http://www.eurekalert.org/pub_releases/2012-07/qmuo-wpl071612.php

Women professorships low in some Scandinavian universities due to sexism

Despite a global reputation for gender equality, certain Scandinavian countries disadvantage female scholars with sexist attitudes towards 'women-friendly' work policies.

These are the findings of a new study on equality in universities in Denmark, Norway and Sweden, where the share of professorships among women are below the European average.

The research, which reveals female academics' perceptions of sex equality, hiring and discrimination, has been carried out by Professor Geraldine Healy at Queen Mary, University of London and Catherine Seierstad at Brunel University.

Key findings of the paper Women's equality in the Scandinavian academy: a distant dream?:

Persistent sexism in universities, particularly at professor level

A 'glass ceiling' affects women academics from taking senior roles

Welfare provision, which focuses on mother as carer, has the unintended consequences of limiting women's development opportunities

Career progress for women of childbearing age is impacted by negative perceptions within academia

Women academics with children are often burdened with the 'lion's share' of domestic duties, forcing them to sacrifice their career development compared to male counterparts

"The findings suggest inequality regimes in Scandinavian universities conspire to limit women's aspirations or ensure that women pay a higher price for success than men do," says Professor Healy, from the School of Business and Management.

"This study reveals that some Scandinavian countries may have more of a 'glass ceiling' for women in academia than many of their European counterparts, with men continuing to dominate senior roles."

Scandinavian countries are deemed the most equal in the world, and have the most established welfare model. Their governments have introduced many 'women-friendly' policies including affordable day care and paid maternity leave to enable Scandinavian parents to balance work and family life.

Such rights go some way to explaining the high proportion of Scandinavian women in the labour market. However, Professor Healy argues that the welfare benefits offered by the Scandinavian system, in fact "may work against women when it comes to promotion opportunities". "This makes poor business sense when significant talent is excluded from career development opportunities," she warns.

"Given their high equality ranking it might reasonably be expected that Scandinavian women would be well represented in academic hierarchies, for example, however our research found marked differences between the countries."

The majority of respondents in a survey of women academics in three Scandinavian universities were aged 30 to 49, had children (69 per cent) and came from a range of academic disciplines. The sample encompasses a group of women, over two-thirds of whom are managing a dual career as mother and academic.

Sweden is in sixth place and Norway in 12th in the proportion of academics who are women, whereas Denmark, in 20th place, is below the EU average. As many as 80 per cent of respondents stated that there was no sex equality in their universities, with Swedish women most likely to give a negative response (94 per cent) followed by the Danes (83 per cent). Over half believed that women had to work harder than men to achieve. Women professors were most likely to have experienced discrimination when applying for positions.

"That women professors were most likely to have experienced discrimination is unsurprising," says Professor Healy, "by seeking promotion they have put themselves in a specific arena of discrimination."

Interestingly, Norwegian academics were least likely to have experienced discrimination and were more likely to aim high. Norway generally tends to score highest on international equality polls.

Where examples of discrimination were given, they related to women being of child-bearing age. Professor Healy says: "Those who perceive Scandinavian countries as closer to a gender utopia fail to recognise that women are still judged according to their potential or actual reproductive capacity.

"The welfare provision, which focuses on mother as carer, has the unintended consequences of limiting women's development opportunities. The likelihood of young women taking parental leave, for example, is used to favour the appointment of men.

"Therefore informal practices in many cases supersede formal equality policies and leads to the undervaluing of women's talent, which not only damages the university but reinforces men's domination of the hierarchies."

Many respondents also reported that their career development is constrained by 'choices' between home and work, which may result from Scandinavian women's experience of an unequal division of labour in the home.

Reported strategies for managing careers for some women meant leaving academia whereas others sought to plateau their careers while their children were young. This is a common approach, according to Professor Healy, but one with "inherent dangers for women academics who are later penalised for having made insufficient progress in the same time period as a male colleague".
"While there has been an upsurge in equality strategies and action plans, it is yet to be seen if these strategies will challenge sex inequalities in universities in Scandinavian countries or whether a more egalitarian equilibrium remains a distant dream," she warns.
While gendered inequality regimes are common in universities, including the UK, what places this study apart is that it is set in countries deemed the most equal.
The full paper entitled 'Women's equality in the Scandinavian academy: a distant dream?', published by Sage Journals, is available to download here: http://bit.ly/Oq5YHu

http://www.eurekalert.org/pub_releases/2012-07/migf-ps071212.php

Pioneering self-contained 'smart village' offers world model for rural poverty relief

California innovation experts counseling Malaysia's development drive

An innovative, high-tech "smart village" built in Malaysia provides a potential global template for addressing rural poverty in a sustainable environment, say international experts meeting in California's Silicon Valley.
Rimbunan Kaseh, a model community built north-east of Kuala Lumpur, consists of 100 affordable homes, high-tech educational, training and recreational facilities, and a creative, closed-loop agricultural system designed to provide both food and supplementary income for villagers.
Malaysian Dato' Tan Say Jim detailed the project Monday at a special meeting in San Jose of the Global Science and Innovation Advisory Council (GSIAC) -- a unique assembly of all-star international and Malaysian experts and leaders created to guide sustainable Malaysian development.
The "smart village," located on 12 hectares in the Malaysian state of Pahang, includes a four-level aquaculture system whereby water cascades through a series of tanks to raise, first, fish sensitive to water quality, then tilapia ("the world's answer to affordable protein," says Mr. Tan), then guppies and finally algae. The latter two products are used to feed the larger fish.
Photos of the "smart village" are available for download online at
https://dl.dropbox.com/u/3960397/smart%20village%20photos.zip
A video depicting home construction is online here: http://www.youtube.com/watch?v=OvXaWmlB6Wg
Filtered fish tank wastewater is then used to irrigate trees, grain fields and crops such as flowers and fresh produce, the plants grown individually in novel hydroponic devices. The "auto-pot" is a three-piece plastic container that automatically detects soil moisture levels and waters plants precisely as required, reducing needs for costly fertilizers and pesticides as well as water. Organic waste is composted to encourage worms and other organisms on which free-range chickens feed together with the home-grown grains. In addition to access to reliable food supplies, villagers augment their monthly income by an estimated $400 to $650.
"It is a complete loop; a modern farm -- one that could even exist on the rooftop of a building," says Mr. Tan of IRIS Corporation Berhad, which spearheads the public-private partnership.
The energy-efficient homes (roughly 100 square meters – 1,000 square feet) require 10 days to construct, in part from post-consumer materials, and cost between 50,000 to 60,000 Malaysian Ringgit ($16,000 to $20,000).
The village's solar-generated power is complemented by biomass energy and mini-hydro electricity.
Rounding out the design: a community hall, resource centre, places of worship, playgrounds and educational facilities equipped with 4G Internet service supporting both e-learning and e-health services.
"With this project we stimulate rural growth with modern agriculture activities, we balance development and economic activities between the urban and rural areas, we provide income and we improve living standards," says Mr. Tan.
Malaysia is looking to scale up the smart village initiative, replicating the Rimbunan Kaseh model at as many as 12 sites in the short to medium term.
"This model offers a great opportunity to create holistic change for people in the worse circumstances in Malaysia and other nations as well," says Ellis Rubinstein, President and Chief Executive Officer of the New York Academy of Sciences (NYAS), which co-chairs the GSIAC Secretariat with the Malaysian Industry-Government Group on High Technology (MIGHT). Says Mr. Rubinstein: "Integrated smart communities could transform services available to Malaysia's citizenry while creating thousands of jobs, complementing GSIAC's unprecedented alliance to improve education in that country at every level from 'Cradle to Career'.
Says Dato' Zakri Abdul Hamid (Dr. A.H. Zakri), Science Advisor to Prime Minister of Malaysia and co-chair of of MIGHT: "GSIAC has provided us with an unprecedented opportunity to advance our local capacities in

both scale and effectiveness. Thanks to the New York Academy of Sciences, we have a chance to work with a partnership of many of the world's leading multinational companies – usually competitors but, for us, coming together – and experts from universities around the world.
"This alliance gives us confidence we can take up in Malaysia the best practices so far demonstrated anywhere in the world. It opens the door to major foreign investment. And it gives us a chance that no other government – either regional or national – has anywhere else in the world: to develop a staged, integrated solution to our citizen's needs that will dramatically increase efficiencies of scale as well as metrics of performance and impact just by virtue of being an integrated, fully thought out plan from the outset."
Assembled last year, GSIAC is composed of leading education, economics, business, science and technology experts from Malaysia, China, India, Russia, Japan, Korea, The Netherlands, the UK and the USA, including two Nobel laureates, each volunteering to help the Asian country achieve an environmentally-sustainable, high-income economy driven by knowledge and innovation. The full Council meets annually, chaired by Malaysian Prime Minister YAB Dato' Sri Mohd. Najib Tun Abdul Razak.

http://www.bbc.co.uk/news/science-environment-18860276

UK science to be freely available

The government is to develop plans to make publicly funded research results freely available to all.

By Pallab Ghosh Science correspondent, BBC News

Currently, scientists and members of the public have to pay the leading scientific journals to see research that has already been paid for from the public purse.
Under new proposals the government will pay publishers a fee each time a paper is published.
In return the research will be available to those who wish to see it.
The total cost of the subsidy is estimated to be £50m a year which will be taken from funds that would otherwise have been spent on research.
Universities and Science Minister David Willetts said: "Removing pay walls that surround taxpayer funded research will have real economic and social benefits.
"It will allow academics and businesses to develop and commercialise their research more easily and herald a new era of academic discovery."
Critics however say that the plan comes at too great a cost to the taxpayer and the research budget.
Fred Friend of University College London (UCL), who is among those who pioneered the move to open access publishing, told BBC News that although Mr Willett's intention to protect the UK's world leading academic publishers, "what it actually does is protect the publishing sector's exorbitant profits".
Writing an article on his website as part of a campaign for a more radical shift to open access, Mr Friend said: "It would be ironic if the very publishers who through lobbying have delayed the introduction of open access by several years were to dominate the open access publishing market."
Mr Friend believes that having decided that it will subsidise publishers from its research budget the government should make every effort to get the best possible deal for the taxpayer. In particular he believes that Mr Willets should require publishers to relax their opposition to so-called academic repositories as a condition of receiving government money.
Many universities and research organisations encourage their scientists to make their published research freely available on-line on repositories they provide. But many researchers do not do this because some academic publishers say that they will not publish any research if it is also available on a repository.
Such repositories are important because they contain all the experimental data that was collected during the experiment as well as its results.
It is the raw data that is as important if not more so to other researchers as the results themselves in order to make full use of the information to help their own research. It is unclear at this stage whether publishers will allow access to the raw data or impose a charge for access to this information.
"The Government, despite having made a bad choice, still has an opportunity through the detailed implementation of the new structure to ensure that researchers and taxpayers do not lose out completely," Mr Friend told BBC News.
But Prof Doug Kell of Research Councils UK which manages the UK civil research budget said that the proposed system had more advantages than disadvantages:
"I am delighted that, together, the Research Councils have been able both to harmonise and to make significant changes to their policies, ensuring that more people have access to cutting edge research that can contribute to both economic growth in our knowledge economy and the wider wellbeing of the UK."

http://www.bbc.co.uk/news/world-us-canada-18863341

HIV-prevention drug Truvada approved by US

US health regulators have for the first time approved a drug to prevent HIV infection.

Truvada can be used by those at high risk of infection and anyone who may engage in sexual activity with HIV-infected partners, said the Food and Drug Administration (FDA).

Studies showed the drug reduced the risk of contracting HIV by up to 73%.

Some health workers and groups active in the HIV community opposed a green light for the once-daily pill.

There have been concerns the circulation of such a drug could engender a false sense of security and mean people will take more risks. There have also been fears that a drug-resistant strain of HIV could develop.

In a statement, the FDA stressed that the drug should be used as part of a "comprehensive HIV prevention plan", including condom use and regular HIV testing.

In May, an advisory group of health experts recommended approval for the pill.

Truvada, made by California-based Gilead Sciences, is already backed by the FDA to be taken with existing antiretroviral drugs for people who have HIV.

Studies from 2010 showed that Truvada reduced the risk of HIV in healthy gay men - and among HIV-negative heterosexual partners of HIV-positive people - by between 44% and 73%.

Michael Barton of UNAIDS, the Joint United Nations Programme on HIV/AIDS, said there was good trial evidence that the drug could significantly cut the risk of the infection being passed on, but only if the tablets are taken consistently.

Many of the men in the trials did not take the drug regularly enough to get the full protection.

He said that, in most circumstances, it would be better to treat the HIV-positive partner in the couple rather than focus on the HIV-negative one.

"We know that for HIV-positive people if they consistently take antiretroviral drugs and their viral load is suppressed for them it's almost impossible to transmit the virus."

Antiretroviral drugs will also prolong their life.

But he said the new drug might be useful in situations where, for example, a woman has a partner with HIV who is unwilling to take antiretrovirals or use condoms.

Truvada is approved in the UK for the treatment of HIV, but not prevention.

http://www.sciencedaily.com/releases/2012/07/120716152308.htm

Victory Stance May Be a Universal Gesture of Triumph, Not Pride

When Olympic athletes throw up their arms, clench their fists and grimace after a win, they are displaying triumph through a gesture that is the same across cultures, a new study suggests.

ScienceDaily - New findings due to be published in the journal Evolution and Human Behavior suggest this victory pose signals feelings of triumph, challenging previous research that labeled the expression pride.

"We found that displays of triumph include different behaviors to those of pride and occur more immediately after a victory or win," said David Matsumoto, professor of psychology at San Francisco State University. "Triumph has its own signature expression that is immediate, automatic and universal across cultures."

Matsumoto's latest findings come after his 2008 study of Olympic athletes, which suggested that expressions of pride and shame are universal and hardwired in humans. For his latest study, he investigated whether some of the expressions labeled as pride in his 2008 paper are more indicative of a separate emotion - triumph. Little research has been conducted on triumph as an emotion. Some psychologists believe triump h is a subset of pride, while Matsumoto's latest findings suggest triumph may be an emotion in its own right.

