinpointed how. The scant evidence makes many physicians unsure, if not outright skeptical, of the method.

Mark Tarnopolsky, a neurometabolic researcher at McMaster University in Hamilton, Canada, was one of those physicians—until he suffered a severe hamstring injury in a waterskiing accident 4 years ago. Massage therapy was part of his rehabilitation regimen, and it was so effective at easing his pain that he became determined to track down the mechanism that made him feel so good. "I thought there has to be a physiologic basis for this," he says. "And being a cellular scientist, my interest's in the cellular basis."

So Tarnopolsky and colleagues—including the coordinator of his rehab program—recruited 11 young men willing to exercise in the name of science. The subjects underwent a grueling upright cycling session that left their muscles damaged and sore. Ten minutes after their workout, a massage therapist massaged one of their legs. Meanwhile, the researchers took tissue samples from the volunteers' quadriceps muscles—once before the workout, once 10 minutes after the massage, and once 3 hours after the workout—and compared the genetic profiles of each sample.

The researchers detected more indicators of cell repair and inflammation in the post-workout samples than in the pre-workout samples. That didn't surprise them because scientists know that exercise activates genes associated with repair and inflammation. What did shock them were the clear differences between the massaged legs and the unmassaged ones after exercise. The massaged legs had 30% more PGC-1alpha, a gene that helps muscle cells build mitochondria, the "engines" that turn a cell's food into energy. They also had three times less NFkB, which turns on genes associated with inflammation.

The results, published online today in Science Translational Medicine, suggest that massage suppresses the inflammation that follows exercise while promoting faster healing. "Basically, you can have your cake and eat it too," Tarnopolsky says. He adds that the study found no evidence to support often-repeated claims that massage removes lactic acid, a byproduct of exertion long blamed for muscle soreness, or waste products from tired muscles. "This is probably the best study I've seen that looks at the biological basis for massage therapy," says Thomas Best, a sports medicine physician at Ohio State University in Columbus, who has studied massage's effects on animals. He notes that it would be a hard experiment to reproduce because no two massages are identical, but he calls the results "compelling" nonetheless.

Tarnopolsky, for one, is a convert. "There's no question I'm going to be visiting the massage therapist more often," he says.

http://www.eurekalert.org/pub_releases/2012-02/osu-abo020212.php

A battle of the vampires, 20 million years ago?

They are tiny, ugly, disease-carrying little blood-suckers that most people have never seen or heard of, but a new discovery in a one-of-a-kind fossil shows that "bat flies" have been doing their noxious business with bats for at least 20 million years.

CORVALLIS, Ore. – For bats, that's a long time to deal with a parasite doing its best vampire impression. Maybe it is nature's revenge on the vampire bat, an aggressive blood consumer in its own right that will feed on anything from sheep to dogs and humans.

The find was made by researchers from Oregon State University in amber from the Dominican Republic that was formed 20-30 million years ago. The bat fly was entombed and perfectly preserved for all that time in what was then oozing tree sap and later became a semi-precious stone.

This is the only known fossil of a bat fly, a specimen at least 20 million years old that carried malaria and fed on the blood of bats. **Photo by George Poinar, Jr., courtesy of Oregon State University**

This is the only fossil ever found of a bat fly, and scientists say it's an extraordinary discovery. It was also carrying malaria, further evidence of the long time that malaria has been prevalent in the New World. The genus of bat fly discovered in this research is now extinct. The findings have been published in two professional journals, Systematic Parasitology and Parasites and Vectors.

"Bat flies are a remarkable case of specific evolution, animals that have co-evolved with bats and are found nowhere else," said George Poinar, Jr., an OSU professor of zoology and one of the world's leading experts on the study of ancient ecosystems through plants and animals preserved in amber.

"Bats are mammals that go back about 50 million years, the only true flying mammal, and the earliest species had claws and climbed trees," Poinar said. "We now know that bat flies have been parasitizing them for at least half that time, and they are found exclusively in their fur. They are somewhat flat-sided like a flea, allowing them to move more easily through bat fur."

Not every bat is infested with bat flies, and some of the contemporary flies are specific to certain species of bats. But they are still pretty common and found around the world. Bat flies only leave their bat in order to mate, Poinar said, and that's probably what this specimen was doing when it got stuck in some sticky, oozing sap.

The study this story is based on is available online: http://bit.ly/y1ekGE

http://www.scientificamerican.com/article.cfm?id=habitable-planet-gj-667cc

Newfound Alien Planet Is Best Candidate Yet to Support Life, Scientists Say

A potentially habitable alien planet has been found orbiting a nearby star

By Denise Chow and SPACE.com | Thursday, February 2, 2012 | 27

A potentially habitable alien planet - one that scientists say is the best candidate yet to harbor water, and possibly even life, on its surface - has been found around a nearby star.

The planet is located in the habitable zone of its host star, which is a narrow circumstellar region where temperatures are neither too hot nor too cold for liquid water to exist on the planet's surface.

"It's the Holy Grail of exoplanet research to find a planet around a star orbiting at the right distance so it's not too close where it would lose all its water and boil away, and not too far where it would all freeze," Steven Vogt, an astronomer at the University of California, Santa Cruz, told SPACE.com. "It's right smack in the habitable zone — there's no question or discussion about it. It's not on the edge, it's right in there."

