http://www.eurekalert.org/pub_releases/2011-03/uoc-eio032811.php

Early indications of Parkinson's disease revealed in dream sleep

During a large-scale study of the socioeconomic costs of this neurodegenerative disease, Danish researchers, some from the University of Copenhagen, discovered that very early symptoms of Parkinson's disease may be revealed in dream or REM sleep.

Parkinson's disease is a brain disease best known for the trembling it causes. It is an incurable, chronic disease and gradually affects the muscles and mental capacity, seriously afflicting the lives if the patient and his or her immediate relatives.

"In the study we saw that eight years before diagnosis, Parkinson's sufferers exhibited work and health indications that something was wrong," says Poul Jennum, professor of clinical neurophysiology at the Center for Healthy Ageing, University of Copenhagen, and the Sleep Centre at Glostrup Hospital.

Among the very early symptoms is the sleep disorder RBD, or REM sleep behaviour disorder. REM is a particular stage of sleep in which we dream, and our eyes flicker rapidly behind our eyelids, hence the term REM, or Rapid Eye Movement. To prevent us from actually acting out our dreams the body usually shuts down our muscle movement during REM sleep, but in RBD it is still active, and REM sleepers with RBD display a range of behaviours from simple arm and leg spasms to kicking, shouting, seizing or jumping out of bed.

"In some cases their behaviour may be violent and result in injuries to the patients or their partners," Professor Jennum explains. "Our hypothesis is that the very earliest stages of Parkinson's disease show up as various other diseases such as RBD," Jennum says.

In recent years, great advances have been made in the treatment of Parkinson's disease, but we still do not have therapies to mitigate the later symptoms, costs and increased mortality of the disease.

"This may become possible if we are able to intervene earlier, and if we are able to find clear indications of Parkinson's disease eight years sooner than we are now, this may give us an important tool. The question is of course whether we can actually say that RBD is always a very early marker for Parkinson's disease. That is what we are now investigating at the Sleep Centre at Glostrup Hospital," says Jennum.

Not surprisingly the study showed that Parkinson's sufferers are more often in contact with all sections of the health service, more often unemployed, more often on benefits, and on average cost the health service DKK 50,000 a year more than healthy control subjects.

For the study, researchers used the National Patient Register to identify all the patients diagnosed with Parkinson's disease between 1997 and 2007. 13,700 patients were compared to 53,600 healthy patients of the same sex, social class, educational background etc.

The study was carried out by researchers from the Center for Healthy Ageing, the Danish Center for Sleep Medicine, University of Copenhagen, Glostrup Hospital, Bispebjerg Hospital and the Danish Institute of Health Research, and was published in the Journal of Neurology, February 2011.

http://www.eurekalert.org/pub_releases/2011-03/acs-fct030911.php

From crankcase to gas tank: New microwave method converts used motor oil into fuel

ANAHEIM, March 28, 2011 - ***That dirty motor oil that comes out of your car or truck engine during oil changes could end up in your fuel tank, according to a report presented here today at the 241st National Meeting & Exposition of the American Chemical Society (ACS).***

It described development of a new process for recycling waste crankcase oil into gasoline-like fuel - the first, they said, that uses microwaves and has "excellent potential" for going into commercial use.

"Transforming used motor oil into gasoline can help solve two problems at once," said study leader Howard Chase, Professor of Biochemical Engineering at the University of Cambridge in the United Kingdom. "It provides a new use for a waste material that's too-often disposed of improperly, with harm to the environment. In addition, it provides a supplemental fuel source for an energy-hungry world."

Estimates suggest that changing the oil in cars and trucks produces about 8 billion gallons of used motor oil each year around the world. In the United States and some other countries, some of that dirty oil is collected and re-refined into new lubricating oil or processed and burned in special furnaces to heat buildings. Chase noted, however, that such uses are far from ideal because of concerns over environmental pollution from re-refining oil and burning waste oil. And in many other countries, used automotive waste oil is discarded or burned in ways that can pollute the environment.