Photographs of Olympic athletes, used in Matsumoto's study, show the contrast between expressions of triumph (left) and pride (right). (Credit: Bob Willingham FRPS)

Participants in the study were shown photographs of judo competitors from 17 countries, who had just won a medal match at the 2004 Olympic Games, and were asked to judge the emotion portrayed by choosing an emotion from a list. The study included participants from two different cultures: the United States and South Korea. Separate research has found that South Korean culture is more hierarchical than the U.S., values

collectivism more than individual achievement and rights and includes social rules that downplay displays of emotion.
Across multiple studies, the observers consistently chose the same expressions as representations of triumph. In the photographs labeled triumph, athletes raised their arms above the shoulders, clenched their fists and their faces showed grimaces or mouths yelling. In the photographs labeled pride, athletes held their arms out from their body with their hands open, tilted their head back and their face showed a small smile.
"One of the biggest differences between triumph and pride can be seen in the face," Matsumoto said. "When someone feels triumphant after a contest or challenge, their face can look quite aggressive. It's like Michael Phelps' reaction after winning the 2008 Olympics. It looks quite different to the small smile we see when someone is showing pride."
Matsumoto says expressions of triumph are a declaration of one's success or performance whereas expressions of pride stem from feeling good about one's self, which requires time for self-evaluation. That may explain, says Matsumoto, why after a victory, expressions of triumph kick in before those of pride.
Analysis of the photographs of athletes used in the study revealed that triumph expressions occurred, on average, 4 seconds after the end of the judo match. Pride expressions occurred, on average, 16 seconds after the end of the match. "Watch that immediate reaction in the first few seconds after an athlete has won their medal match - no matter what the sport is - and you'll see this triumph response from athletes all around the world, regardless of culture," Matsumoto said.
The study suggests that displays of triumph may have an important role in evolution, perhaps by helping individuals signal status and dominance in early human societies.
Matsumoto's study has been accepted for publication in the journal Evolution and Human Behavior and will be published in the September 2012 issue. Matsumoto co-authored the paper with Hyi Sung Hwang, who graduated from SF State in 2008 and is now a research scientist at Humintell LLC.

http://nyti.ms/OehGQU

New Cancer Threat Lurks Long After Cure

Secondary cancers now make up the sixth-most-common group of malignancies

By STEVEN PETROW

Watching Robin Roberts tear up in front of millions of viewers on "Good Morning America" last month, I cried, too.
With equal measures of courage and fear, Ms. Roberts, an anchor of the show and a breast cancer survivor, explained that the life-saving treatment she received five years ago was responsible for a new diagnosis, this time myelodysplastic syndrome (MDS), a rare blood and bone marrow disease once called preleukemia.
MDS is a potentially fatal condition that can be caused by radiation and chemotherapy, both of which Ms. Roberts had in her initial cancer treatment. In medical-speak, it's a "secondary cancer." As a cancer and chemo survivor, I know that I, too, have a higher likelihood of developing these cancers.
When I was given a diagnosis of testicular cancer in 1984, secondary cancers were primarily a threat for pediatric cancer survivors. Their young bodies are most vulnerable to radiation and chemo, and they have more years in which to develop new malignancies. Also at risk were those beating some of the more "curable" adult cancers because of the highly toxic treatment regimens.
Secondary cancers now make up the sixth-most-common group of malignancies, in part because more survivors are living longer. Physicians are better at limiting toxicity from radiation and chemotherapy, so fewer people die from the effects of treatments. The bad news: More people are surviving their original cancers only to be haunted by the prospect of new diagnoses later.
Cancer survivors generally fall into one of two groups when it comes to our psychological health. First are those plagued by anxiety, depression, even post-traumatic stress disorder, which may afflict up to 58 percent of us, according to a recent American Cancer Society study. Then there are those who experience heightened self-esteem, a greater appreciation of life and its meaning, and sometimes a new or deeper spirituality.
Which bucket do you fall into? More important, can you choose where you land?
One of my heroes, Senator Frank Church, Democrat of Idaho and an ardent environmentalist and survivor of testicular cancer, died of a second cancer two weeks before I joined the cancer club. After his first diagnosis, Mr. Church wrote that survival had inspired him to live life to its fullest: "Life itself is such a chancy proposition that the only way to live is by taking great chances." For Mr. Church, his original diagnosis became a metaphoric kick in the pants, resulting in a lifetime of good works.
I had read his advice a few years before my own diagnosis … and ignored it. But after I started chemo, I revisited those words, and in the years that followed I took some decided risks of my own. Some of them

worked out beyond my imagining. I left a Ph.D. program to compile an oral history of the AIDS epidemic, and found a life as a writer. I lost other gambles, notably a relationship that crashed and burned, as so many do. Along the way, I became aware that you couldn't really take big risks without, well, taking big risks. Though cancer liberated me from what had seemed like a small life, for me, and for many survivors, freedom does not last forever. Back when I was treated, there were no data showing testicular cancer survivors living more than 20 years. If you survived, you got a reprieve, but a limited one.

At 26, that seemed like a lifetime. As I approached the 15-year survival mark, not so much.As time moved on, the fear of a secondary cancer engulfed me - I began to hear what I feared was the tick-tock of the death clock. And then entering my 40s, the alarm bell rang.

My doctors discovered a new tumor on a grainy ultrasound. Two months and three opinions later, the mass turned out to be a phantom. But the damage was done. I took a desk job with a matching 401(k) and a Cadillac health insurance plan. I paid off my student loans and credit card debt. I said goodbye to great chances.

My life shrank again as I toiled in an office the sun never even winked at. And I was single again. As my 20th year of survival approached, I started to have panic attacks, my heart seemingly exploding out of my chest. Eventually a therapist helped me understand that while I was morphing, so, too, was medicine. Testicular cancer survivors now live beyond 20 years; I was part of that data set.

That was eight years ago.

For the nearly 14 million cancer survivors, including Ms. Roberts and me, life is a roller coaster of a ride knowing that the treatments administered to us may one day exact a heavy price. Neither the reprieve nor the freedom it brings is permanent — but with more awareness of these mental health issues and new therapeutic interventions, doctors and patients are much better equipped than ever before to fight these demons.

After I found the bottom of the bucket of fear, I looked again to Mr. Church. Again, I am trying to seek out his notion of great chances, but it is more challenging in my 50s, with a mortgage and aging parents.

I now understand that the senator's credo was not meant solely for those with life-threatening conditions. Are you happy in your relationship? Does your work satisfy you? If not, take your own great chance. You don't need to have had cancer to benefit from this life lesson.

Steven Petrow is a journalist and founding editorial director of Everyday Health.

http://bit.ly/MwDDec

Fungus Makes Manganese Manage Mine Mess

Fungi and bacteria produce superoxide that makes manganese into an environmental cleanup star. Cynthia Graber reports

A coal mine can degrade its local environment. But a fungus may inadvertently help clean up the mine—with its own waste products.

Researchers worked with a fungus called Stilbella aciculosa. As it makes spores, it also produces superoxide. That's a highly reactive kind of oxygen. When the released superoxide bumps into the mineral manganese in the environment, it makes that mineral much more reactive itself. The pepped-up manganese then grabs and holds a variety of toxic metals and other substances that need to be cleaned up and gotten out of coal mine drainage water.

The research, led by Colleen Hansel of Harvard and the Woods Hole Oceanographic Institution, appears in the Proceedings of the National Academy of Sciences. [Colleen M. Hansel, "Mn(II) oxidation by an ascomycete fungus is linked to superoxide production during asexual reproduction"]

It's been known that various bacteria and fungi can help in environmental remediation. The new research shows that production of the vital forms of manganese requires that the fungi and bacteria be actively producing superoxide. So creating conditions that encourage the organisms to make the superoxide could be the first step in a pathway by which they help manganese to literally do the dirty work. And make some toxic mine sites a lot cleaner. ***Listen to this Podcast***

http://www.eurekalert.org/pub_releases/2012-07/giot-mqi071712.php

Musical glove improves sensation, mobility for people with spinal cord injury

Georgia Tech researchers have created a wireless, musical glove that may improve sensation and motor skills for people with paralyzing spinal cord injury (SCI).

The gadget was successfully used by individuals with limited feeling or movement in their hands due to tetraplegia. These individuals had sustained their injury more than a year before the study, a time frame when most rehab patients see very little improvement for the remainder of their lives. Remarkably, the device was primarily used while the participants were going about their daily routines.

The device is called Mobile Music Touch (MMT). The glove, which looks like a workout glove with a small box on the back, is used with a piano keyboard and vibrates a person's fingers to indicate which keys to play. While learning to play the instrument, several people with SCI experienced improved sensation in their fingers. Researchers at Georgia Tech and Atlanta's Shepherd Center recently completed a study focusing on people with weakness and sensory loss due to SCI.

"After our preliminary work in 2011, we suspected that the glove would have positive results for people with SCI," said Ph.D. graduate Tanya Markow, the project's leader. "But we were surprised by how much improvement they made in our study. For example, after using the glove, some participants were able to feel the texture of their bed sheets and clothes for the first time since their injury."

Markow worked with individuals with SCI who had limited feeling or movement in their hands. Each suffered a spinal injury more than a year prior to the study. The eight-week project required study participants to practice playing the piano for 30 minutes, three times a week. Half used the MMT glove to practice; half did not.

Georgia Tech researchers, together with Shepherd Center, have created a wireless, musical glove that may improve sensation and motor skills for people with paralyzing spinal cord injury. Mobile Music Touch was successfully used by individuals with limited feeling or movement in their hands due to tetraplegia.

Georgia Institute of Technology

The MMT system works with a computer, MP3 player or smart phone. A song, such as Ode to Joy, is programmed into a device, which is wirelessly linked to the glove. As the musical notes are illuminated on the correct keys on the piano keyboard, the gadget sends vibrations to "tap" the corresponding fingers. The participants play along, gradually memorizing the keys and learning additional songs.

However, these active learning sessions with MMT were not the primary focus of the study. The participants also wore the glove at home for two hours a day, five days a week, feeling only the vibration (and not playing the piano). Previous studies showed that wearing the MMT system passively in this manner helped participants learn songs faster and retain them better. The researchers hoped that the passive wearing of the device would also have rehabilitative effects.

At the end of the study, participants performed a variety of common grasping and sensation tests to measure their improvement. Those who used the MMT system performed significantly better than those who just learned the piano normally. "Some people were able to pick up objects more easily," said Markow. "Another said he could immediately feel the heat from a cup of coffee, rather than after a delay."

Markow believes the increased motor abilities could be caused by renewed brain activity that sometimes becomes dormant in persons with SCI. The vibration might be triggering activity in the hand's sensory cortex, which leads to firing in the brain's motor cortex. Markow would like to expand the study to include functional MRI results.

The glove has evolved in recent years under the leadership of Georgia Tech's Thad Starner and Ellen Yi-Luen Do, as well as Deborah Backus, director of multiple sclerosis research at Shepherd Center. The initial concept, Piano Touch, developed with the team by then master's student Kevin Huang, demonstrated that people could easily learn to play the piano by wearing the glove and feeling its vibrations. It didn't take long for Starner to see the larger health benefits.

"Equipment used for hand rehabilitation may seem monotonous and boring to some, and doesn't provide any feedback or incentive," said Starner, who oversees the Contextual Computing Group. "Mobile Music Touch overcomes each of those challenges and provides surprising benefits for people with weakness and sensory loss due to SCI. It's a great example of how wearable computing can change people's lives."

Starner is an associate professor in the School of Interactive Computing. Do is a professor in the Schools of Interactive Computing and Industrial Design.

http://www.eurekalert.org/pub_releases/2012-07/su-src071312.php

Stanford researchers calculate global health impacts of the Fukushima nuclear disaster

Radiation from Japan's Fukushima Daiichi nuclear disaster may eventually cause anywhere from 15 to 1,300 deaths and from 24 to 2,500 cases of cancer, mostly in Japan, Stanford researchers have calculated.

The estimates have large uncertainty ranges, but contrast with previous claims that the radioactive release would likely cause no severe health effects. The numbers are in addition to the roughly 600 deaths caused by

the evacuation of the area surrounding the nuclear plant directly after the March 2011 earthquake, tsunami and meltdown.

Recent PhD graduate John Ten Hoeve and Stanford civil engineering Professor Mark Z. Jacobson, a senior fellow at the Precourt Institute for Energy and the Stanford Woods Institute for the Environment, are set to publish their findings Tuesday (July 17) in the journal Energy and Environmental Science. The research constitutes the first detailed analysis of the event's global health effects.

No effects?

The Fukushima Daiichi meltdown was the most extensive nuclear disaster since Chernobyl. Radiation release critically contaminated a "dead zone" of several hundred square kilometers around the plant, and low levels of radioactive material were found as far as North America and Europe.

But most of the radioactivity was dumped in the Pacific – only 19 percent of the released material was deposited over land – keeping the exposed population relatively small.

"There are groups of people who have said there would be no effects," said Jacobson.

A month after the disaster, the head of the United Nations Science Committee on the Effects of Atomic Radiation, for example, predicted that there would be no serious public health consequences resulting from the radiation.

Global reach?

Evaluating the claim, Ten Hoeve and Jacobson used a 3-D global atmospheric model, developed over 20 years of research, to predict the transport of radioactive material. A standard health-effects model was used to estimate human exposure to radioactivity. Because of inherent uncertainties in the emissions and the health-effects model, the researchers found a range of possible death tolls, with a best estimate of 130. A wide span of cancer morbidities was also predicted, with a best estimate of 180.

Those affected according to the model were overwhelmingly in Japan, with extremely small effects noticeable in mainland Asia and North America. The United States was predicted to suffer between 0 and 12 deaths and 0 and 30 cancer morbidities, although the methods used were less precise for areas that saw only low radionuclide concentrations.

"These worldwide values are relatively low," said Ten Hoeve. He explained they should "serve to manage the fear in other countries that the disaster had an extensive global reach."

The response

The Japanese government's response was much more rapid and coordinated than that of the Soviets in Chernobyl, which may have mitigated some of the cancer risk. Japanese government agencies, for example, evacuated a 20-kilometer radius around the plant, distributed iodine tablets to prevent radioiodine uptake and prohibited cultivation of crops above a radiation threshold – steps that Ten Hoeve said "people have applauded."

But the paper also notes that nearly 600 deaths were reported as a result of the evacuation process itself, mostly due to fatigue and exposure among the elderly and chronically ill. According to the model, the evacuation prevented at most 245 radiation-related deaths – meaning the evacuation process may have cost more lives than it saved. Still, the researchers cautioned against drawing conclusions about evacuation policy.

"You still have an obligation to evacuate people according to the worst-case scenario," said Jacobson.

If it happened here

To test the effects of varying weather patterns and geography on the reach of a nuclear incident, the two researchers also analyzed a hypothetical scenario: an identical meltdown at the Diablo Canyon Power Plant, near San Luis Obispo, Calif.

Despite California's population density being about one-fourth that of Japan's, the researchers found the magnitude of the projected health effects to be about 25 percent larger.

The model showed that rather than being whisked toward the ocean, as with Fukushima, a larger percentage of the Diablo Canyon radioactivity deposited over land, including population centers such as San Diego and Los Angeles.

Jacobson stressed, however, that none of the calculations expressed the full scope of a nuclear disaster.

"There's a lot more to the issue than what we examined, which were the cancer-related health effects," he said. "Fukushima was just such a large disaster in terms of soil and water contamination, displacement of lives, confidence in government oversight, cost and anguish."