Vogt is one of the authors of the new study, which was led by Guillem Anglada-Escudé and Paul Butler of the Carnegie Institution for Science, a private, nonprofit research organization based in Washington, D.C.

"This planet is the new best candidate to support liquid water and, perhaps, life as we know it," Anglada-Escudé said in a statement.

An alien super-Earth

The researchers estimate that the planet, called GJ 667Cc, is at least 4.5 times as massive as Earth, which makes it a so-called super-Earth. It takes roughly 28 days to make one orbital lap around its parent star, which is located a mere 22 light-years away from Earth, in the constellation Scorpius (the Scorpion). "This is basically our next-door neighbor," Vogt said. "It's very nearby. There are only about 100 stars closer to us than this one."

Interestingly enough, the host star, GJ 667C, is a member of a triple-star system. GJ 667C is an M-class dwarf star that is about a third of the mass of the sun, and while it is faint, it can be seen by ground-based telescopes, Vogt said. "The planet is around one star in a triple-star system," Vogt explained. "The other stars are pretty far away, but they would look pretty nice in the sky."

The discovery of a planet around GJ 667C came as a surprise to the astronomers, because the entire star system has a different chemical makeup than our sun. The system has much lower abundances of heavy elements (elements heavier than hydrogen and helium), such as iron, carbon and silicon.

"It's pretty deficient in metals," Vogt said. "These are the materials out of which planets form — the grains of stuff that coalesce to eventually make up planets — so we shouldn't have really expected this star to be a likely case for harboring planets."

The fortuitous discovery could mean that potentially habitable alien worlds could exist in a greater variety of environments than was previously thought possible, the researchers said. "Statistics tell us we shouldn't have found something this quickly this soon unless there's a lot of them out there," Vogt said. "This tells us there must be an awful lot of these planets out there. It was almost too easy to find, and it happened too quickly."

The detailed findings of the study will be published in the Astrophysical Journal Letters.

An intriguing star system

Another super-Earth that orbits much closer to GJ 667C was previously detected in 2010, but the finding was never published, Vogt added. This planet, called GJ 667Cb, takes 7.2 days to circle the star but its location makes it far too hot to sustain liquid water on its surface.

"It's basically glowing cinders, or a well-lit charcoal," Vogt said. "We know about a lot of these, but they're thousands of degrees and not places where you could live."

But, the newly detected GJ 667Cc planet is a much more intriguing candidate, he said.

"When a planet gets bigger than about 10 times the size of the Earth, there's a runaway process that happens, where it begins to eat up all the gas and ice in the disk that it's forming out of and swells quickly into something like Uranus, Jupiter or Saturn," Vogt explained. "When you have a surface and the right temperature, if there's water around, there's a good chance that it could be in liquid form. This planet is right in that sweet spot in the habitable zone, so we've got the right temperature and the right mass range."

Preliminary observations also suggest that more planets could exist in this system, including a gas giant planet and another super-Earth that takes about 75 days to circle the star. More research will be needed to confirm these planetary candidates, as well as to glean additional details about the potentially habitable super-Earth, the scientists said.

Finding nearby alien planets

To make their discovery, the researchers used public data from the European Southern Observatory combined with observations from the W.M. Keck Observatory in Hawaii and the new Carnegie Planet Finder Spectrograph at the Magellan II Telescope in Chile. Follow-up analyses were also made using a planet-hunting technique that measures the small dips, or wobbles, in a star's motion caused by the gravitational tug of a planet.

"With the advent of a new generation of instruments, researchers will be able to survey many M dwarf stars for similar planets and eventually look for spectroscopic signatures of life in one of these worlds," Anglada-Escudé said in a statement. Anglada-Escudé was with the Carnegie Institution for Science when he conducted the research, but has since moved on to the University of Gottingen in Germany.

With the GJ 667C system being relatively nearby, it also opens exciting possibilities for probing potentially habitable alien worlds in the future, Vogt said, which can't easily be done with the planets that are being found by NASA's prolific Kepler spacecraft.

"The planets coming out of Kepler are typically thousands of light-years away and we could never send a space probe out there," Vogt said. "We've been explicitly focusing on very nearby stars, because with today's technology, we could send a robotic probe out there, and within a few hundred years, it could be sending back picture postcards."

http://www.sciencedaily.com/releases/2012/02/120202150821.htm

Hubble Zooms in On a Magnified Galaxy

Thanks to the presence of a natural "zoom lens" in space, NASA's Hubble Space Telescope got a uniquely close-up look at the brightest "magnified" galaxy yet discovered.

ScienceDaily - This observation provides a unique opportunity to study the physical properties of a galaxy vigorously forming stars when the universe was only one-third its present age.

A so-called gravitational lens is produced when space is warped by a massive foreground object, whether it is the Sun, a black hole, or an entire cluster of galaxies. The light from more-distant background objects is distorted, brightened, and magnified as it passes through this gravitationally disturbed region.

A team of astronomers led by Jane Rigby of NASA's Goddard Space Flight Center in Greenbelt, Md., aimed Hubble at one of the most striking examples of gravitational lensing, a nearly 90-degree arc of light in the galaxy cluster RCS2 032727-132623. Hubble's view of the distant background galaxy is significantly more detailed than could ever be achieved without the help of the gravitational lens.