Scientists thus are looking for new uses for that Niagara of waste oil, growing in volume as millions of people in China, India, and other developing countries acquire cars. Among the most promising recycling techniques is pyrolysis, a process that involves heating oil at high temperatures in the absence of oxygen. Pyrolysis breaks down the waste oil into a mix of gases, liquids, and a small amount of solids. The gases and

liquids can then be chemically converted into gasoline or diesel fuel. However, the current processes heat the oil unevenly, producing gases and liquids not easily converted into fuel.

Chase and his research team say the new method overcomes this problem and uses their new pyrolysis technology. In lab studies, his doctoral students, Su Shiung Lam and Alan Russell, mixed samples of waste oil with a highly microwave-absorbent material and then heated the mixture with microwaves. The pyrolysis process appears to be highly efficient, converting nearly 90 percent of a waste oil sample into fuel. So far, the scientists have used the process to produce a mixture of conventional gasoline and diesel.

"Our results indicate that a microwave-heated process shows exceptional promise as a means for recycling problematic waste oil for use as fuel," Chase and Lam said. "The recovery of valuable oils using this process shows advantage over traditional processes for oil recycling and suggests excellent potential for scaling the process to the commercial level."

http://www.eurekalert.org/pub_releases/2011-03/jhmi-jht032811.php

Johns Hopkins team identifies genetic link to attempted suicide

Findings could lead to new avenues of treatment research

A study of thousands of people with bipolar disorder suggests that genetic risk factors may influence the decision to attempt suicide. Johns Hopkins scientists, reporting in the journal Molecular Psychiatry, have identified a small region on chromosome 2 that is associated with increased risk for attempted suicide. This small region contains four genes, including the ACP1 gene, and the researchers found more than normal levels of the ACP1 protein in the brains of people who had committed suicide. This protein is thought to influence the same biological pathway as lithium, a medication known to reduce the rate of suicidal behavior.

The researchers say the findings could lead to better suicide prevention efforts by providing new directions for research and drug development. "We have long believed that genes play a role in what makes the difference between thinking about suicide and actually doing it," says study leader Virginia L. Willour, Ph.D., an assistant professor of psychiatry and behavioral sciences at the Johns Hopkins University School of Medicine.

Willour and her colleagues studied DNA samples from nearly 2,700 adults with bipolar disorder, 1,201 of them with a history of suicide attempts and 1,497 without. They found that those with one copy of a genetic variant in the region of chromosome 2 where ACP1 is located were 1.4 times more likely to have attempted suicide, and those with two copies were almost three times as likely.

Willour and her colleagues were able to replicate their findings in another group of samples: This one comprised DNA from more than 3,000 people with bipolar disorder. By using only DNA from people with bipolar disorder, the researchers say they were able to control for mental illness and narrow in on what may cause one group to attempt suicide and another to control those urges.

Suicide is estimated to kill 1.4 percent of the U.S. population, and roughly 4.6 percent of the population has attempted suicide at least once, Willour says. Among people with bipolar disorder, 47 percent think about killing themselves while 25 percent actually try to do it, she says.

Willour says the next steps are to replicate these findings and to determine the exact biological mechanisms through which these genetic risk factors increase the risk for suicidal behavior.

"What's promising are the implications of this work for learning more about the biology of suicide and the medications used to treat patients who may be at risk," Willour says. "Not everyone with bipolar disorder can take lithium because of its side effects. If we could give them another option, that would be fantastic."

The study was funded by grants from the National Institute of Mental Health and the American Foundation for Suicide Prevention.

Other Hopkins researchers who participated in the study are Fayaz Seifuddin, M.S.; Pamela B. Mahon, Ph.D.; Dubravka Jancic, Ph.D.; Mehdi Pirooznia, M.D., Ph.D.; Barbara Schweizer, R.N., B.S.; Fernando S. Goes, M.D.; Francis Mondimore, M.D.; Dean F. MacKinnon, M.D.; J. Raymond DePaulo Jr., M.D.; Peter P. Zandi, Ph.D.; and James B. Potash, M.D., M.P.H.