Mark Z. Jacobson, Civil and Environmental Engineering: (650) 723-6836, jacobson@stanford.edu

'Worldwide Health Effects of the Fukushima Daiichi Nuclear Accident,' Energy and Environmental Science, at Mark Z. Jacobson's Fukushima research page: http://www.stanford.edu/group/efmh/jacobson/fukushima.html

http://www.eurekalert.org/pub_releases/2012-07/uosc-edm071712.php

Experimental drug may extend therapeutic window for stroke

Clinical safety trials in humans to start this summer

LOS ANGELES — A team led by a physician-scientist at the University of Southern California (USC) has created an experimental drug that reduces brain damage and improves motor skills among stroke-afflicted rodents when given with federally approved clot-busting therapy.

Clinical trials to test the safety of the drug in people are expected to start later this summer.

Stroke, which occurs when blood flow to a part of the brain stops, is the No. 4 cause of death and the leading cause of adult disability in the United States. According to the American Stroke Association, the Food and Drug Administration-approved tPA (tissue plasminogen activator) is the best treatment for stroke caused by a blocked artery, but to be effective, it must be administered within three hours after symptoms start.

If given outside that three-hour window, tPA has shown serious side effects in animal and human brains, including bleeding and breakdown of the brain's protective barrier. Generally, according to the American Stroke Association, only 3 to 5 percent of those who suffer a stroke reach the hospital in time to be considered for tPA treatment.

"What tPA does best is to break down clots in the blood vessel and restore blood flow, but it is a powerful enzyme," said Berislav V. Zlokovic, M.D., Ph.D., director of the Zilkha Neurogenetic Institute at the Keck School of Medicine of USC and the study's lead investigator. "After three hours, tPA also damages the blood vessel and causes intracerebral bleeding. We have developed something that not only counteracts the bleeding but also reduces brain damage and significantly improves behavior after stroke. I feel very strongly that this approach will extend the therapeutic window for tPA."

Zlokovic is the scientific founder of ZZ Biotech, a Houston-based biotechnology company he co-founded with USC benefactor Selim Zilkha to develop biological treatments for stroke and other neurological ailments. The company's 3K3A-APC is a genetically engineered variant of the naturally occurring activated protein C (APC), which plays a role in the regulation of blood clotting and inflammation. APC has cell-protecting, anti-inflammatory and anti-coagulant properties; 3K3A-APC has reduced anti-coagulant ability, which minimizes the risk of bleeding induced by normal APC. The protective effect of 3K3A-APC on the lining of blood vessels in the brain further helps prevent bleeding caused by tPA.

In collaboration with the University of Rochester Medical Center, Henry Ford Health Sciences Center, University of Arizona College of Medicine and The Scripps Research Institute, Zlokovic and his team gave tPA — alone and in combination with 3K3A-APC — to mice and rats four hours after stroke. They also gave 3K3A-APC for three consecutive days after stroke. They measured the amount of brain damage, bleeding and motor ability of the rodents up to seven days afterward.

The researchers found that, under those conditions, tPA therapy alone caused bleeding in the brain and did not reduce brain damage or improve motor ability when compared to the control. The combination of tPA and 3K3A-APC, however, reduced brain damage by more than half, eliminated tPA-induced bleeding and significantly improved motor ability.

"Dr. Zlokovic's study really demonstrates the promise of the drug and we are eager to show the same results in human clinical trials," said Kent Pryor, Ph.D., M.B.A., ZZ Biotech's chief operating officer.

Previous research suggests that the experimental drug may also protect against other neurological maladies such as amyotrophic lateral sclerosis and traumatic brain injury as a standalone therapy.

"We are encouraged by these results," said Joe Romano, CEO and president of ZZ Biotech. "In terms of improving treatment for stroke and other neurological diseases, this could be really exciting."

The research was supported by ZZ Biotech and grants from the National Heart, Lung and Blood Institute of the National Institutes of Health (R01-HL063290-14, R01-HL052246-18).

Results of the study, "An activated protein C analog with reduced anticoagulant activity extends the therapeutic window of tissue plasminogen activator for ischemic stroke in rodents," are available online in the journal Stroke, published by the American Heart Association.

http://www.eurekalert.org/pub_releases/2012-07/uocd-dst071712.php

Drug shown to improve memory in those with Down syndrome

Milestone in research aimed at boosting cognition

AURORA, Colo. - Researchers at the University of Colorado School of Medicine have found a drug that boosts memory function in those with Down syndrome, a major milestone in the treatment of this genetic disorder that could significantly improve quality of life. "Before now there had never been any positive results in attempts to improve cognitive abilities in persons with Down syndrome through medication," said Alberto Costa, MD,

Ph.D., who led the four- year study at the CU School of Medicine. "This is the first time we have been able to move the needle at all and that means improvement is possible." The study was published today in the journal Translational Psychiatry.

Costa, an associate professor of medicine, and his colleagues studied 38 adolescents and young adults with Down syndrome. Half took the drug memantine, used to treat Alzheimer's disease, and the others took a placebo.

Costa's research team hypothesized that memantine, which improved memory in mice with Down syndrome, could increase test scores of young adults with the disorder in the area of spatial and episodic memory, functions associated with the hippocampus region of the brain. Participants underwent a 16-week course of either memantine or a placebo while scientists compared the adaptive and cognitive function of the two groups. While they found no major difference between the groups in adaptive and most measures of cognitive ability, researchers discovered that those taking memantine showed significant improvement in verbal episodic memory. One of the lowest functioning individuals in the study saw a ten-fold increase in memory skills.

"People who took the medicine and memorized long lists of words did significantly better than those who took the placebo," said Costa, a neuroscientist specializing in Down syndrome research. "This is a first step in a longer quest to see how we can improve the quality of life for those with Down syndrome."

Currently, there are drugs that treat the symptoms of medical conditions associated with Down syndrome but nothing to improve brain function. But in 2007 Costa demonstrated that memantine could improve memory in mice with Down syndrome. He then set out to replicate those findings in a human trial of the drug.

"This is an excellent example of translational science," he said. "We took a drug that worked well in mice and we tested it in humans with positive results."

Although the trial was small, the results could have far-reaching implications. Costa said a follow-up study was needed using a larger group of people with Down syndrome. Another important step will be to pursue studies with younger, school-age participants with Down syndrome. They would have more rapidly developing brains and, since they are in school, would be routinely tested so the effects of the drug could be closely monitored. That could take as little as five years.

Researchers also want to know if memantine can ward off the onset of Alzheimer's disease in those with Down syndrome. The two conditions show striking similarities and researchers are actively exploring how they may be linked. Babies born with Down syndrome, for example, often carry the biological markers for Alzheimer's disease. "Everyone with Down syndrome will develop Alzheimer's disease pathology by their mid-30s," Costa said. "We would like to know if this drug can slow down or even halt the development of that disease in adults with Down syndrome."

Memantine works by normalizing the function of a glutamate receptor in the brain known as the N-methyl-D-aspartate or the NMDA receptor. "This receptor plays a central role in memory and learning," Costa said.

Given the small size of the study and the need for more research, Costa stressed that people should not start taking memantine for Down syndrome. Although it has proven safe and well-tolerated by the study participants, researchers urge caution, saying more work needs to be done to determine if this is a viable treatment option.

"Our study is a significant and hopeful sign that certain drugs can enhance the intellectual capacity of those with Down syndrome," he said. "For more than 30 years we have been unable to impact cognition in Down syndrome. Now it appears that we may be able to." Costa has a major stake in improving the lives of those with Down syndrome, the most common cause of intellectual disability. He has a 17-year-old daughter with the condition. "For me this research is not merely academic," he said. "It's personal."

The CU School of Medicine's work on Down syndrome has resulted in it being chosen as one of nine national testing centers for a new drug manufactured by F. Hoffmann-La Roche LTD aimed at improving memory in adults with Down syndrome. Costa is the principal investigator of the Colorado center.

He will give a lecture about his latest research July 20 in Washington D.C. at the 2012 Annual Meeting & Clinical Symposium of the Down Syndrome Medical Interest Group - USA. The conference is being held from 1 p.m. to 9 p.m. at the Marriott Wardman Park, 2660 Woodley Rd. NW.

The other researchers in the study included Richard Boada, Ph.D., Christa Hutaff-Lee, Ph.D., David Weitzenkamp, Ph.D., Timothy A. Benke, MD, Ph.D. and Edward J. Goldson, MD.

The trial was funded by Forest Research Institute Investigator Initiated Grant NAM-58. During the course of this study, Costa was also supported in part by grants from the Eunice Kennedy Shriver National Institute of Child Health and Human Development.

"I also am grateful to the Anna and John J. Sie Foundation, the Linda Crnic Institute and the Coleman Institute for Cognitive Disabilities for believing in my research all these years. This work would not have been possible without their support in these harsh economic times," Costa said.

http://www.sciencedaily.com/releases/2012/07/120717084654.htm

Two Biological Risk Factors for Schizophrenia Linked

Researchers have discovered a relationship between two well-established biological risk factors for schizophrenia previously believed to be independent of one another

ScienceDaily - Johns Hopkins researchers say they have discovered a cause-and-effect relationship between two well-established biological risk factors for schizophrenia previously believed to be independent of one another. The findings could eventually lead researchers to develop better drugs to treat the cognitive dysfunction associated with schizophrenia and possibly other mental illnesses.

Researchers have long studied the role played in the brain's neurons by the Disrupted-in-Schizophrenia 1 (DISC1) gene, a mutation with one of the strongest links to an increased risk of developing the debilitating psychiatric illness.

In a study published in the journal Molecular Psychiatry, the laboratory of Mikhail V. Pletnikov, M.D., Ph.D., in collaboration with the laboratory of Solomon H. Snyder, M.D., D.Sc., instead looked at the role the DISC1 gene plays in glia cells known as astrocytes, a kind of support cell in the brain that helps neurons communicate with one another.

"Abnormalities in glia cells could be as important as abnormalities in neuronal cells themselves," says Pletnikov, an associate professor of psychiatry and behavioral sciences at the Johns Hopkins University School of Medicine, and the study's leader. "Most gene work has been done with neurons. But we also need to understand a lot more about the role that genetic mutations in glia cells play because neuron-glia interaction appears crucial in ensuring the brain operates normally."

Besides the paranoia and hallucinations that characterize the disease, schizophrenics have cognitive deficits, leaving them unable to think clearly or organize their thoughts and behavior.

Previous studies found that one of the roles of astrocytes is to secrete the neurotransmitter D-serine, which helps promote the transmission of glutamate in the brain, believed to be a key to cognitive function. Schizophrenics have decreased glutamate transmission. It appears, Pletnikov says, that people with DISC1 mutations associated with the psychiatric illness are faster to metabolize D-serine, which leads to a decrease in the apparently crucial transmitter.

In clinical trials, other researchers are trying to boost D-serine levels in people with schizophrenia to see if they can boost cognitive function.

In the new study, the Johns Hopkins researchers found that DISC1 is directly involved in regulating the production of D-serine by the enzyme known as serine racemase.

The researchers found that DISC1 normally binds to serine racemase and stabilizes it. The mutant DISC1 in patients with schizophrenia cannot bind with serine racemase, and instead destabilizes and destroys it. The result is a deficiency of D-serine.

The Hopkins researchers bred mice with the mutant DISC1 protein expressed only in astrocytes and, as predicted, the animals had decreased levels of D-serine. These mice also showed abnormal behavior "consistent with schizophrenia," Pletnikov says. For example, the rodents showed sensitivity to psycho-stimulants that target glutamate transmission. By treating the mice with D-serine, the scientists were able to ameliorate the schizophrenic-like symptoms. Mice without the DISC1 mutation in astrocytes had normal D-serine levels.

Pletnikov says that in the future, researchers hope that they can target the unstable junction between the abnormal DISC1 and serine racemase. If drugs, for example, can be found to increase glutamate transmission in humans, doctors may be able to improve cognitive function in schizophrenics. He says a DISC1 mutation may also be an important risk factor in other psychiatric disorders.

"Abnormal glutamate transmission is believed to be present in patients with bipolar disorder, major depression and possibly anxiety disorders, so our findings could apply to other psychiatric diseases," he says.

The study is funded by monies from the American Recovery and Reinvestment Act (ARRA MH083728); the Brain and Behavior Research Foundation Independent Investigator and Young Investigator Awards; U.S. Public Health Service Grants MH18501, P20 MH084018, P50 MH094268, R01 MH069853, R01 MH092443, R21 MH085226 and RC1 MH088753; and the Cell Science Research Foundation in Japan. It is also supported by the SR/RUSK foundation, the Stanley Foundation and the Maryland Stem Cell Research Fund.

The above story is reprinted from materials provided by Johns Hopkins Medicine.

Journal Reference:

T M Ma, S Abazyan, B Abazyan, J Nomura, C Yang, S Seshadri, A Sawa, S H Snyder, M V Pletnikov. Pathogenic disruption of DISC1-serine racemase binding elicits schizophrenia-like behavior via D-serine depletion. Molecular Psychiatry, 2012; DOI: 10.1038/mp.2012.97

http://www.sciencedaily.com/releases/2012/07/120717131217.htm

Why Is Earth So Dry? Planet Formed from Rocky Debris in Hotter Region, Inside of Solar System's 'Snow Line'

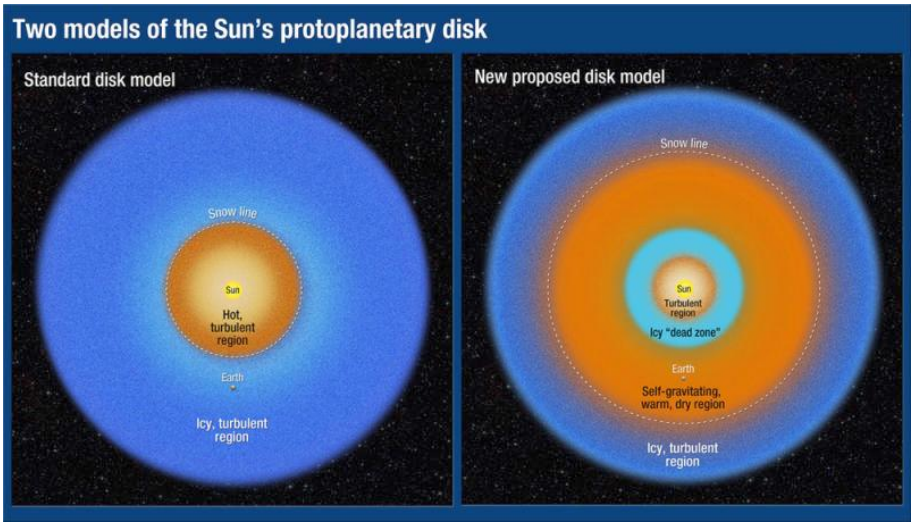
Astronomers have been puzzled by Earth's water deficiency.

ScienceDaily - With large swaths of oceans, rivers that snake for hundreds of miles, and behemoth glaciers near the north and south poles, Earth doesn't seem to have a water shortage. And yet, less than one percent of our planet's mass is locked up in water, and even that may have been delivered by comets and asteroids after Earth's initial formation.