The results were recently published in The Astrophysical Journal, in a paper led by Keren Sharon of the Kavli Institute for Cosmological Physics at the University of Chicago. Professor Michael Gladders and graduate student Eva Wuyts of the University of Chicago were also key team members.

Thanks to the presence of a natural "zoom lens" in space, this is a close-up look at the brightest distant "magnified" galaxy in the universe known to date. It is one of the most striking examples of gravitational lensing, where the gravitational field of a foreground galaxy bends and amplifies the light of a more distant background galaxy. In this image the light from a distant galaxy, nearly 10 billion light-years away, has been warped into a nearly 90-degree arc of light in the galaxy cluster RCS2 032727-132623. The galaxy cluster lies 5 billion light-years away. The background galaxy's image is over three times brighter than typically lensed galaxies. **(Credit: NASA, ESA, J. Rigby (NASA Goddard Space Flight Center), K. Sharon (Kavli Institute for Cosmological Physics, University of Chicago), and M. Gladders and E. Wuyts (University of Chicago))**

The presence of the lens helps show how galaxies evolved from 10 billion years ago to today. While nearby galaxies are fully mature and are at the tail end of their star-formation histories, distant galaxies tell us about the universe's formative years. The light from those early events is just now arriving at Earth. Very distant galaxies are not only faint but also appear small on the sky. Astronomers would like to see how star formation progressed deep within these galaxies. Such details would be beyond the reach of Hubble's vision were it not for the magnification made possible by gravity in the intervening lens region.

In 2006 a team of astronomers using the Very Large Telescope in Chile measured the arc's distance and calculated that the galaxy appears over three times brighter than previously discovered lensed galaxies. In 2011 astronomers used Hubble to image and analyze the lensed galaxy with the observatory's Wide Field Camera 3.

The distorted image of the galaxy is repeated several times in the foreground lensing cluster, as is typical of gravitational lenses. The challenge for astronomers was to reconstruct what the galaxy really looked like, were it not distorted by the cluster's funhouse-mirror effect.

Hubble's sharp vision allowed astronomers to remove the distortions and reconstruct the galaxy image as it would normally look. The reconstruction revealed regions of star formation glowing like bright Christmas tree bulbs. These are much brighter than any star-formation region in our Milky Way galaxy.

Through spectroscopy, the spreading out of light into its constituent colors, the team plans to analyze these star-forming regions from the inside out to better understand why they are forming so many stars.

http://medicalxpress.com/news/2012-02-malaria-previously-thought.html

Malaria kills twice as many as previously thought: study

New research published in this week's edition of The Lancet shows that malaria kills 1.2 million people worldwide each year: twice as many as previously thought.

Furthermore, while many believe most malaria deaths occur in young children (under 5 years), the new study shows that close to half of all deaths (42%) occur in older children and adults. Encouragingly, the data clearly show malaria interventions scaled-up over the past decade are driving mortality down. The study is by Professor Christopher Murray, Institute for Health Metrics and Evaluation, University of Washington, Seattle, WA, USA, and colleagues, and was funded by the Bill & Melinda Gates Foundation.

The authors systematically collected all available data for malaria mortality from 1980 to 2010. Their finding of 1.2 million deaths in 2010 is nearly twice as high as the figure in the World Malaria Report 2011,

with substantially more malaria deaths in adults in Africa, as well as other parts of the world. They found that between 1980 and 2010, global malaria deaths have increased from 1.0 million in 1980 to a peak of 1.8 million in 2004. This increase is explained by rising malaria death rates in the 1980s and early 1990s and a growth in populations at risk of malaria. By 2010, this figure had fallen to 1.2 million malaria deaths, a 32% decrease since 2004. Between 1980 and 2004, Malaria deaths in children aged under 5 years in sub-Saharan Africa had almost tripled from 377,000 to just over 1 million. In 2010, some 700,000 malaria deaths occurred in African children younger than 5 years (around 56% of total global malaria deaths), a fall of around 350,000 since the 2004 peak. Despite these reductions, mortality risk in 2010 is highest in western, eastern, and, in particular, central sub-Saharan Africa.

Although malaria deaths in children account for most malaria deaths, the number of deaths in adults is high. Malaria deaths in individuals aged 15 years, 50 years, and 70 years or older account for 20%, 9%, and 6% of malaria deaths in 2010, respectively (thus over a third of all deaths occur in adults). With few exceptions, the proportion of malaria deaths in adults in each country examined was almost always more than 40%. The exceptions are sub-Saharan African countries, which have the highest malaria transmission.

The authors found that, compared with the World Malaria Report 2011, their estimates of deaths were 1.3 times higher for children younger than 5 years in Africa, 8.1 times higher for those aged 5 years or older in Africa, and 1.8 times higher for individuals of all ages outside of Africa. They also found that 24% of child deaths in Africa were due to malaria in 2008, 50% higher than the 16% found by Black and colleagues in the same year (and whose methods were used in the World Malaria Report). This should place more emphasis, say the authors, on making reductions of malaria mortality a central strategy to achieving Millennium Development Goal 4 (reducing mortality in children under 5 years by two thirds from 1990 to 2015). They add: "That malaria is a previously unrecognised driver of adult mortality also means that the benefits and cost-effectiveness of malaria control, elimination, and eradication are likely to have been underestimated."