For more information: http://www.hopkinsmedicine.org/psychiatry/specialty_areas/moods/expert_team/willour.html

http://www.eurekalert.org/pub_releases/2011-03/uog-uy032511.php

'Spicing' up your love life possible, study finds

Looking to spice up your sex life? Try adding ginseng and saffron to your diet. Both are proven performance boosters, according to a new scientific review of natural aphrodisiacs conducted by University of Guelph researchers.

Indulge in wine and chocolate, too, but know that their amorous effects are likely all in your head. Stay away from the more obscure Spanish fly and Bufo toad. While purported to be sexually enhancing, they produced the opposite result and can even be toxic. Those are among the findings of the study by Massimo Marcone, a professor in Guelph's Department of Food Science, and master's student John Melnyk. The results will appear in the journal Food Research International but are available online now.

"Aphrodisiacs have been used for thousands of years all around the world, but the science behind the claims has never been well understood or clearly reported," Marcone said.

"Ours is the most thorough scientific review to date. Nothing has been done on this level of detail before now." There is a need for natural products that enhance sex without negative side effects, Melnyk added. Currently, conditions such as erectile dysfunction are treated with synthetic drugs, including sildenafil (commonly sold as Viagra) and tadalafil (Cialis). "But these drugs can produce headache, muscle pain and blurred vision, and can have dangerous interactions with other medications. They also do not increase libido, so it doesn't help people experiencing low sex drive," he said.

The researchers examined hundreds of studies on commonly used consumable aphrodisiacs to investigate claims of sexual enhancement - psychological and physiological. Ultimately, they included only studies meeting the most stringent controls.

The results? They found that panax ginseng, saffron and yohimbine, a natural chemical from yohimbe trees in West Africa, improved human sexual function. People report increased sexual desire after eating muira puama, a flowering plant found in Brazil; maca root, a mustard plant in the Andes; and chocolate. Despite its purported aphrodisiac effect, chocolate was not linked to sexual arousal or satisfaction, the study said.

"It may be that some people feel an effect from certain ingredients in chocolate, mainly phenylethylamine, which can affect serotonin and endorphin levels in the brain," Marcone said.

Alcohol was found to increase sexual arousal but to impede sexual performance.

Nutmeg, cloves, garlic, ginger, and ambergris, formed in the intestinal tract of the sperm whale, are among substances linked to increased sexual behaviour in animals.

While their findings support the use of foods and plants for sexual enhancement, the authors urge caution. "Currently, there is not enough evidence to support the widespread use of these substances as effective aphrodisiacs," Marcone said. "More clinical studies are needed to better understand the effects on humans."

http://www.scientificamerican.com/blog/post.cfm?id=the-dawn-of-beer-remains-elusive-in-2011-03-28

The dawn of beer remains elusive in archaeological record

By John Matson | Monday, March 28, 2011 | 16

NEW YORK CITY - *Who brewed - and then enjoyed - the first beer? The civilization responsible for the widely beloved beverage must have been a very old one, but we don't yet know who first brewed up a batch of beer, Christine Hastorf explained in a March 10 lecture at New York University on the archaeology of beer.*

Hastorf, a University of California, Berkeley, anthropologist, noted that documented evidence of beer-making stretches back several thousands of years, but "unfortunately we don't get a really deep story" beyond that. Looking at very early fire sites and settlements, Hastorf noted, "we can't say they were making beer or not."

One place they certainly were making beer is Mesopotamia, where cuneiform tablets record the trade of beer around 4000 BC. The Sumerians were so enthralled with beer that around 1800 BC, someone inscribed an ode to Ninkasi, the goddess of beer, on a tablet that survives today. The Hymn to Ninkasi features verses such as "Ninkasi, you are the one who pours out the filtered beer of the collector vat / It is [like] the onrush of Tigris and Euphrates," according to Ian S. Hornsey's 2003 A History of Beer and Brewing.