Astronomers have been puzzled by Earth's water deficiency. The standard model explaining how the solar system formed from a protoplanetary disk, a swirling disk of gas and dust surrounding our Sun, billions of years ago suggests that our planet should be a water world. Earth should have formed from icy material in a zone around the Sun where temperatures were cold enough for ices to condense out of the disk. Therefore, Earth should have formed from material rich in water. So why is our planet comparatively dry?

A new analysis of the common accretion-disk model explaining how planets form in a debris disk around our Sun uncovered a possible reason for Earth's comparative dryness. Led by Rebecca Martin and Mario Livio of the Space Telescope Science Institute in Baltimore, Md., the study found that our planet formed from rocky debris in a dry, hotter region, inside of the so-called "snow line." The snow line in our solar system currently lies in the middle of the asteroid belt, a reservoir of rubble between Mars and Jupiter; beyond this point, the Sun's light is too weak to melt the icy debris left over from the protoplanetary disk. Previous accretion-disk models suggested that the snow line was much closer to the Sun 4.5 billion years ago, when Earth formed.

"Unlike the standard accretion-disk model, the snow line in our analysis never migrates inside Earth's orbit," Livio said. "Instead, it remains farther from the Sun than the orbit of Earth, which explains why our Earth is a dry planet. In fact, our model predicts that the other innermost planets, Mercury, Venus, and Mars, are also relatively dry. " The results have been accepted for publication in the journal Monthly Notices of the Royal Astronomical Society.



A Tale of Two Disk Models: This illustration of two different disk models shows overhead views of the structure of the protoplanetary disk that encircled the newborn Sun 4.6 billion years ago. The Sun's family of planets agglomerated from dust and ices within the disk. The major difference between the two models is the location of the so-called snow line, which divides a warm, dry area of the disk from an icy, turbulent region. In the standard disk model, shown at left, Earth formed beyond the snow line, in an icy region. Our planet should, therefore, contain lots of water because it formed from ices that would have been a major fraction of its composition. However, it's estimated that less than 1 percent of Earth's mass is locked up in water, which has puzzled scientists. In the new disk model, shown at right, Earth formed in a warmer, dry region, outside the snow line, which is much farther away from the Sun. This model explains why Earth is comparatively dry. It provides new insights into estimates of the abundance of Earth-like planets in the galaxy. **(Credit: NASA, ESA, and A. Feild (STScI); Science: NASA, ESA, and R. Martin and M. Livio (STScI))**

In the conventional model, the protoplanetary disk around our Sun is fully ionized (a process where electrons are stripped off of atoms) and is funneling material onto our star, which heats up the disk. The snow line is initially far away from the star, perhaps at least one billion miles. Over time, the disk runs out of material, cools, and draws the snow line inward, past Earth's orbit, before there is sufficient time for Earth to form.

"If the snow line was inside Earth's orbit when our planet formed, then it should have been an icy body," Martin explained. "Planets such as Uranus and Neptune that formed beyond the snow line are composed of tens of percents of water. But Earth doesn't have much water, and that has always been a puzzle."

Martin and Livio's study found a problem with the standard accretion-disk model for the evolution of the snow line. "We said, wait a second, disks around young stars are not fully ionized," Livio said. "They're not standard disks because there just isn't enough heat and radiation to ionize the disk."

"Very hot objects such as white dwarfs and X-ray sources release enough energy to ionize their accretion disks," Martin added. "But young stars don't have enough radiation or enough infalling material to provide the necessary energetic punch to ionize the disks."
So, if the disks aren't ionized, mechanisms that would allow material to flow through the region and fall onto the star are absent. Instead, gas and dust orbit around the star without moving inward, creating a so-called "dead zone" in the disk. The dead zone typically extends from about 0.1 astronomical unit to a few astronomical units beyond the star. (An astronomical unit is the distance between Earth and the Sun, which is roughly 93 million miles.) This zone acts like a plug, preventing matter from migrating towards the star. Material, however, piles up in the dead zone and increases its density, much like people crowding around the entrance to a concert, waiting for the gates to open.
The dense matter begins to heat up by gravitational compression. This process, in turn, heats the area outside the plug, vaporizing the icy material and turning it into dry matter. Earth forms in this hotter region, which extends to around a few astronomical units beyond the Sun, from the dry material. Martin and Livio's altered version of the standard model explains why Earth didn't wind up with an abundance of water.
Martin cautioned that the revised model is not a blueprint for how all disks around young stars behave. "Conditions within the disk will vary from star to star," Livio said, "and chance, as much as anything else, determined the precise end results for our Earth."

http://www.sciencedaily.com/releases/2012/07/120717141233.htm

Closer to a Cure? Chemists Synthesize Compound That Flushes out Latent HIV

Stanford chemists have synthesized a compound that flushes out latent HIV

ScienceDaily - A new collection of compounds, called "bryologs" -- derived from a tiny marine organism -- activate hidden reservoirs of the virus that currently make the disease nearly impossible to eradicate.
Thanks to antiretrovirals, an AIDS diagnosis hasn't been a death sentence for nearly two decades. But highly active antiretroviral therapy, or HAART, is also not a cure. Patients must adhere to a demandingly regular drug regimen that carries plenty of side effects. And while the therapy may be difficult to undergo in the United States, it is nearly impossible to scale to the AIDS crisis in the developing world.
The problem with HAART is that it doesn't address HIV's so-called proviral reservoirs -- dormant forms of the virus that lurk within T-cells and other cell types. Even after all of the body's active HIV has been eliminated, a missed dose of antiretroviral drugs can allow the hibernating virus to emerge and ravage its host all over again.
"It's really a two-target problem," said Stanford chemistry Professor Paul Wender, "and no one has successfully targeted the latent virus." But Wender's lab is getting closer, exciting many HIV patients hoping for a cure.
The lab has created a collection of "bryologs" designed after a naturally occurring, but difficult to obtain, molecule. The new compounds have been shown to activate latent HIV reservoirs with equal or greater potency than the original substance. The lab's work may give doctors a practical way to flush out the dormant virus.
The findings were published on July 15 in the journal Nature Chemistry.

Nature's medicine

The first attempts to reactivate latent HIV were inspired by observations of Samoan healers. When ethnobotanists examined the bark of Samoa's mamala tree, traditionally used by healers to treat hepatitis, they found a compound known as prostratin.
Prostratin binds to and activates protein kinase C, an enzyme that forms part of the signaling pathway that reactivates latent viruses. The discovery sparked interest in the enzyme as a potential therapeutic target, especially as it was discovered that prostratin isn't the only biomolecule to bind to the kinase.
The bryozoan Bugula neritina - a mossy, colonial marine organism -- produces a protein kinase C-activating compound that is many times more potent than prostratin. The molecule, named bryostatin 1, was deemed to hold promise as a treatment, not only for HIV but for cancer and Alzheimer's disease as well.
The National Cancer Institute initiated a Phase II clinical trial for the compound in 2009 for the treatment of non-Hodgkin lymphoma. But the substance had a number of side effects and proved prohibitively difficult to produce. "It took 14 tons of bryozoans to make 18 grams of bryostatin," said Wender. "They've stopped accrual in trials because, even if the trials worked, the compound cannot be currently supplied."
Patient enrollment was suspended until more accessible compounds came out of the Wender Group's lab.

A synthetic approach

Wender, who published the first practical synthesis of prostratin and its analogs in 2008, had set out to make a simpler, more effective synthetic analog of bryostatin. "We can copy the molecule," he said, "or we can learn how it works and use that knowledge to create something that has never existed in nature and might be superior to it."

The seven resulting compounds, called bryologs, share two fundamental features with the original bryostatin: the recognition domain, which directly contacts protein kinase C, and the spacer domain, which allows the bryolog-protein kinase C complex to be inserted into the cell membrane. The researchers tested the new compounds' ability to reactivate viral reservoirs in J-Lat cell lines, which contain latent HIV and begin to fluoresce when they express the virus.

In the J-Lat line, bryologs induced virus in as many or more cells than bryostatin at a variety of concentrations, and ranged from 25 to 1,000 times more potent than prostratin. The compounds showed no toxic effects. Bryolog testing remains in the early stages -- the researchers are currently conducting in vivo studies in animal models. But practical bryostatin substitutes may be the first step toward true HIV-eradication therapy.

"I receive letters on a regular basis from people who are aware of our work -- who are not, so far as I know, scientifically trained, but do have the disease," said Wender. "The enthusiasm they express is pretty remarkable. That's the thing that keeps me up late and gets me up early."

The research was supported by the National Institutes of Health. Primary authors are Stanford chemistry graduate student Brian Loy and doctoral students Brian DeChristopher and Adam Schrier, in collaboration with Professor Jerry Zack, co-director of the UCLA AIDS Center, and Dr. Matthew Marsden from the UCLA School of Medicine.

Brian A. DeChristopher, Brian A. Loy, Matthew D. Marsden, Adam J. Schrier, Jerome A. Zack, Paul A. Wender. Designed, synthetically accessible bryostatin analogues potently induce activation of latent HIV reservoirs in vitro. Nature Chemistry, 2012; DOI: 10.1038/nchem.1395

http://www.scientificamerican.com/article.cfm?id=mostly-big-brained-survive

Mostly the Big-Brained Survive

Animals' brain-to-body size ratio predicts their likelihood of extinction, a new analysis finds

By Emma Marris and Nature magazine | July 17, 2012 | 4

Small mammals with big brains are more adaptable to environmental changes. **Image: J. Edwards/Getty Images**

Large-brained animals may be less likely to go extinct in a changing world, perhaps because they can use their greater intelligence to adapt their behaviour to new conditions, according to an analysis presented to a meeting of conservation biologists this week. The finding hints at a way to prioritize future conservation efforts for endangered species.

Brain size relative to body size is fairly predictable across all mammals, says Eric Abelson, who studies biological sciences at Stanford University in Palo Alto, California. “As body size grows, brain size grows too, but at slower rate,” he says. Plotting brain size against body size creates a tidy curve. But some species have bigger or smaller brains than the curve would predict for their body size. And a bigger brain-to-body-size ratio usually means a smarter animal.

Abelson looked at the sizes of such deviations from the curve and their relationships to the fates of two groups of mammalian species — ‘palaeo’ and ‘modern’. The palaeo group contained 229 species in the order Carnivora from the last 40 million years, about half of which are already extinct. The modern group contained 147 species of North American mammals across 6 orders. Analysis of each group produced similar results: species that weighed less than 10 kilograms and had big brains for their body size were less likely to have gone extinct or be placed on the International Union for Conservation of Nature red list for endangered species.

For species larger than about 10 kilograms, the advantage of having a large brain seems to be swamped by the disadvantage of being big. Large species tend to reproduce later in life, have fewer offspring, require more resources and larger territories, and catch the attention of humans, either as food or as predators. Hunting pressure or reductions in available space can hit them particularly hard.

But for smaller mammals, such as rodents, the future may belong to the big-brained. Animals with larger brains relative to their body size have been shown to be more likely to thrive when introduced to new places, and Abelson’s work suggests that they would outperform their dimmer peers when it comes to adapting to changes at home as well. This behavioural flexibility of the brainy could tide them over until the slower process of genetic change is able to catch up to a changed environment, Abelson says. "If the climate cools significantly I may not be able to adapt anatomically in my lifetime, but if I was sufficiently flexible I could build a warmer house."

Other investigations into the links between particular traits and extinction risk have found that variations in body size, diet, population density, home range, lifespan and growth rate are tied to the risk of a species dying

out. Walter Jetz, an ecologist at Yale University in New Haven, Connecticut, says that analyses of extinction risk using many traits will probably be more powerful and accurate than predictions based on single traits. Such analyses should also take climate change and other environmental changes into account, says Jetz.
Abelson is agnostic on how the extinction-brain size relationship should inform conservation efforts. One could argue for expending more resources on the smaller-brained species that are at high risk. Or one could decide to spend more energy smoothing the way for the smarter, more adaptable species, since they might have a higher likelihood of surviving. "All I can say is that I hope it is useful for whoever is making those decisions," he says.

http://phys.org/news/2012-07-mechanisms-embryonic-stem-cells-cell.html

Researchers identify mechanisms that allow embryonic stem cells to become any cell in the human body

New research at the Hebrew University of Jerusalem sheds light on pluripotency

Phys.org - New research at the Hebrew University of Jerusalem sheds light on pluripotency—the ability of embryonic stem cells to renew themselves indefinitely and to differentiate into all types of mature cells. Solving this problem, which is a major challenge in modern biology, could expedite the use of embryonic stem cells in cell therapy and regenerative medicine. If scientists can replicate the mechanisms that make pluripotency possible, they could create cells in the laboratory which could be implanted in humans to cure diseases characterized by cell death, such as Alzheimer's, Parkinson's, diabetes and other degenerative diseases.
To shed light on these processes, researchers in the lab of Dr. Eran Meshorer, in the Department of Genetics at the Hebrew University's Alexander Silberman Institute of Life Sciences, are combining molecular, microscopic and genomic approaches. Meshorer's team is focusing on epigenetic pathways—which cause biological changes without a corresponding change in the DNA sequence—that are specific to embryonic stem cells.
The molecular basis for epigenetic mechanisms is chromatin, which is comprised of a cell's DNA and structural and regulatory proteins. In groundbreaking research performed by Shai Melcer, a PhD student in the Meshorer lab, the mechanisms which support an "open" chromatin conformation in embryonic stem cells were examined. The researchers found that chromatin is less condensed in embryonic stem cells, allowing them the flexibility or "functional plasticity" to turn into any kind of cell.
A distinct pattern of chemical modifications of chromatin structural proteins (referred to as the acetylation and methylation of histones) enables a looser chromatin configuration in embryonic stem cells. During the early stages of differentiation, this pattern changes to facilitate chromatin compaction.
But even more interestingly, the authors found that a nuclear lamina protein, lamin A, is also a part of the secret. In all differentiated cell types, lamin A binds compacted domains of chromatin and anchors them to the cell's nuclear envelope. Lamin A is absent from embryonic stem cells and this may enable the freer, more dynamic chromatin state in the cell nucleus. The authors believe that chromatin plasticity is tantamount to functional plasticity since chromatin is made up of DNA that includes all genes and codes for all proteins in any living cell. Understanding the mechanisms that regulate chromatin function will enable intelligent manipulations of embryonic stem cells in the future.
"If we can apply this new understanding about the mechanisms that give embryonic stem cells their plasticity, then we can increase or decrease the dynamics of the proteins that bind DNA and thereby increase or decrease the cells' differentiation potential," concludes Dr. Meshorer. "This could expedite the use of embryonic stem cells in cell therapy and regenerative medicine, by enabling the creation of cells in the laboratory which could be implanted in humans to cure diseases characterized by cell death, such as Alzheimer's, Parkinson's, diabetes and other degenerative diseases."
More information: The research appears in the journal Nature Communications as Melcer et al., Histone modifications and lamin A regulate chromatin protein dynamics in early embryonic stem cell differentiation. go.nature.com/9B33Ue

http://www.eurekalert.org/pub_releases/2012-07/haoq-rpr071712.php

Researchers publish results of an iron fertilization experiment

The results, which were published in the scientific journal Nature, provide a valuable contribution to a better understanding of the global carbon cycle

An international research team has published the results of an ocean iron fertilization experiment (EIFEX) carried out in 2004 in the current issue of the scientific journal Nature. Unlike the LOHAFEX experiment carried out in 2009, EIFEX has shown that a substantial proportion of carbon from the induced algal bloom sank to the deep sea floor. These results, which were thoroughly analyzed before being published now, provide a valuable contribution to our better understanding of the global carbon cycle.
An international team on board the research vessel Polarstern fertilized in spring 2004 (i.e. at the end of the summer season in the southern hemisphere) a part of the closed core of a stable marine eddy in the Southern

Ocean with dissolved iron, which stimulated the growth of unicellular algae (phytoplankton). The team followed the development of the phytoplankton bloom for five weeks from its start to its decline phase. The maximum biomass attained by the bloom was with a peak chlorophyll stock of 286 Milligram per square metre higher than that of blooms stimulated by the previous 12 iron fertilization experiments. According to Prof. Dr. Victor Smetacek and Dr. Christine Klaas from the Alfred Wegener Institute for Polar and Marine Research in the Helmholtz Association, this was all the more remarkable because the EIFEX bloom developed in a 100 metre deep mixed layer which is much deeper than hitherto believed to be the lower limit for bloom development.