Crucially, 433 000 more deaths occurred worldwide in individuals aged 5 years or older in 2010 than was suggested by WHO estimates (524 000 versus 91 000). "You learn in medical school that people exposed to malaria as children develop immunity and rarely die from malaria as adults," said Dr. Christopher Murray, IHME Director and the study's lead author. "What we have found in hospital records, death records, surveys and other sources shows that just is not the case."

The authors say: "Since the global peak in 2004, there has been a substantial decrease in malaria deaths that is attributable to the rapid, although variable, scale-up of control activities in sub-Saharan Africa. This scale-up has been driven in part by an expansion in health aid targeted towards malaria and suggests that the investments made by major funders such as the Global Fund to Fight AIDS, Tuberculosis and Malaria have rapidly decreased the burden of malaria."

However, they add that more malaria mortality also means that short-term goals—eg, the reduction of malaria deaths to zero by 2015—might be unrealistic. The authors say: "We estimated that if decreases from the peak year of 2004 continue, malaria mortality will decrease to less than 100 000 deaths only after 2020."

The importance of the Global Fund in reversing mortality since 2004 is highlighted in the study. The authors say: "The announcement by the Global Fund that round 11 of funding would be cancelled raises enormous doubts as to whether the gains in malaria mortality reduction can be built on or even sustained. From 2003 to 2008, the Global Fund provided 40% of development assistance for health targeted towards malaria. This reduction in resources for malaria control is a real and imminent threat to population health in endemic countries."

A linked Lancet Editorial concludes: "What should happen now? WHO's new independent advisory body, the Malaria Policy Advisory Committee (MPAC), held its first meeting this week. But MPAC only has 15 members. We believe urgent technical and policy analyses must be initiated by WHO—involving a broader group of experts (eg, including those in child survival) and country representatives—to review these new data and their implications for malaria control programmes. This opportunity needs to be grasped with urgency and optimism." ***More information:*** *Provided by Lancet*

http://www.sciencedaily.com/releases/2012/02/120202201511.htm

U.S. Counties With Thriving Small Businesses Have Healthier Residents

Counties with a greater concentration of locally-owned businesses have healthier populations - with lower mortality, obesity and diabetes - than do those that rely on large companies

ScienceDaily - Counties and parishes with a greater concentration of small, locally-owned businesses have healthier populations -- with lower rates of mortality, obesity and diabetes -- than do those that rely on large companies with "absentee" owners, according to a national study by sociologists at LSU and Baylor University.

"What stands out about this research is that we often think of the economic benefits and job growth that small business generates, but we don't think of the social benefits to small communities," said Troy C. Blanchard, Ph.D., lead author and associate professor of sociology at LSU. "This study highlights not only the economic benefits of small business, but its contributions to health and well-being."

The study of 3,060 counties and parishes in the contiguous United States, published online in the Cambridge Journal of Regions, Economy and Society and forthcoming in its March print issue, brings new evidence to a body of research literature and a debate among sociologists, who traditionally have advanced two competing hypotheses about how small business impacts public health.

Some sociologists argue that small businesses -- unlike chain retail "big box" stores and large manufacturing plants -- have a greater investment in the community and thus have more at stake when it comes to the well-being of employees, customers and other local citizens. The LSU and Baylor researchers, who analyzed national population, health, business and housing data, found that the greater the proportion of small businesses, the healthier the population.

"Some communities appear to have thriving small business sectors that feature entrepreneurial cultures that promote public health. A place like this has a can-do climate, a practical problem-solving approach in which a community takes control of its own destiny," said co-author Charles M. Tolbert, Ph.D., chair of the sociology department at Baylor. "The alternative is the attitude that 'Things are out of our control.'" Communities may become dependent on outside investment to solve problems, the researchers wrote.

Their findings are a departure from the traditional conclusion that "bigger is better." Beginning in the 1970s, communities courted large employers from the outside, with a goal of providing high-paying jobs with benefits. In contrast, small local employers offered lower pay, few -- if any -- benefits, little chance for advancement, vulnerability to competition and sometimes, nepotism, the researchers wrote.

"The old way of thinking was that you wanted to work for a big company because of pension plans, health insurance, dental insurance," said co-author Carson Mencken, Ph.D., professor of sociology at Baylor University. "But many of them have moved overseas to cheaper labor markets. So what we see are larger retailers, usually next to interstates, that pay low wages and may not even offer full-time jobs with benefits, but instead hire people to work 30 hours a week. There's a high turnover."

Larger companies showed a large drop in wages -- 33 percent in real dollars -- and access to health insurance between 1988 and 2003, previous research has shown. Amid restructuring and globalization, some large businesses are giving employees furloughs from full-time jobs, then rehiring them as short-time contract workers with no benefits.

While locally owned businesses are not adding greater compensation or benefits, the pay gap is shrinking.

"It's in their financial interest to take a stake in the community, to make it a place where people want to live and work," Mencken said.

Said Tolbert: "When someone creates a 'mom and pop' business, it's a huge step to bring that first employee on board. If it's a relative or neighbor, they'll bend over backward to hire and retain them. They're going to bring on board somebody they trust, and they'll pull every hair and every tooth in their head before they lay off someone who's their neighbor." For some workers, self-employment is a way to escape the "roller coaster" cycle of furloughs and call-backs. Given that health insurance and access to medical care will be limited, poorer health might be expected of those workers.