"Who has a goddess of beer who doesn't care about beer?" Hastorf asked rhetorically. "I think it's fair to say that beer was important in Mesopotamian life." Perhaps because Ninkasi was a female deity, Sumerian brewing was the realm of women.

Ancient Egypt also has a record of beer production thousands of years ago, including enough detail on the ingredients and processes to inspire breweries such as Newcastle and Kirin to make their own facsimiles. There were fairly large-scale brewing operations in Egypt, Hastorf said: "It wasn't just taverns and microbreweries and women producing it for their families."

A 2004 study in the Proceedings of the National Academy of Sciences pushes the history of fermented beverages back even further. In that study, Patrick McGovern of the University of Pennsylvania Museum of Archaeology and Anthropology and his colleagues presented evidence that neolithic Chinese villagers were making "a mixed fermented beverage of rice, honey, and fruit (hawthorn fruit and/or grape)" as early as 9,000 years ago. Dogfish Head brewery took a stab at reproducing the stuff, resulting in the award-winning - and potent - Chateau Jiahu. In terms of alcohol content, that beverage is closer to wine than beer, but its ingredients make it a sort of hybrid.

Hastorf ascribes the widespread popularity of early forms of beer - from the Fertile Crescent to Asia to South America, where chicha beer has its own long history - to a number of factors. It is a social beverage, certainly, which contributes to its ongoing popularity today. But perhaps of equal importance thousands of years ago were

beer's health benefits - its nutritional value and its importance as a purified drinking liquid in places where water supplies were unsafe.

On top of that, beer is relatively easy to brew and can be made from just about anything - all you need is water, cooking heat and some form of carbohydrate, along with enzymes and yeast that are abundant in nature. (The yeast can come from fruit; the enzymes from saliva.) "It's pretty darn easy to make," Hastorf said. She cited colleagues who have advanced theories that humans first domesticated cereal crops to make beer, not just bread, and that humans evolved to associate ethanol, which is present in ripe fruit, with satiety. The various lines of evidence indicate that beer may well be as old as cooking itself, which began at least 250,000 years ago. "When people started harnessing fire and cooking, they probably started making beer," Hastorf said.

http://www.eurekalert.org/pub_releases/2011-03/acs-sme030911.php

Safer, more effective skin-whitening creams from ancient Chinese herbal medicine

ANAHEIM - *Scientists today reported discovery of the active ingredients in an herb used in traditional Chinese medicine for skin whitening, changing skin color to a lighter shade.*

The ingredients are poised for clinical trials as a safer, more effective alternative to skin whitening creams and lotions that millions of women and some men use in Asia and elsewhere, they said. The report was among more than 9,500 presentations this week at the 241st National Meeting & Exposition of the American Chemical Society (ACS).

The finding, which caps an intense search for these natural skin lightening substances, could be a boon to women in Asian countries, said study leader Hui-Min Wang, Ph.D. He explained that skin whitening products are all the rage there, but too-often accompanied by itching, redness, inflammation, and other side effects.

"Toxic skin whitening creams are a growing threat to women's health, especially in Asia," Wang said. "We hope that our product will improve lives and provide a safer, more natural way to lighten skin. A cream based on these herbal ingredients could be available on store shelves in as little as a year."

Skin-whitening is big business in countries like China, Japan, Korea, and India, where many women view whiter skin as a symbol of beauty, good health, and high social status. One study estimates that half the women in Asian countries use skin lightening creams, spending the equivalent of several billion dollars annually. People also use such products to fade unsightly age spots, freckles, and scars that have collected pigment.

Dozens of skin whitening creams, lotions, and other products are on sale throughout Asia. Some products contain toxic mercury, hydroquinone, and other potentially toxic substances that can cause redness, itching, inflammation and other skin problems. Some whitening ingredients could increase the risk of skin cancer when used frequently and at high doses, Wang said, citing the need for safer, more effective alternatives.