The bloom was dominated by diatoms, a group of algae that require dissolved silicon to make their shells and are known to form large, slimy aggregates with high sinking rates at the end of their blooms. "We were able to prove that over 50 per cent of the plankton bloom sank below 1000 metre depth indicating that their carbon content can be stored in the deep ocean and in the underlying seafloor sediments for time scales of well over a century", says Smetacek.

These results contrast with those of the LOHAFEX experiment carried out in 2009 where diatom growth was limited by different nutrient conditions, especially the absence of dissolved silicon in the chosen eddy. Instead, the plankton bloom consisted of other types of algae which, however, have no protective shell and were eaten more easily by zooplankton. "This shows how differently communities of organisms can react to the addition of iron in the ocean", says Dr. Christine Klaas. "We expect similarly detailed insights on the transportation of carbon between atmosphere, ocean and sea bottom from the further scientific analysis of the LOHAFEX data", adds Prof. Dr. Wolf-Gladrow, Head of Biosciences at the Alfred Wegener Institute, who is also involved in the Nature study.

Iron plays an important role in the climate system. It is involved in many biochemical processes such as photosynthesis and is hence an essential element for biological production in the oceans and, therefore, for CO2 absorption from the atmosphere. During past ice ages the air was cooler and drier than it is today and more iron-containing dust was transported from the continents to the ocean by the wind. The iron supply to marine phytoplankton was hence higher during the ice ages. This natural process is simulated in iron fertilisation experiments under controlled conditions.

"Such controlled iron fertilization experiments in the ocean enable us to test hypotheses and quantify processes that cannot be studied in laboratory experiments. The results improve our understanding of processes in the ocean relevant to climate change", says Smetacek. "The controversy surrounding iron fertilization experiments has led to a thorough evaluation of our results before publication", comments the marine scientist as an explanation for the long delay between the experiment to the current publication in Nature.

Original publication: Victor Smetacek, Christine Klaas et al. (2012): Deep carbon export from a Southern Ocean iron-fertilized diatom bloom. Nature doi:10.1038/nature11229

Summary of the experiment: *A patch of 150 square kilometres (circle with a diameter of 14 kilometres) within an marine eddy of the Antarctic Circumpolar Current was fertilized with seven tonnes of iron sulphate on 13/14 February 2004. This corresponds to an iron addition of one hundredth of a gramme per square metre. The resultant iron concentration of 2 nanomole per litre is similar to values measured in the wake of melting icebergs; the iron concentrations in coastal regions tend to be much higher.*

The input of iron in regions with high nutrient concentrations (nitrate, phosphate, silicate) and low chlorophyll content (the so-called high-nutrient / low-chlorophyll regions) stimulates the growth of plankton algae (phytoplankton). After fertilization, the development of the plankton bloom was investigated using standard oceanographic methods over a period of five weeks. From the surface water down to a depth of over 3,000 metres, chlorophyll, organic carbon, nitrogen, phosphate and other parameters were measured to follow the development, demise and sinking of the bloom and the associated export of carbon. In addition, the phytoplankton and zooplankton species and bacterial numbers and abundance were determined. The chlorophyll content rose over a period of 24 days after fertilization. Thereafter, phytoplankton aggregates formed and sank within a few days to depths of 3,700 metres. Long spines of these diatoms and mucous substances led to aggregate formation and export of the fixed carbon from the surface to the sea floor. This process was monitored for five weeks after the start of fertilisation.

http://bit.ly/Oq8qvO

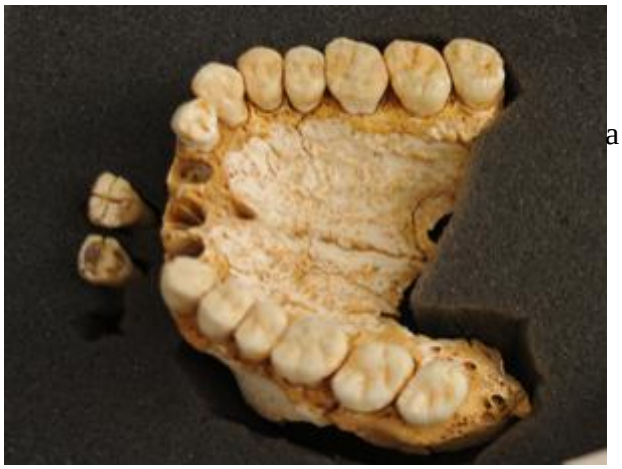
Neanderthal dental tartar reveals evidence of medicine

The tartar on Neanderthal teeth has a tale to tell.

18:00 18 July 2012 by Colin Barras

The chemicals and food fragments it contains reveal that our close relations huddled around fires to cook and consume plants – including some with medicinal properties. The find is the earliest direct evidence of self-medication in prehistory.

Despite their reputed taste for flesh, we now know that at least some Neanderthals enjoyed a more varied diet. The latest evidence comes from an analysis of 50,000-year-old Neanderthal teeth from the El Sidrón site in northern Spain.



Neanderthal remains found in El Sidrón Cave (Image: CSIC Comunicación)

Karen Hardy at ICREA, the Catalan Institution for Research and Advanced Studies in Barcelona, working with Stephen Buckley at the University of York, UK, and colleagues, used a scalpel to scrape tartar off the teeth of five Neanderthals. They chemically analysed some of the tartar samples, and examined others using an electron microscope.

Smoke signals

The microscope revealed cracked starch granules, which suggests the Neanderthals roasted plants before eating them. More evidence for the importance of fire was found in the chemicals within the tartar: there were aromatic hydrocarbons and phenols, which are associated with wood smoke.

Unexpectedly, there were few lipids or proteins in the tartar, suggesting the Neanderthals of El Sidrón ate little meat. However, one Neanderthal consumed yarrow, a natural astringent, and camomile, an anti-inflammatory. "It's very surprising that the plants we were able to securely identify were those with a bitter taste and no nutritional qualities – but known medicinal properties," says Hardy. Neanderthals were apparently able to select plants for medical use, she says. Non-human primates today are known to self-medicate, so the discovery is not unexpected, but finding strong evidence of the practice in prehistory is a challenge, says Hardy.

Amanda Henry at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, agrees. She says there have been hints since the 1970s that Neanderthals had medicinal know-how, but nothing as strong as the evidence from Neanderthal tartar. "To my knowledge this is the first direct evidence of self-medication," she says.

Veg out

The finding also adds to the evidence of the importance of plants in Neanderthal diets. In 2010, Henry found starch granules and other plant microfossils in Neanderthal tartar from specimens found in Iraq and Belgium, suggesting they ate plants. The nature of preservation indicated the food had been baked or boiled in water rather than roasted (Proceedings of the National Academy of Sciences, DOI: 10.1073/pnas.1016868108).

Erik Trinkaus at Washington University in St Louis, Missouri, and Michael Richards at the Max Planck Institute for Evolutionary Anthropology recently completed an isotopic analysis of Neanderthal bone collagen. Their data suggested the hominins generally got most of their protein from meat.

However, Trinkaus says the new results do not contradict this finding. "[Our analysis] says nothing about their consumption of plant foods or where they got most of their calories from," he says. "The work of Hardy, Henry and others has documented substantial plant food in the Neanderthal diet, and one would of course expect more in warmer climates." It is also possible that meat in the Neanderthal diet has simply failed to leave a signal in the tartar, says Katerina Harvati at Tübingen University in Germany.

The new El Sidrón findings help to paint a picture of everyday Neanderthal life, says Hardy. "The identification of wood smoke is very exciting as it allows us to personalise and bring to life an individual event in which a person might be sitting beside a fire, cooking and eating – and administering medicating plants."

That peaceful image clashes starkly with another image typically associated with the Neanderthals of El Sidrón. An earlier analysis of Neanderthal teeth from the site by some members of the El Sidrón team suggests the small population experienced periods of nutritional stress. Cut marks on Neanderthal bones from the site suggest many members of the group were cannibalised after death.

Journal reference: Naturwissenschaften, DOI: 10.1007/s00114-012-0942-0

http://www.eurekalert.org/pub_releases/2012-07/wsu-psf071812.php

PSU study finds 'caffeinated' coastal waters

Possible sources include sewer overflows, septic tanks

A new study finds elevated levels of caffeine at several sites in Pacific Ocean waters off the coast of Oregon - though not necessarily where researchers expected. This study is the first to look at caffeine pollution off the Oregon coast. It was developed and conducted by Portland State University master's student Zoe Rodriguez del Rey and her faculty adviser Elise Granek, assistant professor of Environmental Science and Management, in collaboration with Steve Sylvester of Washington State University, Vancouver.

In spring 2010, Rodriguez del Rey and Granek collected and analyzed samples from 14 coastal locations and seven adjacent water bodies as far north as Astoria, Ore., and as far south as Brookings.
Locations were identified as potentially polluted if they were near wastewater treatment plants, large population centers or rivers and streams emptying into the ocean.
The study found high caffeine levels near Carl Washburne State Park (Florence, Ore.) and Cape Lookout, two areas not near the potential pollution sources, yet low levels of caffeine near large population centers like Astoria/Warrenton and Coos Bay.
High levels were also found following a late-season storm of wind and rain that triggered sewer overflows.
Results of the study were published in the July 2012 Marine Pollution Bulletin, "Occurrence and concentration of caffeine in Oregon coastal waters."
The results seem to indicate that wastewater treatment plants are effective at removing caffeine, but that high rainfall and combined sewer overflows flush the contaminants out to sea. The results also suggest that septic tanks, such as those used at the state parks, may be less effective at containing pollution.
"Our study findings indicate that, contrary to our prediction, the waste water treatment plants are not a major source of caffeine to coastal waters," says Granek. "However, onsite waste disposal systems may be a big contributor of contaminants to Oregon's coastal ocean and need to be better studied to fully understand their contribution to pollution of ocean waters."
Caffeine is found in many food and beverage products as well as some pharmaceuticals, and caffeine pollution is directly related to human activity (although many plant species produce caffeine, there are no natural sources of the substance in the Northwest). The presence of caffeine may also signal additional anthropogenic pollution, such as pesticides, pharmaceuticals and other contaminants.
Even "elevated levels" of caffeine are measured in nanograms per liter, well below a lethal dose for marine life. However, an earlier study by Rodriguez del Rey and Granek on intertidal mussels showed that caffeine at the levels measured in this current study can still have an effect despite the lower doses
"We humans drink caffeinated beverages because caffeine has a biological effect on us - so it isn't too surprising that caffeine affects other animals, too," says Granek. Previous studies have found caffeine in other bodies of water around the world, including the North Sea, the Mediterranean, Puget Sound, Boston Harbor, and Sarasota Bay, Fla.
The project was funded in part by an Oregon Sea Grant Program Development Grant and the National Oceanographic and Atmospheric Administration. Granek has submitted a grant to further study septic tanks in coastal areas, which could help identify the extent to which these systems are sources of contamination to Oregon's marine waters.

http://www.eurekalert.org/pub_releases/2012-07/osu-lrt071812.php

Lungs respond to hospital ventilator as if it were an infection

When patients are placed on a mechanical ventilator for days at a time, their lungs react to the pressure generated