But small businesses are more likely to support bond issues for health infrastructures, recruit physicians, push for local anti-smoking legislation, promote community health programs and activities and support local farmers' markets, researchers said.

They found that counties with a greater proportion of small businesses have a healthier population. They analyzed the number of small businesses per 100,000 people, categorizing small business as those with four or fewer employees; large manufacturing establishments as those with 500 or more employees; and large retailers as those with 100 or more employees. "Our findings suggest that the rewards of a vibrant small business sector are multi-dimensional," Blanchard said. "In addition to job creation, small businesses yield important non-economic rewards to communities that may improve the health of local residents. "

LSU and Baylor researchers analyzed data from the 2000 Census of Population and Housing, the 2007 Centers for Disease Control Obesity and Diabetes Estimates, the National Center for Health Statistics Compressed Mortality records from 1994 to 2006, the 2002 County Business Patterns and the 2002 Nonemployer Statistics.

The research paper is based on work supported by the U.S. Department of Agriculture, the National Research Initiative, the Social and Economic Sciences Division of the National Science Foundation.

http://www.eurekalert.org/pub_releases/2012-02/afps-ans020312.php

A new study shows how to boost the power of pain relief, without drugs

Placebos reduce pain by creating an expectation of relief. Distraction - say, doing a puzzle - relieves it by keeping the brain busy.

But do they use the same brain processes? Neuromaging suggests they do. When applying a placebo, scientists see activity in the dorsolateral prefrontal cortex. That's the part of the brain that controls high-level cognitive functions like working memory and attention—which is what you use to do that distracting puzzle.

Now a new study challenges the theory that the placebo effect is a high-level cognitive function. The authors—Jason T. Buhle, Bradford L. Stevens, and Jonathan J. Friedman of Columbia University and Tor D. Wager of the University of Colorado Boulder—reduced pain in two ways – either by giving them a placebo, or a difficult memory task. lacebo. But when they put the two together, "the level of pain reduction that people experienced added up. There was no interference between them," says Buhle. "That suggests they rely on separate mechanisms." The findings, published in Psychological Science, a journal of the Association for Psychological Science, could help clinicians maximize pain relief without drugs.

In the study, 33 participants came in for three separate sessions. In the first, experimenters applied heat to the skin with a little metal plate and calibrated each individual's pain perceptions. In the second session, some of the people applied an ordinary skin cream they were told was a powerful but safe analgesic. The others put on what they were told was a regular hand cream. In the placebo-only trials, participants stared at a cross on the screen and rated the pain of numerous applications of heat—the same level, though they were told it varied. For other trials they performed a tough memory task—distraction and placebo simultaneously. For the third session, those who'd had the plain cream got the "analgesic" and vice versa. The procedure was the same.

The results: With either the memory task or the placebo alone, participants felt less pain than during the trials when they just stared at the cross. Together, the two effects added up; they didn't interact or interfere with each other. The data suggest that the placebo effect does not require executive attention or working memory.

So what about that neuroimaging? "Neuroimaging is great," says Buhle, "but because each brain region does many things, when you see activation in a particular area, you don't know what cognitive process is driving it." This study tested the theory about how placebos work with direct behavioral observation.

The findings are promising for pain relief. Clinicians use both placebos and distraction—for instance, virtual reality in burn units. But they weren't sure if one might diminish the other's efficacy. "This study shows you can use them together," says Buhle, "and get the maximum bang for your buck without medications."

http://www.eurekalert.org/pub_releases/2012-02/icl-som020312.php

Surface of Mars an unlikely place for life after 600 million year drought, say scientists

Mars may have been arid for more than 600 million years, making it too hostile for any life to survive on the planet's surface

Mars may have been arid for more than 600 million years, making it too hostile for any life to survive on the planet's surface, according to researchers who have been carrying out the painstaking task of analysing individual particles of Martian soil. Dr Tom Pike, from Imperial College London, will discuss the team's analysis at a European Space Agency (ESA) meeting on 7 February 2012. The researchers have spent three years analysing data on Martian soil that was collected during the 2008 NASA Phoenix mission to Mars. Phoenix touched down in the northern arctic region of the planet to search for signs that it was habitable and to analyse ice and soil on the surface.

The results of the soil analysis at the Phoenix site suggest the surface of Mars has been arid for hundreds of millions of years, despite the presence of ice and the fact that previous research has shown that Mars may have had a warmer and wetter period in its earlier history more than three billion years ago. The team also estimated that the soil on Mars had been exposed to liquid water for at most 5,000 years since its formation billions of years ago. They also found that Martian and Moon soil is being formed under the same extremely dry conditions.

Satellite images and previous studies have proven that the soil on Mars is uniform across the planet, which suggests that the results from the team's analysis could be applied to all of Mars. This implies that liquid water has been on the surface of Mars for far too short a time for life to maintain a foothold on the surface.