Wang and colleagues say that they have found a promising alternative in the form of an herbal "cure-all" used in traditional Chinese medicine in the form of soup or tea. The evergreen bush, Cinnamomum subavenium, is a close relative of the trees whose inner bark is the source of cinnamon. The scientists isolated two chemicals from the plant that have the ability to block tyrosinase, an enzyme that controls the synthesis of melanin, a dark pigment responsible for coloring skin, hair, and eyes. Inhibiting tyrosinase is one of the major strategies for skin-whitening, Wang said.

They tested these so-called "melanogenesis inhibitors" on the embryos of zebrafish, which are widely used as stand-ins for people and other animals in biomedical research. The embryos contain a highly visible band of black pigment. Exposure to low levels of the two chemicals reduced melanin production in the fish embryos by almost 50 percent within just four days, turning the embryos snowy white, the scientists said.

"When we saw the results, we were amazed," said Wang, who is with Kaohsiung Medical University in Taiwan. "My first thought was, well, 'If these herbal whiteners can transform zebrafish embryos from black to white, maybe they can also lighten women's skin.'"

He estimated that the chemicals are 100 times more effective in reducing melanin pigmentation than the common skin whitening agents kojic acid and arbutin, which have been used in cosmetics for more than 30 years. The substances did not appear to be toxic when tested in low doses on both cultured human skin cells and zebrafish embryos, Wang noted.

Wang is looking forward to clinical trials of a new beauty product based on the ingredients. Just a one percent solution of the chemicals could achieve dramatic skin whitening, Wang said, adding that several cosmetic companies are working with his group. Wang and his colleagues have applied for patents in the U.S., Japan, and Taiwan.

The scientists acknowledge funding from the National Science Council of Taiwan, Ministry of Economic Affairs (Taiwan), and the Kaohsiung Medical University.

http://www.eurekalert.org/pub_releases/2011-03/plos-pgd032211.php

Parasite-induced genetically driven autoimmune chagas disease

Researchers have shown that the Trypanosoma cruzi agent of Chagas Disease (CD) invades host embryo cells and spreads its mitochondrial DNA (kDNA) minicircles into the host's genome.

Dr. Antonio Teixeira and associates at the University of Brasília, Brazil, inoculated virulent typanosomes in fertile chicken eggs and documented the heritability and fixation of the kDNA mutations in the chicks and their progeny. The results, published in the open-access journal PLoS Neglected Tropical Diseases on March 29th, show that kDNA-mutated chickens undergo genotype alterations, developing an inflammatory heart condition similar to Chagas disease in humans.

Chagas is one of the most lethal endemic infectious diseases in the Western Hemisphere, and although initially restricted to South America, it is now present in many parts of the world. This insect-born infection can also be transmitted from mother to child and via blood transfusion, and while acute infections are usually acquired in infancy or childhood, chronic Chagas disease kills many of those infected after they reach 40 years of age. The disease attacks the heart and is the most frequent cause of heart failure in endemic regions. While the treatment of Chagas disease with anti-trypanosomal nitroderivatives curtails the parasitic infection, it does not abrogate the destructive heart lesions which can lead to death.

An earlier study by Santos-Buch and Teixeira (1974) showed that immune lymphocytes from chagasic rabbits destroy embryo heart cells in vitro, and that this accelerated rejection of target cells occurred within 10 hours. Control, non-immune lymphocytes adhered to target heart cells 72 hours after incubation. Now, Dr Teixeira's research team describes the origin of the autoimmune rejection of the target heart cells in Chagas disease: "This chicken model was necessary to eliminate any residual active infection, because the birds are resistant to T. cruzi infection upon hatching. The kDNA-mutated chickens develop clinical signs of the heart disease and failure - their hearts are grossly enlarged and microscopic exams reveal that immune lymphocytes adhere to the target cells and lyses."

As Dr. Teixeira explains, this is "the first time that an autoimmune disease has been experimentally reproduced in an animal model, showing specific parasite induced kDNA modifications in coding regions of the host's genome".