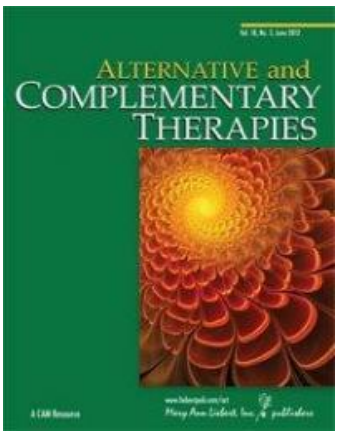
COLUMBUS, Ohio - When hospital patients need assistance breathing and are placed on a mechanical ventilator for days at a time, their lungs react to the pressure generated by the ventilator with an out-of-control immune response that can lead to excessive inflammation, new research suggests. While learning that lungs perceive the ventilation as an infection, researchers also discovered potential drug targets that might reduce the resulting inflammation - a tiny piece of RNA and two proteins that have roles in the immune response.
Using human cell cultures, Ohio State University researchers determined that mechanical pressures trigger an innate immune response - the same immune response that the body launches to begin its fight against any kind of infection. The rhythmic pressure of ventilation stimulated the production of pro-inflammatory chemicals by activating proteins called toll-like receptors (TLRs) in lung cells, the research showed.
"We showed that these cells respond to a mechanical force, pressure, as if it were an inflammatory stimulus. They almost perceive it as a bacterial toxin - and they don't like it," said Samir Ghadiali, associate professor of biomedical engineering at Ohio State and co-lead author of the study. "We didn't know until this study how we could possibly turn off that type of mechanically induced inflammation. Essentially what we found are two things that may help: microRNAs and two TLRs in the innate immunity pathway."
The job of TLRs is to recognize distinctive characteristics of pathogens and send out signals to activate other players in the immune system. This response persists during ventilation even with no pathogen present, and the prolonged inflammation can lead to organ failure. Acute lung injuries requiring mechanical ventilation lead to more deaths annually than do breast cancer and prostate cancer combined.
The study also suggested that at least one tiny piece of RNA - called a microRNA - is influential in this immune response because its behavior regulates the activation of the toll-like receptor proteins. The findings suggest

that manipulating levels of either the microRNA or TLRs could be the basis for potential new treatment options for acute lung injury that requires ventilation. This study appears online and is scheduled for future print publication in the Journal of the Federation of American Societies for Experimental Biology (FASEB Journal).
The study has clinical relevance as well as an influence on the big picture of the field of mechanotransduction - the study of how a mechanical force gets changed into a chemical stimulus inside the body. Mechanics play a role in many disease processes, including hardening of the arteries, other cardiac disorders, kidney problems, emphysema and chronic obstructive pulmonary disease, and cancer.
"This work suggests that there may be a ubiquitous inflammatory mechanism that cells have to respond to anything they perceive as a danger," Ghadiali said. "At least in the lung, we now know the innate immunity pathway plays an important role, and this study showed that a mechanical force gets converted into cytokine production through this well-known pathway."
Ventilators are used on patients in intensive care units who are suffering from a variety of conditions that lead to acute respiratory distress syndrome; these include pneumonia, bacterial or viral infections, trauma and sepsis. Scientists have known for more than a decade that mechanical ventilation causes inflammation in the lungs that lingers after an acute illness has been cleared, but they have had a hard time figuring out why the lungs respond in this way.
Research attempts to reduce lung damage by altering the force of the ventilation pressure, surface tension or breathing rhythm haven't worked out, said Ghadiali, also an investigator in Ohio State's Davis Heart and Lung Research Institute. So his team, co-led by Patrick Nana-Sinkam, associate professor of internal medicine, sought to determine if there might be another way to regulate lung inflammation in ventilated patients.
The researchers first characterized inflammatory effects of mechanical pressure in experiments using human small airway cells from deep inside the lungs, where ventilation pressure tends to do the most damage.
These tests showed that as little as four hours of exposure to ventilation pressure and breathing rates that mimic the clinical environment raised levels of three proinflammatory cytokines, which are chemical messengers that promote an inflammatory response. "The cells keep secreting compounds to recruit the immune system to fight an infection, but there is no infection. It's a response we don't want," Ghadiali said.
The scientists then tested these same cells to examine what role microRNAs (miRs) might have in the lung's inflammatory response to ventilation. Using powerful computers to screen the cells for which miRs responded to ventilation pressure and cyclic breathing patterns, they identified a clear target for more study: a microRNA known as miR-146a. This microRNA's activation increased in the cells as experimental levels of cyclic ventilation pressure increased.
MicroRNAs are small pieces of RNA that bind to messenger RNA, which contains the instructions for building proteins in the process of gene expression. When that connection is made, however, the microRNA has an inverse relationship to its target protein, meaning an overexpressed microRNA leads to lower levels of the protein that the microRNA regulates. "We know that these tiny molecules have the ability to regulate fundamental biological processes in disease. However, their role as mediators of mechanically induced inflammation has yet to be explored," Nana-Sinkam said.
The identification of miR-146a led the researchers to explore the role of two toll-like receptor proteins in the inflammatory response to mechanical ventilation. Because miR-146a has been studied for several years, it is known to target two toll-like receptor proteins that in turn are known to regulate production of the proinflammatory cytokines that the lung cells were found to secrete in response to mechanical pressure.
With this relationship established, the researchers tested the effects of manipulating these various players on the lung cells' inflammatory response. Among their key findings: Dramatically driving up levels of miR-146a in human small airway cells under mechanical ventilation conditions lowered the activity of the two TLRs, which in turn led to very little cytokine secretion - meaning inflammation was held at bay. "So we have a microRNA that we can overexpress that targets the innate immunity pathway and shuts down mechanically induced inflammation," Ghadiali said.
But the miR is not the only potential target, he noted. Therapies could be designed to target the toll-like receptor proteins themselves, as well, to reduce lung inflammation created by both a disease and the ventilation. The researchers plan to test the effectiveness of experimental drugs that act on these biological targets in upcoming studies on rodents.
This work was supported by the National Institutes of Health, an American Heart Association postdoctoral fellowship and a National Science Foundation CAREER grant.

Additional Ohio State authors include Melissa Crawford of the Department of Internal Medicine, and Yan Huang and Natalia Higuita-Castro of the Department of Biomedical Engineering. All are affiliated with the Davis Heart and Lung Research Institute.

http://www.eurekalert.org/pub_releases/2012-07/mali-eoh071812.php

Efficacy of herbal remedies for managing insomnia



New Rochelle, NY - Approximately 1 in 3 Americans suffers from chronic sleep deprivation and another 10-15% of the population has chronic insomnia. Sleep disorders can profoundly affect a person's whole life and have been linked to a range of diseases, including obesity, depression, anxiety, and inflammatory disorders. Over-the-counter herbal remedies are often used to treat insomnia, but surprisingly, very little research has been done to study their efficacy, according to an article in Alternative and Complementary Therapies, published by Mary Ann Liebert, Inc., publishers. The article is available free on the Alternative and Complementary Therapies website at ***http://www.liebertpub.com/act*.**

Alternative and Complementary Therapies is a bimonthly journal that publishes original articles, reviews, and commentaries evaluating alternative therapies and how they can be integrated into clinical practice.

People need many hours of sound, restorative sleep every night to maintain an optimal state of physiological and psychological health, but many factors can disrupt sleep schedules and compromise the quality of sleep. In the article, "Sleep…Naturally: A Review of the Efficacy of Herbal Remedies for Managing Insomnia," the authors conducted a search of the Internet and electronic databases to identify literature on herbal remedies that are commonly used to manage insomnia, including valerian, hops, kava-kava, chamomile, and St. John's wort. They found that few scientific studies had been published that reported on the therapeutic potential and safety of these herbal remedies and the results were either inconclusive or contradictory.

The authors concluded that, considering the benefits that a natural management strategy could offer patients with insomnia, additional research is required to assess the effectiveness and safety of herbal remedies as therapeutic agents.

About the Journal

Alternative and Complementary Therapies is a bimonthly journal that publishes original articles, reviews, and commentaries evaluating alternative therapies and how they can be integrated into clinical practice. Topics include botanical medicine, vitamins and supplements, nutrition and diet, mind-body medicine, acupuncture and traditional Chinese medicine, ayurveda, indigenous medicine systems, homeopathy, naturopathy, yoga and meditation, manual therapies, energy medicine, and spirituality and health. Complete tables of content and a sample issue may be viewed on the Alternative and Complementary Therapies website at http://www.liebertpub.com/act.

http://www.sciencedaily.com/releases/2012/07/120719103244.htm

Short-Term Intestinal Parasite Infection Triggers Specific Cytokines That Can Prevent the Development of Type 1 Diabetes

Infection with intestinal worms may provide long-term protection against type I diabetes

ScienceDaily - Short-term infection with intestinal worms may provide long-term protection against type I diabetes (TID), suggests a study conducted by William Gause, PhD, and colleagues at the University of Medicine and Dentistry of New Jersey-New Jersey Medical School. The research has been published in the journal Mucosal Immunology.

The incidence of TID -- a form of the disease in which the body's own immune cells attack the insulin-producing islet cells of the pancreas -- is relatively low in developing countries. One explanation for this phenomenon is the prevalence of chronic intestinal worm infections, which dampen the self-aggressive T cells that cause diabetes and other autoimmune diseases. Understanding how T cells are tamed during worm infection could lead to new strategies to control these inflammatory diseases.

Dr. Gause's team, including Pankaj Mishra, PhD, in his laboratory, and David Bleich, MD, now shows that a two-week infection with the intestinal worm H. polygyrus (cured using oral drugs) prompted T cells to produce the cytokines interleukin (IL)-4 and IL-10, which acted independently to provide lasting protection against TID in mice. A similar approach using eggs from another parasitic worm, Trichuris suis, is currently being tested in clinical trials in patients with Crohn's disease and multiple sclerosis. The studies presented in this paper now provide potential mechanisms explaining the potency of parasite-induced control of inflammatory diseases.

The University of Medicine and Dentistry of New Jersey (UMDNJ) is New Jersey's only health sciences university with more than 6,000 students on five campuses attending three medical schools, the State's only dental school, a graduate school of biomedical sciences, a school of health related professions, a school of nursing and New Jersey's only school of public health. UMDNJ operates University Hospital, a Level I Trauma

Center in Newark, and University Behavioral HealthCare, which provides a continuum of healthcare services with multiple locations throughout the State.

P K Mishra, N Patel, W Wu, D Bleich, W C Gause. Prevention of type 1 diabetes through infection with an intestinal nematode parasite requires IL-10 in the absence of a Th2-type response. Mucosal Immunology, 2012; DOI: 10.1038/mi.2012.71

http://www.sciencedaily.com/releases/2012/07/120719103605.htm

Mild HIV Type Slows Development of AIDS and Makes New Preventive Treatments Possible

A new study from Lund University in Sweden has opened the way for new approaches to slowing the development of AIDS in HIV-1-infected patients.

ScienceDaily - It is hoped that this could lead to better treatment methods and preventive measures to combat HIV and AIDS.

The findings have just been published in the distinguished scientific journal New England Journal of Medicine. The most common type of the virus that causes AIDS -- HIV-1 -- is less aggressive when it infects a person already carrying the milder HIV-2. The study looked at how the disease developed in those who had been infected with HIV-1 and those who were infected with both HIV-1 and HIV-2.

"The moderating effect of HIV-2 was extremely strong. The time it took to develop AIDS was around 50 per cent longer for those infected with both strains than for those only carrying the HIV-1 virus.

The unusually large difference makes me, as a researcher, very optimistic that it will be possible to identify new and significant approaches that can be taken to combating the development of AIDS," says Joakim Esbjörnsson, a virologist at Lund University.

"The unique thing about our study, which has been carried out over 20 years, is that we have been able to follow healthy individuals from when they were infected with HIV-1 only or both HIV-1 and HIV-2 through the entire course of the disease, and to make comparisons of how the infection has developed over time," says Hans Norrgren, doctor in infectious diseases and researcher at Lund University and Skåne University Hospital.

An observation that was linked to an early stage of HIV infection was a difference in the genetic diversity of the HIV.

It is well-known that different strains of HIV co-exist during the course of the infection and that the genetic difference between them increases the closer to AIDS the infection comes. This genetic difference was lower early on in the disease among people with a dual infection than among those with only HIV-1 infection, which gave them a better starting point from which the development of AIDS was delayed.

The researchers have also studied the levels of CD4+ T cells -- helper cells with a key role in the immune system that are attacked and destroyed by the HIV virus.

Patients with dual infection were also seen to be at an advantage in this. They had a higher number of CD4+ T cells throughout the period of infection. It took longer to reach critically low levels of CD4+ T cells, and thus also longer before the infection developed into AIDS.

"Our results suggest that HIV-2 can activate cellular reactions which naturally check the development of AIDS. If we can map these, I think we can also uncover entirely new mechanisms that are key to the slower development of the disease. In the long run, this could lead to better preventive measures and treatments," says Patrik Medstrand, Professor of Virology at Lund University.

Behind the findings lies a unique 20-year follow-up of 4 700 people in Guinea-Bissau in West Africa.

"Our work is the result of many people's work over many years, in particular the staff of the National Public Health Laboratory in Guinea-Bissau and the police health station in the capital Bissau, who have carried out the practical work of examining the study participants, taking samples and conducting laboratory analyses," says Fredrik Månsson, a doctor in infectious diseases in Malmö and one of the researchers behind the study.

About HIV-2

West Africa is the only region where the milder strain of HIV, HIV-2, is found on a large scale.

Like the globally dominant and more aggressive HIV-1, HIV-2 is an infection that can lead to AIDS. However, fewer of those infected with HIV-2 develop AIDS, only around 25-30 per cent of those who do not receive treatment.

Joakim Esbjörnsson, Fredrik Månsson, Anders Kvist, Per-Erik Isberg, Salma Nowroozalizadeh, Antonio J. Biague, Zacarias J. da Silva, Marianne Jansson, Eva Maria Fenyö, Hans Norrgren, Patrik Medstrand. Inhibition of HIV-1 Disease Progression by Contemporaneous HIV-2 Infection. New England Journal of Medicine, 2012; 367 (3): 224 DOI: 10.1056/NEJMoa1113244

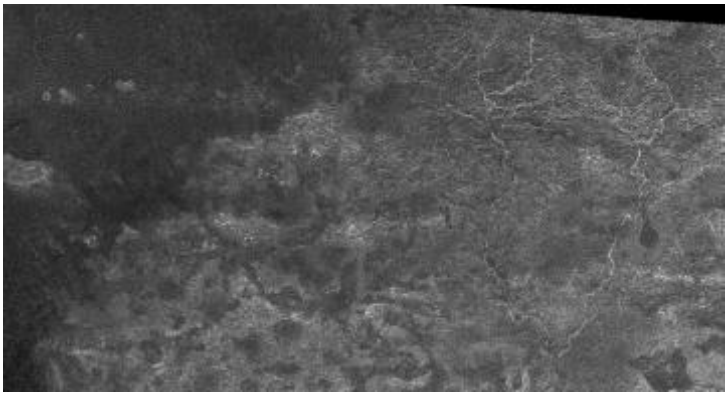
http://www.eurekalert.org/pub_releases/2012-07/miot-rno072012.php

River networks on Titan point to a puzzling geologic history

Findings suggest the surface of Saturn's largest moon may have undergone a recent transformation

Written by: Jennifer Chu, MIT News Office

For many years, Titan's thick, methane- and nitrogen-rich atmosphere kept astronomers from seeing what lies beneath. Saturn's largest moon appeared through telescopes as a hazy orange orb, in contrast to other heavily cratered moons in the solar system. In 2004, the Cassini-Huygens spacecraft - a probe that flies by Titan as it orbits Saturn - penetrated Titan's haze, providing scientists with their first detailed images of the surface. Radar images revealed an icy terrain carved out over millions of years by rivers of liquid methane, similar to how rivers of water have etched into Earth's rocky continents.



River Plateau ***Titan's Xanadu region is an Australia-sized plateau composed of water ice. Flowing over this frozen landscape are remnants of rivers networks, seen as bright cobweb-like filaments in the right side of the image.*** **Image: NASA/JPL**

While images of Titan have revealed its present landscape, very little is known about its geologic past. Now researchers at MIT and the University of Tennessee at Knoxville have analyzed images of Titan's river networks and determined that in some regions, rivers have created surprisingly little erosion. The researchers say there are two possible explanations: either erosion on Titan is extremely slow, or some other recent phenomena may have wiped out older riverbeds and landforms.

"It's a surface that should have eroded much more than what we're seeing, if the river networks have been active for a long time," says Taylor Perron, the Cecil and Ida Green Assistant Professor of Geology at MIT. "It raises some very interesting questions about what has been happening on Titan in the last billion years."

A paper detailing the group's findings will appear in the Journal of Geophysical Research-Planets.

What accounts for a low crater count?

Compared to most moons in our solar system, Titan is relatively smooth, with few craters pockmarking its facade. Titan is around four billion years old, about the same age as the rest of the solar system. But judging by the number of craters, one might estimate that its surface is much younger, between 100 million and one billion years old.