Dr Pike, from the Department of Electrical and Electronic Engineering at Imperial, who is lead author on the study published in the journal Geophysical Research Letters, explains:

"We found that even though there is an abundance of ice, Mars has been experiencing a super-drought that may well have lasted hundreds of millions of years. We think the Mars we know today contrasts sharply with its earlier history, which had warmer and wetter periods and which may have been more suited to life. Future

NASA and ESA missions that are planned for Mars will have to dig deeper to search for evidence of life, which may still be taking refuge underground."

During the Phoenix mission, Dr Pike and his research group formed one of 24 teams based at mission control in the University of Arizona in the USA, operating part of the spacecraft's onboard laboratories. They analysed soil samples dug up by a robot arm, using an optical microscope to produce images of larger sand-sized particles, and an atomic-force microscope to produce 3D images of the surface of particles as small as 100 microns across. Since the end of the mission, the team has been cataloguing individual particle sizes to understand more about the history of the Martian soil.

In the study, the researchers looked for the microscopic clay particles that are formed when rock is broken down by water. Such particles are an important marker of contact between liquid water and the soil, forming a distinct population in the soil. The team found no such marker. They calculated that even if the few particles they saw in this size range were in fact clay, they made up less than 0.1 percent of the total proportion of the soil in the samples. On Earth, clays can make up to 50 percent or more of the soil content, so such a small proportion in the Martian samples suggests that the soil has had a very arid history.

They estimated that the soil they were analysing had only been exposed to liquid water for a maximum of 5,000 years by comparing their data with the slowest rate that clays could form on Earth.

The team found further evidence to support the idea that Martian soil has been largely dry throughout its history by comparing soil data from Mars, Earth and the Moon. The researchers deduced that the soil was being formed in a similar way on Mars and the Moon because they were able to match the distribution of soil particle sizes. On Mars, the team inferred that physical weathering by the wind as well as meteorites breaks down the soil into smaller particles. On the Moon, meteorite impacts break down rocks into soil, as there is no liquid water or atmosphere to wear down the particles.

This research has received support from the UK Science and Technology Facilities Council; the Danish Research Agency; the Wolfermann-Nägeli Foundation, Switzerland; the Space Center at EPFL, Switzerland; the Swiss National Science Foundation; and the National Aeronautics and Space Administration.

http://www.eurekalert.org/pub_releases/2012-02/jhmi-ntd020212.php

New technique dissolves blood clots in the brain and lowers risk of brain damage after stroke

CT-guided catheters carry clot-busting drug to shrink clots, Johns Hopkins-led study shows

Johns Hopkins neurologists report success with a new means of getting rid of potentially lethal blood clots in the brain safely without cutting through easily damaged brain tissue or removing large pieces of skull. The minimally invasive treatment, they report, increased the number of patients with intracerebral hemorrhage (ICH) who could function independently by 10 to 15 percent six months following the procedure.

At the International Stroke Conference taking place January 31 through February 2 in New Orleans, the researchers will present their findings from 93 patients, ages 18 to 80, who randomly got either the new treatment or standard-of-care "supportive" therapy that essentially gives clots a chance to dissolve on their own.

The new study was coordinated by Johns Hopkins and the surgical review centers at the University of Cincinnati and the University of Chicago. All 93 patients were diagnosed with ICH, a particularly lethal or debilitating form of stroke long considered surgically untreatable under most circumstances.

"The last untreatable form of stroke may well have a treatment," says study leader Daniel F. Hanley, M.D., a professor of neurology at the Johns Hopkins University School of Medicine. "If a larger study proves our findings correct, we may substantially reduce the burden of strokes for patients and their families by increasing the number of people who can be independent again after suffering a stroke."

ICH is a bleed in the brain that causes a clot to form, often caused by uncontrolled high blood pressure. The clot builds up pressure and leaches inflammatory chemicals that can cause irreversible brain damage, often leading to death or extreme disability. The standard of care for ICH patients is general supportive care, usually in an ICU; only 10 percent undergo the more invasive and risky craniotomy surgery, which involves removing a portion of the skull and making incisions through healthy brain tissue to reach and remove the clot. Roughly 50 percent of people who suffer an intracerebral hemorrhage die from it.

Although in the United States just 15 percent of stroke patients have ICH, that rate translates to roughly 30,000 to 50,000 individuals — more often than not, Asians, Hispanics, African-Americans, the elderly and those who lack access to medical care. The more common form of stroke is ischemic stroke, which occurs when an artery supplying blood to the brain is blocked.

Surgeons performed the minimally invasive procedure by drilling a dime-sized hole in each patient's skull close to the clot location. Using a CT scan that Hanley likens to "GPS for the brain," they guided the catheter through the hole and directly into the clot. The catheter was then used to drip small doses of the clot-busting drug t-PA into the clot for a couple of days, shrinking the clots roughly 20 percent per day. Those patients who underwent supportive therapy saw their clots shrink by about 5 percent per day.

A major advantage is that the minimally invasive surgery busted the clot without the potentially injurious side effects associated with craniotomy, Hanley says.

The minimally invasive approach was also found to be as safe as general supportive therapy, which can involve intense blood pressure control, artificial ventilation, drugs to control swelling and watchful waiting for the clot to dissipate on its own.

For the new study, patients were treated at more than two dozen sites throughout the United States, Canada and Europe, by staff neurologists and surgeons. Hanley says it's a bonus that patients don't need specialized equipment to have the procedure done.

"More extensive surgery probably helps get rid of the clot, but injures the brain," he says. "This 'minimalist approach' probably does just as much to clear the clot while apparently protecting the brain."

The research is supported by the National Institute of Neurological Disease and Stroke.

http://www.eurekalert.org/pub_releases/2012-02/w-npr020112.php

New procedure repairs severed nerves in minutes, restoring limb use in days or weeks

Team apply new procedure to rapidly induce nerve regeneration in mammals

American scientists believe a new procedure to repair severed nerves could result in patients recovering in days or weeks, rather than months or years. The team used a cellular mechanism similar to that used by many invertebrates to repair damage to nerve axons. Their results are published today in the Journal of Neuroscience Research.

"We have developed a procedure which can repair severed nerves within minutes so that the behavior they control can be partially restored within days and often largely restored within two to four weeks," said Professor George Bittner from the University of Texas. "If further developed in clinical trials this approach would be a great advance on current procedures that usually imperfectly restore lost function within months at best."

The team studied the mechanisms all animal cells use to repair damage to their membranes and focused on invertebrates, which have a superior ability to regenerate nerve axons compared to mammals. An axon is a long extension arising from a nerve cell body that communicates with other nerve cells or with muscles.

This research success arises from Bittner's discovery that nerve axons of invertebrates which have been severed from their cell body do not degenerate within days, as happens with mammals, but can survive for months, or even years.

The severed proximal nerve axon in invertebrates can also reconnect with its surviving distal nerve axon to produce much quicker and much better restoration of behaviour than occurs in mammals.

"Severed invertebrate nerve axons can reconnect proximal and distal ends of severed nerve axons within seven days, allowing a rate of behavioural recovery that is far superior to mammals," said Bittner. "In mammals the severed distal axonal stump degenerates within three days and it can take nerve growths from proximal axonal stumps months or years to regenerate and restore use of muscles or sensory areas, often with less accuracy and with much less function being restored."

The team described their success in applying this process to rats in two research papers published today. The team were able to repair severed sciatic nerves in the upper thigh, with results showing the rats were able to use their limb within a week and had much function restored within 2 to 4 weeks, in some cases to almost full function.

"We used rats as an experimental model to demonstrate how severed nerve axons can be repaired. Without our procedure, the return of nearly full function rarely comes close to happening," said Bittner. "The sciatic nerve controls all muscle movement of the leg of all mammals and this new approach to repairing nerve axons could almost-certainly be just as successful in humans."

To explore the long term implications and medical uses of this procedure, MD's and other scientist-collaborators at Harvard Medical School and Vanderbilt Medical School and Hospitals are conducting studies to obtain approval to begin clinical trials.

"We believe this procedure could produce a transformational change in the way nerve injuries are repaired," concluded Bittner.

http://www.physorg.com/news/2012-02-amazon-fungi-polyurethane-oxygen.html

Amazon fungi found that eat polyurethane, even without oxygen

Until now polyurethane has been considered non-biodegradable, but a group of students from Yale University in the US has found fungi that will not only eat and digest it, they will do so even in the absence of oxygen.

PhysOrg.com - Each year Yale University operates a Rainforest Expedition and Laboratory course, which includes an expedition to a tropical jungle in the spring recess and summer research on samples collected. Last year the group cultured microorganisms found on plants they collected in the Amazon, one of the most biologically diverse regions on Earth. Among the samples they discovered a fungus, Pestalotiopsis microspora, that will digest the plastic material, polyurethane.

Polyurethane is a synthetic polymer developed in the 1940s, that is often used to replaces rubber, paint, wood, or metals. Polyurethane is found in a wide variety of modern appliances, furnishings, paints, vehicle parts, foam insulation materials, glues, and shoes, among many other applications, and has the advantages of strength, durability and elasticity. Some of the polyurethane used can be recycled into other products, but it all ends as waste eventually. The environmental problem is that once it enters the landfill it could remain there almost indefinitely because nothing we know is able to metabolize and digest it (in other words, it is not biodegradable), and the chemical bonds within it are so strong they do not degrade readily. Polyurethane can be burnt, but this releases harmful carbon monoxide into the atmosphere, along with other toxic chemicals.

Last year's group, led by Professor Scott Strobel, a molecular biochemist, discovered P. microspora and found that it will not only eat polyurethane, but can survive on a diet consisting solely of polyurethane. Furthermore, it can survive in anaerobic environments, such as those existing in the oxygen-starved regions deep inside landfills.

The fungus was discovered in the jungles of Ecuador by Pria Anand, and another undergraduate student, Jonathan Russell, identified a serine hydrolase, the enzyme thought to enable the fungus to digest the polyurethane. Both students are studying in the Department of Molecular Biophysics and Biochemistry at Yale in Connecticut.

The newly-discovered fungus is an endophytic microorganism, which means it lives on or inside the tissues of host plants without causing them harm. Several other microorganisms were found that would degrade both solid and liquid polyurethane, but only P. microspora isolates could survive entirely on the plastic under aerobic and anaerobic conditions.

The paper describing the discovery was published in the journal Applied and Environmental Microbiology. The authors suggest endophytic fungi such as P. microspora could be used to deal naturally with waste products such as polyurethane—a process known as bioremediation.