What might explain this moon's low crater count? Perron says the answer may be similar to what happens on Earth. "We don't have many impact craters on Earth," Perron says. "People flock to them because they're so few, and one explanation is that Earth's continents are always eroding or being covered with sediment. That may be the case on Titan, too."

For example, plate tectonics, erupting volcanoes, advancing glaciers and river networks have all reshaped Earth's surface over billions of years. On Titan, similar processes - tectonic upheaval, icy lava eruptions, erosion and sedimentation by rivers - may be at work.

But identifying which of these geological phenomena may have modified Titan's surface is a significant challenge. Images generated by the Cassini spacecraft, similar to aerial photos but with much coarser resolution, are flat, depicting terrain from a bird's-eye perspective, with no information about a landform's elevation or depth. "It's an interesting challenge," Perron says. "It's almost like we were thrown back a few centuries, before there were many topographic maps, and we only had maps showing where the rivers are."

Charting a river's evolution

Perron and MIT graduate student Benjamin Black set out to determine the extent to which river networks may have renewed Titan's surface. The team analyzed images taken from Cassini-Huygens, and mapped 52 prominent river networks from four regions on Titan. The researchers compared the images with a model of river network evolution developed by Perron. This model depicts the evolution of a river over time, given variables such as the strength of the underlying material and the rate of flow through the river channels. As a river erodes slowly through the ice, it transforms from a long, spindly thread into a dense, treelike network of tributaries.

Black compared his measurements of Titan's river networks with the model, and found the moon's rivers most resembled the early stages of a typical terrestrial river's evolution. The observations indicate that rivers in some regions have caused very little erosion, and hence very little modification of Titan's surface.
"They're more on the long and spindly side," Black says. "You do see some full and branching networks, and that's tantalizing, because if we get more data, it will be interesting to know whether there really are regional differences."
Going a step further, Black compared Titan's images with recently renewed landscapes on Earth, including volcanic terrain on the island of Kauai and recently glaciated landscapes in North America. The river networks in those locations are similar in form to those on Titan, suggesting that geologic processes may have reshaped the moon's icy surface in the recent past. "It's a weirdly Earth-like place, even with this exotic combination of materials and temperatures," Perron says. "And so you can still say something definitive about the erosion. It's the same physics." *This research was supported by NASA's Cassini Data Analysis Program.*

http://www.eurekalert.org/pub_releases/2012-07/dai-nob072012.php

Numbers of blind are falling

The numbers of people in Germany who are blind or visually impaired is going down.

Robert P. Finger and his co-authors present their findings in the current edition of Deutsches Ärzteblatt International ***(Dtsch Arztebl Int 2012; 109[27/28]: 484-9).***
The aging of the population would lead one to expect an increase in the numbers of blind and visually impaired—for in most cases the main reason for loss of vision is an age-related disease. Rates of macular degeneration, for example, and diabetes-related eye disease both go up with age. At the same time, however, the numbers of cases in which glaucoma or optic nerve atrophy results in blindness are going down. Retinal detachment, too, is occurring less frequently.
Using data from the archive of the blind registry of the Rhineland Regional Council (Landschaftsverband Rheinland), the researchers were able to calculate the prevalence of blindness (standardized for sex and age) from 1978 to 2006, and matched this with the Severe Disability Statistics on blindness and visual impairment. The results allowed them to formulate prevalence trends for the past 30 years.
The total number of registered blind in the Rhineland increased from 10 665 in 1978 to 15 766 in 1997 and then remained stable until 2006, when it was 15 725. The prevalence of blindness in the region of study also rose from 1978 to 1997 and then remained stable until 2006, as reflected in the dataset for blindness and visual impairment. After standardization for Germany, the prevalence can be seen to have been falling slightly since 1997. *http://www.aerzteblatt.de/pdf.asp?id=127315*

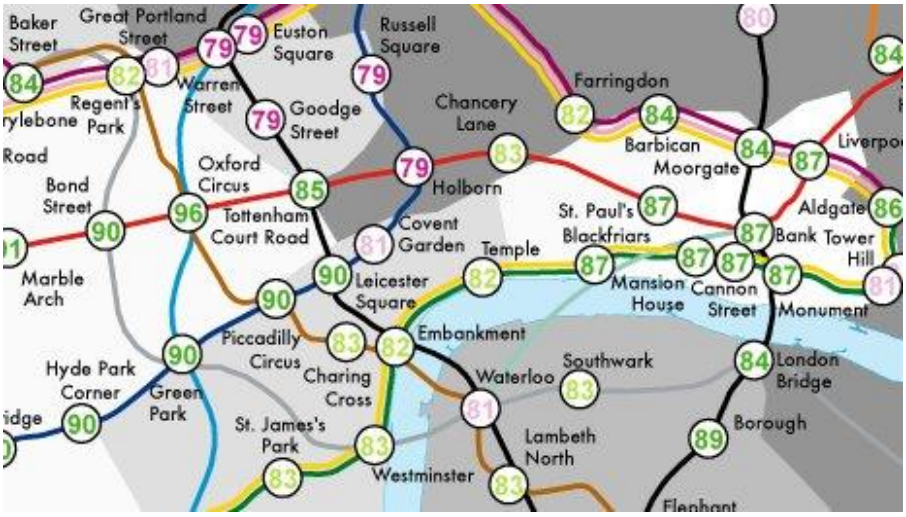
http://www.bbc.co.uk/news/uk-england-london-18917932

Tube map used to plot Londoners' life expectancy

A version of the Tube map has been produced to show how life expectancy varies from station to station.

By Andy Dangerfield BBC News, London

The contrast it depicts between Tube stops is stark, with the variation in life expectancies of children born near stations only minutes apart being years different. The map - called Lives on the Line - was created by University College London (UCL) researcher Dr James Cheshire and shows some startling results. For example, it shows there is a 20-year difference in life expectancy between those born near Oxford Circus and others born close to some stations on the Docklands Light Railway (DLR).



A version of the Tube map has been produced to show how life expectancy varies from station to station.

Newborns around Star Lane are predicted to live, on average, for 75.3 years in contrast to 96.4 years for those near Oxford Circus.

'Different patterns'

Elsewhere, there is a six-year difference between Pimlico and Vauxhall - consecutive stations on the Victoria line, but on opposite sides of the River Thames.

In 2008, the London Health Observatory showed that if travelling east on the Tube from Westminster, every two Tube stops represented more than a year of life expectancy lost. This work inspired Dr Cheshire's latest research, which uses data based on government statistics showing life expectancy at birth for those living around the stations. "I wondered if different patterns emerged across the Tube network," he said. He said he chose to use the Tube map as "it's famous the world over and something most Londoners can relate to".

Dr Cheshire said the map showed that "if you're impoverished as a child, your diet may be poor and sadly it can follow you for the rest of your life".

Other disparities depicted on the map are no less striking. For example, if you travel eastbound between Lancaster Gate and Mile End - 20 minutes on the Central line - life expectancy decreases by 12 years.

But not all the Tube lines show a trend depending on which direction you travel.

"London is a city that's very diverse and one of its great characteristics is that rich and poor people live side by side," Dr Cheshire said.

'Two cities'

Stations serving east London's Olympic Park fair badly and contrast with the Olympic volleyball venue at Earl's Court, in west London, whose spectators will be passing through areas with far higher life expectancies and lower child poverty.

Shadow Health Minister Diane Abbott, who is MP for Hackney North and Stoke Newington, an area where life expectancy is plotted as being relatively low, said the map showed "a tale of two cities". "You need to send more money to where it is needed, and that's the poorer boroughs," she said. She suggested the government "needs to look at children's diets, fizzy drinks machines in schools, school meals and stopping the advertising of junk food".

Public Health Minister Anne Milton said: "The link between life expectancy and deprivation is well established. "That is why from next April, for the first time we are introducing a ring-fenced public health budget for local communities to better target the causes of poor health in their area."

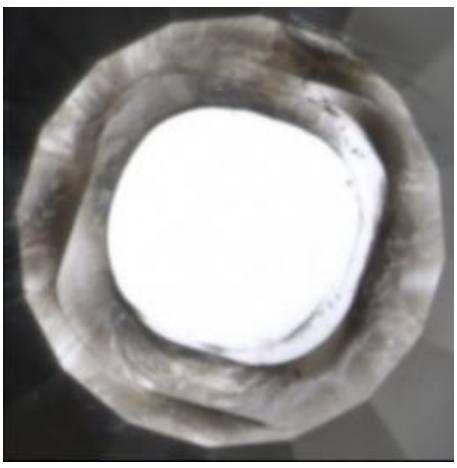
Michael Marmot, a UCL professor who has advised the government on public health, said the map "captures how stark the health equalities are in a very small geographical area". "If you want to see a difference in life expectancy between countries of 11 years, you can fly from London to Guatemala," he said. "But if you are worried about your carbon footprint, you could just catch the Tube east. "The difference between Hackney and the West End is the same as the difference between England and Guatemala in terms of life expectancy."

Sir Michael said life expectancy was affected by "early child development, education, employment and working conditions, having the minimum income to live a healthy life, the environment and the issues of smoking, obesity, drinking and diet".

http://phys.org/news/2012-07-diamond-rough-half-century-puzzle.html

Diamond in the rough: Half-century puzzle solved

A Yale-led team of mineral physicists has for the first time confirmed through high-pressure experiments the structure of cold-compressed graphite



Shadows show severe damage from M-carbon.

Phys.org - A Yale-led team of mineral physicists has for the first time confirmed through high-pressure experiments the structure of cold-compressed graphite, a form of carbon that is comparable in hardness to its cousin, diamond, but only requires pressure to synthesize. The researchers believe their findings could open the way for a super hard material that can withstand great force and can be used — as diamond-based materials are now — for many electronic and industrial applications. The study appears in Scientific Reports, a Nature journal.

Under normal conditions, pure carbon exhibits vastly different physical properties depending on its structure. For example, graphite is soft, but diamond is one of the hardest materials known. Graphite conducts electricity, but diamond is an insulator.

In the middle is the form of carbon confirmed by the Yale-led team, dubbed M-carbon and predicted by theoretical methods initially in 2006. M-carbon is made when graphite is compressed to pressures approximately 200,000 times room pressure, at room temperature.

Although changes were first observed in graphite under high pressure and room temperature conditions 50 years ago, it is only now that the crystal structure has been confirmed by experiment, using long duration x-ray diffraction, Raman spectroscopy and optical techniques to verify these predictions.

"Besides the unique mechanical properties discovered in M-carbon, we find that the transformation of graphite to M-carbon is extremely sluggish and requires a long time to reach equilibrium, which may be the additional reason why this puzzle remained unsolved for the past half century," said Yuejian Wang, the study's first author and former postdoctoral researcher at Yale, who is now assistant professor of physics at Oakland University.

Researchers say this intermediate structure has much lower symmetry than diamond, but is as hard. In fact, "Our study shows that M-carbon is extremely incompressible and hard, rivaling the extreme properties of diamond so much that it damages diamond," said principal investigator Kanani K.M. Lee, assistant professor of geology and geophysics at Yale.

Lee added, "Over the past few years, many theoretical computations have suggested at least a dozen different crystal structures for this new phase, but our experiments showed that only one crystal structure fits the data: M-carbon."

Other authors are Joseph Panzik of Yale, and Boris Kiefer of New Mexico State University. The study was supported by grants from the Carnegie/Department of Energy (DOE) Alliance Center and by national synchrotron facilities supported by the DOE, National Science Foundation, and the W.M. Keck Foundation.

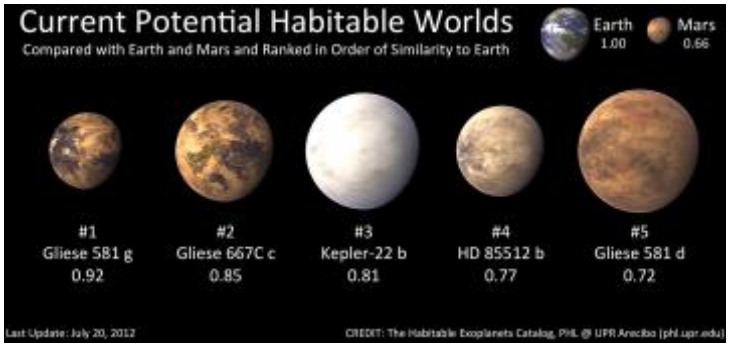
More information: Citation: Scientific Reports DOI: 10.1038/srep00520

http://phys.org/news/2012-07-potential-habitable-exoplanets.html

Five potential habitable exoplanets now

New data suggest the confirmation of the exoplanet Gliese 581g and the best candidate so far of a potential habitable exoplanet

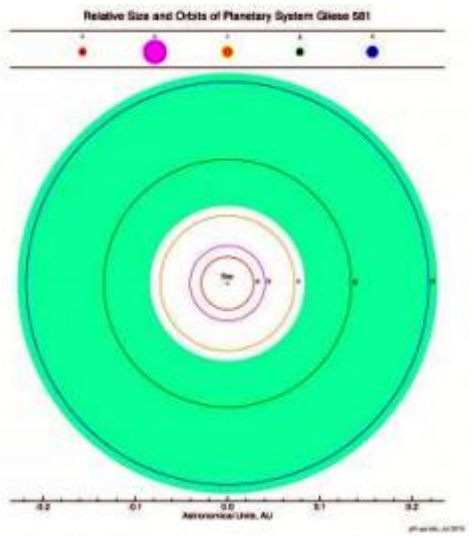
Phys.org - The nearby star Gliese 581 is well known for having four planets with the outermost planet, Gliese 581d, already suspected habitable. This will be the first time evidence for any two potential habitable exoplanets orbiting the same star. Gliese 581g will be included, together with Gliese 667Cc, Kepler-22b, HD85512, and Gliese 581d, in the Habitable Exoplanets Catalog of the PHL @ UPR Arecibo as the best five objects of interest for Earth-like exoplanets.



Artistic representation of all the five known potential habitable worlds including now Gliese 581g, the best candidate for an Earth-like exoplanet so far. All of these planets are superterrans (aka Super-Earths) with masses estimated between two and ten Earth masses. Numbers below the planet names correspond to their similarity with Earth as measured in a scale from zero to one with the Earth Similarity Index, one being identical to Earth.

Doubts about the existence of Gliese 581g appeared only two weeks after its announcement on September 29, 2010 by astronomers of the Lick-Carnegie Exoplanet Survey. Scientists from the HARPS Team from the Geneva Observatory, which discovered all the previously known four planets around Gliese 581, were not able to detect Gliese 581g out of their own data, which included additional observations. Further analysis by others scientists also questioned the existence of Gliese 581g in the last two years.