More information: Biodegradation of Polyester Polyurethane by Endophytic Fungi, Appl. Environ. Microbiol. September 2011 vol. 77 no. 17 6076-6084. doi:10.1128/AEM.00521-11

ABSTRACT

Bioremediation is an important approach to waste reduction that relies on biological processes to break down a variety of pollutants. This is made possible by the vast metabolic diversity of the microbial world. To explore this diversity for the breakdown of plastic, we screened several dozen endophytic fungi for their ability to degrade the synthetic polymer polyester polyurethane (PUR). Several organisms demonstrated the ability to efficiently degrade PUR in both solid and liquid suspensions. Particularly robust activity was observed among several isolates in the genus Pestalotiopsis, although it was not a universal feature of this genus. Two Pestalotiopsis microspora isolates were uniquely able to grow on PUR as the sole carbon source under both aerobic and anaerobic conditions. Molecular characterization of this activity suggests that a serine hydrolase is responsible for degradation of PUR. The broad distribution of activity observed and the unprecedented case of anaerobic growth using PUR as the sole carbon source suggest that endophytes are a promising source of biodiversity from which to screen for metabolic properties useful for bioremediation.

http://medicalxpress.com/news/2012-02-dignity-older-people.html

Dignity counts when caring for older people

Older people feel that their health problems pose a challenge to their sense of independence, dignity and identity and sometimes the health care they are given makes things worse.

According to research funded by UK Research Councils' New Dynamics of Ageing programme (NDA), healthcare providers must avoid taking a 'blanket view' of how to help older people cope with the ageing process.

The study carried out by Dr Liz Lloyd and her colleagues found that people were often surprised by the impact that illness and growing old had on their lives. Their sense of 'self' was affected by the limitations imposed by their age and illnesses. "Growing old and coming to terms with illnesses is complex and demanding

at times - physically, mentally and emotionally," Dr Lloyd said. "When health goes, it can come as quite a shock."

The research shows that older people work hard at maintaining their health and independence, while coming to terms with becoming dependent on others. The participants' views show how, with the struggle to maintain day-to-day activities, their dignity can quickly and easily be lost. One participant, Mary, told researchers: "Inside I feel as though I ought to be able to do things. But I'm not and it's hard to accept."

While some were positive about making changes, others found it harder to adjust their day-to-day routines. All participants made great efforts to find new activities or adapt old ones. For example several learnt to use computers and others took art classes at day centres. All tried to maintain their health in a variety of ways.

Dr Lloyd believes the research shows there are significant differences in the way that people define dignity and independence, and that these are influenced by their relationships, abilities and life experiences. She states, "You can't impose a blanket view of what dignified care is. Of course, there are certain standards that should apply in all circumstances but enhancing dignity needs a lot more than guaranteeing minimum standards."

"In old age when your health fails, it affects your sense of self. Understanding that from an older person's perspective is crucially important. Care and support can enhance dignity or it can worsen the loss of it if not given in the right way. Good support is essential in terms of how people make the adjustments they need to make."

Dr Lloyd highlights that the relationship between dignity, identity and independence is complex. "Loss of independence involves a change in your identity and is a challenge to your dignity," she states. "It is through the support of others that individuals are able to rebuild their sense of identity in their changed circumstances."

Support and care need to be responsive to what people are going through and to see things from the perspective of the person on the receiving end of care. "Older people are going through enormous changes and the people who are helping them need to be aware of these." *Provided by Economic & Social Research Council*

http://www.3ders.org/articles/20120203-83-year-old-woman-got-3d-printed-mandible.html

Woman's infected jaw removed, 3D printed replacement implanted

An 83-year-old woman with a badly infected lower jaw had the entire thing replaced with a 3D printed titanium/bioceramic replica.

The University of Hasselt (Belgium) announced today that Belgian and Dutch scientists have successfully replacing a lower jaw with a 3D printed model for a 83 year-old woman. According to the researchers, It is the first custom-made implant in the world to replace an entire lower jaw. The lower jaw of the elderly woman was badly infected and needed to be removed. Considering the age of the patient, a "classical" microsurgical reconstructive surgery takes too long time and can be risky. Therefore a tailor-made implant is the best choice.

Normally it takes a few days to produce a custom implant, but with 3D printing technology it takes only a few hours. This development is led by Research Institute BIOMED at Hasselt University, in collaboration with surgeons from the Netherlands, including the Orbis Centre in Sittard-Geleen, Xilloc Medical BV, Maastricht and Cam bioceramics BV in Leiden. The 3D printer prints titanium powder layer by layer, while a computer controlled laser ensures that the correct particles are fused together. Using 3D printing technology, less materials are needed and the production time is much shorter than traditional manufacturing. The mandible was finally given a bioceramic coating compatible with the patient's tissue by BioCeramics in Leiden.

The artificial jaw weighs 107 grams, it is only 30 grams heavier than a natural jaw, but the patient can easily get used to it. The operation was performed in June last year in the hospital in Sittard-Geleen. One day later the lady could start talking and swallowing. "Computer technology is causing a revolution in medical industry", said professor Jules Poukens from BIOMED. "A traditional surgery takes up to 20 hours, and the patient should definitely stay 2 to 4 weeks in the hospital. But this operation lasted four hours and the woman could go home after four days."

The university expects that such patient-specific implants will be widely used in the future. *Source: De Pers*