Now the original discoverers of Gliese 581g, led by Steven S. Vogt of UC Santa Cruz, present a new analysis with an extended dataset from the HARPS instrument that shows more promising evidence for its existence. The new analysis strength their original assumption that all the planets around Gliese 581 are in circular and not elliptical orbits as currently believed. It is under this likely assumption that the Gliese 581g signal appears in the new data.



Comparison of the estimated relative size and orbits of the five exoplanets around Gliese 581. The green shade represent the size of the habitable zone, or the orbital region where an Earth-size planet could have surface liquid water. Planets e, b, and c are too hot for liquid water and life but g and d are in the habitable zone. Planet g is specially

in the right spot for Earth-like conditions while d is marginally within these limits, and colder. This is the first case of a stellar system with two potential habitable exoplanets orbiting the same star.

"This signal has a False Alarm Probability of < 4% and is consistent with a planet of minimum mass 2.2M [Earth masses], orbiting squarely in the star's Habitable Zone at 0.13 AU, where liquid water on planetary surfaces is a distinct possibility" said Vogt.

Based on the new data Gliese 581g probably has a radius not larger than 1.5 times Earth radii. It receives about the same light flux as Earth does from the Sun due to its closer orbital position around a dim red dwarf star. These factors combine to make Gliese 581g the most Earth-like planet known with an Earth Similarity Index, a measure of Earth-likeness from zero to one, of 0.92 and higher than the previously top candidate Gliese 667Cc, discovered last year.

"The controversy around Gliese 581g will continue and we decided to include it to our main catalog based on the new significant evidence presented, and until more is known about the architecture of this interesting stellar system" said Abel Méndez, Director of the PHL @ UPR Arecibo.

Authors on the original paper are Steven S. Vogt, UCO/Lick Observatory, UCSC; Paul Butler, Department of Terrestrial Magnetism, Carnegie Institution; and Nader Haghighipour of the Institute for Astronomy and NASA Astrobiology Institute. Their research is published online on July 20, 2012 in the journal Astronomical Notes, 333, No. 7, 561-575. ***More information:*** ***arxiv.org/abs/1207.4515*** ***phl.upr.edu/projects/habitable-exoplanets-catalog***

http://phys.org/news/2012-07-overuse-deworming-drugs-widespread-resistance.html

Overuse of deworming drugs led to widespread resistance among parasites

A long forgotten foe is beginning to reemerge on pastures and meadows around the world, and farmers are finding that they have no way to combat it

Phys.org - Parasitic worms infecting cows, sheep, goats and horses are becoming resistant to the drugs used to kill them, and if changes are not made in how the few remaining drugs that still work are used, there may be no way left to fight the growing threat, according to Ray Kaplan, a University of Georgia professor in the department of infectious diseases. Kaplan has studied drug-resistant parasites for years, and his findings recently published in the journal Veterinary Parasitology warn that the continued overuse of deworming drugs has the potential to create parasites that cannot be killed.

"We're already seeing the worst-case scenario playing out," Kaplan said. "In goats particularly, which have the worst problems with parasites and drug resistance, we quite frequently see farms that have parasite resistance to all de-wormers. Some of these farms reached the point where they no longer could control the effects of the parasites and decided to go out of business."

It wasn't always this way. Forty years ago when deworming drugs were widely adopted by farmers and ranchers, the new treatments looked like a simple solution to an age-old problem. Parasites typically do not cause severe illness or death, but they do make animals grow more slowly and produce less meat, milk or wool. With the simple application of a drug, farmers were able to raise animals that were bigger, stronger and more productive. Veterinarians and parasitologists advised widespread use of the new drugs as a prophylactic. Rather than treating only the animals with heavy parasitic infections that were ill, farmers frequently started giving doses to all animals. "It was like a golden age where all of a sudden the parasites that farmers have been dealing with for so long were gone," Kaplan said. "Our animals never looked better, they never produced better, and so it made sense to keep giving animals these drugs."

But as farmers reaped the benefits, parasites were slowly evolving immunity to the drugs. Eventually, the drugs stopped working, and farmers scrambled for new pharmaceuticals-or made cocktails comprised of several drugs to keep the worms at bay.

Kaplan worries that if the industry continues to overuse the few remaining drugs that still work, widespread resistance will decrease the profitability of raising livestock and force more farmers out of business.

To correct the problem, Kaplan says farmers must adjust their attitudes about parasites and make some fundamental changes to how they care for their animals. "We're trying to change the paradigm of parasite control so that farmers are willing to accept a certain level of production loss in exchange for sustainability," Kaplan said. "We need to use less of these drugs and use them more intelligently and selectively."

The mere presence of parasites in an animal is no cause for alarm. In fact, it is something Kaplan would like farmers to view as natural and normal. Most animals have only low-level worm infections, so rather than treating every animal to prevent the development of worms, Kaplan suggests reserving drug use only for those animals that develop large or dangerous infections. This will limit the number of parasites exposed to the drugs, and slow the development of resistance.

Kaplan also suggests changing the ways in which farmers allow their animals to graze. The parasitic worms live in the gastrointestinal tract of livestock and eggs and are passed in animal feces. The eggs hatch and develop into worm larvae, which then crawl onto the grass. Livestock become infected when they graze on the pasture and ingest the larvae. If animals are allowed to graze freely on large, open pastures, they will naturally tend to favor some segments of the pasture more than others. As they congregate more in those areas, they come in contact with more fecal matter and, consequently, more parasites, he said.

A simple solution to this problem is to divide the pasture into segments with fencing and to periodically rotate animals to new grass. The new areas have fewer parasites, and many of the parasites left behind on old pasture will die naturally before the animals return.

"This decreases exposure," Kaplan said. "Although it's the same number of animals on the same amount of land, by rotating pastures, the animals are less exposed to the parasites and have less need for treatment."

These methods have proven successful in farms Kaplan has visited where parasite drug resistance was extremely high, and he hopes that they serve as an example to other farmers who might be hesitant to adopt the simple, more sustainable approach. "If you use a drug to kill an infectious agent such as bacteria, viruses or parasites, eventually you probably will get drug resistance," Kaplan said. "But how rapidly that occurs, whether it occurs over several years or several decades, will be determined by how the drug is used."

http://www.sciencedaily.com/releases/2012/07/120720135715.htm

Highly Transparent Solar Cells for Windows That Generate Electricity

UCLA researchers have developed a new transparent solar cell that is an advance toward giving windows in homes and other buildings the ability to generate electricity while still allowing people to see outside.

ScienceDaily - The UCLA team describes a new kind of polymer solar cell (PSC) that produces energy by absorbing mainly infrared light, not visible light, making the cells nearly 70% transparent to the human eye. Their study appears in the journal ACS Nano.They made the device from a photoactive plastic that converts infrared light into an electrical current.

"These results open the potential for visibly transparent polymer solar cells as add-on components of portable electronics, smart windows and building-integrated photovoltaics and in other applications," said study leader Yang Yang, a UCLA professor of materials science and engineering, who also is director of the Nano Renewable Energy Center at California NanoSystems Institute (CNSI). Yang added that there has been intense world-wide interest in so-called polymer solar cells. "Our new PSCs are made from plastic-like materials and are lightweight and flexible," he said. "More importantly, they can be produced in high volume at low cost."

Polymer solar cells have attracted great attention due to their advantages over competing solar cell technologies. Scientists have also been intensely investigating PSCs for their potential in making unique advances for broader applications. Several such applications would be enabled by high-performance visibly transparent photovoltaic (PV) devices, including building-integrated photovoltaics and integrated PV chargers for portable electronics. Previously, many attempts have been made toward demonstrating visibly transparent or semitransparent PSCs. However, these demonstrations often result in low visible light transparency and/or low device efficiency because suitable polymeric PV materials and efficient transparent conductors were not well deployed in device design and fabrication.

A team of UCLA researchers from the California NanoSystems Institute, the UCLA Henry Samueli School of Engineering and Applied Science and UCLA's Department of Chemistry and Biochemistry have demonstrated high-performance, solution-processed, visibly transparent polymer solar cells through the incorporation of near-infrared light-sensitive polymer and using silver nanowire composite films as the top transparent electrode. The near-infrared photoactive polymer absorbs more near-infrared light but is less sensitive to visible light, balancing solar cell performance and transparency in the visible wavelength region.

Another breakthrough is the transparent conductor made of a mixture of silver nanowire and titanium dioxide nanoparticles, which was able to replace the opaque metal electrode used in the past. This composite electrode also allows the solar cells to be fabricated economically by solution processing. With this combination, 4% power-conversion efficiency for solution-processed and visibly transparent polymer solar cells has been achieved. "We are excited by this new invention on transparent solar cells, which applied our recent advances in transparent conducting windows (also published in ACS Nano) to fabricate these devices," said Paul S.Weiss, CNSI director and Fred Kavli Chair in NanoSystems Sciences.

Study authors also include Weiss; materials science and engineering postdoctoral researcher Rui Zhu; Ph.D. candidates Chun-Chao Chen, Letian Dou, Choong-Heui Chung, Tze-Bin Song and Steve Hawks; Gang Li, who

is former vice president of engineering for Solarmer Energy, Inc., a startup from UCLA; and CNSI postdoctoral researcher Yue Bing Zheng.

Chun-Chao Chen, Letian Dou, Rui Zhu, Choong-Heui Chung, Tze-Bin Song, Yue Bing Zheng, Steve Hawks, Gang Li, Paul S. Weiss, Yang Yang. Visibly Transparent Polymer Solar Cells Produced by Solution Processing. ACS Nano, 2012; : 120712084458005 DOI: 10.1021/nn3029327

http://www.sciencedaily.com/releases/2012/07/120720135717.htm

Severe Flu Increases Risk of Parkinson's

Severe influenza doubles the odds that a person will develop Parkinson's disease later in life, according to University of British Columbia researchers.

ScienceDaily - However, the opposite is true for people who contracted a typical case of red measles as children -- they are 35 per cent less likely to develop Parkinson's, a nervous system disorder marked by slowness of movement, shaking, stiffness, and in the later stages, loss of balance.

The findings by researchers at UBC's School of Population and Public Health and the Pacific Parkinson's Research Centre, published online this month in the journal Movement Disorders, are based on interviews with 403 Parkinson's patients and 405 healthy people in British Columbia, Canada.

Lead author Anne Harris also examined whether occupational exposure to vibrations -- such as operating construction equipment -- had any effect on the risk of Parkinson's. In another study, published online this month by the American Journal of Epidemiology, she and her collaborators reported that occupational exposure actually decreased the risk of developing the disease by 33 percent, compared to people whose jobs involved no exposure.

Meanwhile, Harris found that those exposed to high-intensity vibrations -- for example, by driving snowmobiles, military tanks or high-speed boats -- had a consistently higher risk of developing Parkinson's than people whose jobs involved lower-intensity vibrations (for example, operating road vehicles). The elevated risk fell short of the statistical significance typically used to establish a correlation, but was strong and consistent enough to suggest an avenue for further study, Harris says.

"There are no cures or prevention programs for Parkinson's, in part because we still don't understand what triggers it in some people and not others," says Harris, who conducted the research while earning her doctorate at UBC. "This kind of painstaking epidemiological detective work is crucial in identifying the mechanisms that might be at work, allowing the development of effective prevention strategies."

Background information

Parkinson's disease results when brain cells that make the neurotransmitter dopamine are destroyed, preventing the brain from transmitting messages to muscles. The disease typically strikes people over age 50. Although some cases are genetic in origin, the cause for most cases of the disease is still unknown; possible explanations include repeated head trauma, or exposure to viruses or chemical compounds.

Treatment: There is no cure for Parkinson's, only medications to treat the symptoms.

Journal References:

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http://www.bbc.co.uk/news/health-18911272

'She went blue and shook from head to toe'

Loud noises, unexpected movements or simply touching can be enough to trigger seizures in newborn babies with "startle disease".

By Philippa Roxby Health reporter, BBC News

Their chest and throat muscles freeze, their limbs go rigid and sometimes their breathing stops. Comforting or cuddling these babies often makes it worse. But new research has discovered a major cause of the disorder and a genetic test for startle disease, or hyperekplexia, is now a possibility. For the 30 or 40 babies affected by the illness in the UK each year, this could transform their lives.

Scarlett Fifield, from Grimsby, was just three hours old when she was first startled. "I'd felt abnormal movements and vibrations in my tummy during pregnancy, sometimes 10 times a day," says her mother, Abbie. "Then when she was born she had her first seizure, went a bit blue and shook from head to toe. It was very frightening." The attacks became steadily worse, occurring whenever Scarlett was fed, winded or startled in any way, until on one occasion she stopped breathing and doctors had to resuscitate her. "Having a baby is meant to be the happiest time in your life, but we felt upset and really down. My hormones were all over the place."

Abbie couldn't breastfeed her daughter because Scarlett's mouth and nose were very sensitive and touching them would trigger convulsions. It took five weeks before Scarlett could finally go home from hospital. By then she had been diagnosed with hyperekplexia and was taking medication to control the attacks.

Gene work

The only cause of the disease was thought to be mutations in the GLRA1 gene. However, recent research, led by University College London and funded by Action Medical Research, has identified a second major cause of the disease - a mutation in the GlyT2 gene.

Dr Rhys Thomas, a clinical lecturer in neurology at Swansea University who helped carry out the research, says this discovery means families can get a definitive diagnosis. "An early genetic diagnosis means babies can be monitored. It's important they survive the first few years of life. "Hyperekplexia can be fatal and even though it's rare, we can be buying them 70 years of life."

Their research also means they can map out how the mutation will develop over time, and therefore how the disease will progress. With the help of doctors and researchers from all over the world, Dr Thomas and his colleague, Professor Robert Harvey from UCL's School of Pharmacy in London, believe they can find more changes in genes that cause startle disease. "We want to look at the unresolved cases and do genome sequencing to find out the causes in the remaining patients," says Prof Harvey. "We want to try to resolve it in its entirety."

'Tense up'

Doctors rarely see a baby with hyperekplexia or they often misdiagnose it as epilepsy - and that is part of the reason some children go undiagnosed. The disorder can have serious consequences, including sudden infant death, so early diagnosis and treatment is vital.

The good news is that the disorder tends to resolve itself and by adulthood is much less of a problem, although some children can experience delays in developing speech or walking. Some adults with the disorder, however, can find themselves dreading bonfire night, fearing slamming doors and other unexpected noises.

When babies are startled, triggering dangerous convulsions and stiffness, the nerve cells are being too easily excited because glycine receptors are impaired. "They tense up in reaction to a sudden noise but there's no relaxation afterwards," explains Prof Harvey.

Abbie remembers how relieved she was to find how what was wrong with Scarlett. "We thought we were going to lose her. We were relieved to know it wasn't such a bad thing, that Scarlett could live a normal life and that as they get older it gets better."

Eight-month-old Scarlett still occasionally has attacks, usually when she's asleep, her mother says.

"During the day she can make herself jump all the time but she just laughs now. A dog barking, a little tap on the back, if I walk into view... Anything like that can make it happen."