FINANCIAL DISCLOSURE: This work was supported by the National Research Council-CNPq and by the Foundation for Science Development of the Federal District, Brazil. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

CITATION: Teixeira ARL, Gomes C, Nitz N, Sousa AO, Alves RM, et al. (2011) Trypanosoma cruzi in the Chicken Model: Chagas-Like Heart Disease in the Absence of Parasitism. PLoS Negl Trop Dis 5(3): e1000. doi:10.1371/journal.pntd.0001000

http://www.nytimes.com/2011/03/29/health/29really.html

The Claim: Dental Cavities Can Be Contagious.

By ANAHAD O'CONNOR

THE FACTS Everyone knows you can catch a cold or the flu. But can you catch a cavity?

Researchers have found that not only is it possible, but it occurs all the time.

While candy and sugar get all the blame, cavities are caused primarily by bacteria that cling to teeth and feast on particles of food from your last meal. One of the byproducts they create is acid, which destroys teeth.

Just as a cold virus can be passed from one person to the next, so can these cavity-causing bacteria. One of the most common is Streptococcus mutans. Infants and children are particularly vulnerable to it, and studies have shown that most pick it up from their caregivers - for example, when a mother tastes a child's food to make sure it's not too hot, said Dr. Margaret Mitchell, a cosmetic dentist in Chicago.

A number of studies have also shown that transmission can occur between couples, too. Dr. Mitchell has seen it in her own practice. "In one instance, a patient in her 40s who had never had a cavity suddenly developed two cavities and was starting to get some gum disease," she said. She learned the woman had started dating a man who hadn't been to a dentist in 18 years and had gum disease.

To reduce the risk, Dr. Mitchell recommends frequent flossing and brushing, and chewing sugar-free gum, which promotes saliva and washes away plaque and bacteria.

THE BOTTOM LINE Cavities can be transmitted from one person to another.

http://www.scientificamerican.com/article.cfm?id=why-escalators-brings-out-best-in-people

Why Escalators Bring out the Best in People

A curious connection between altitude and goodness

By David A. Schroeder | Tuesday, March 29, 2011 | 5

Let's say you are trying to sell cookies for a school fundraiser at the local mall, and you want to pick the ideal spot to set up your table. You'd probably look for an area with a lot of traffic. And once you'd picked your spot, you would no doubt give some thought to your pitch. A friendly hello and nice smile would set the

stage nicely. Perhaps it would be a good idea to offer samples or to have friends hanging around saying nice things about the cookies or the school. A recent Journal of Experimental Social Psychology article by Larry Sanna and his associates at the University of North Carolina suggests a more surprising factor that you might want to consider – proximity to an escalator.

Building on research showing the power of metaphors to shape our thinking, Sanna and his colleagues noted that height is often used as a metaphor for virtue: moral high ground, God on high, looking up to good people, etc. If people were primed to think about height, they wondered, might people be more virtuous?

In a series of four different studies, the authors found consistent s*up*port for their predictions. In the first study they found that twice as many mall shoppers who had just ridden an *up* escalator contributed to the Salvation Army than shoppers who had just ridden the *down* escalator. In a second study, participants who had been taken *up* a short flight of stairs to an auditorium stage to complete a series of questionnaires volunteered more than 50 percent more of their time than participants who had been led *down* to the orchestra pit.

A third study took yet another approach. Participants were to decide how much hot sauce to give to a participant purportedly taking part in a food-tasting study. Those who were *up* on the stage gave only half as much of the painfully hot sauce to the other person as did those who were sitting *down* in the orchestra pit. In a final study, participants watched film clips of scenes taken from an airplane above the clouds, or through the window of a passenger car. Participants who had watched the clip of flying *up* above the clouds were 50 percent more cooperative in a computer game than those who had watched the car ride *down* on the ground.

Overall these studies show remarkable consistency, linking height and different prosocial behaviors - i.e., donations, volunteering, compassion, and cooperation. While we may be inclined to think that our behaviors are the product of comprehensive thought processes, carefully weighing the pros and cons of alternatives, these results clearly show that this is not always the case.

Initial forays into understanding when and why help might be given to those in need began after the well-publicized murder of Kitty Genovese nearly 50 years ago, an attack that many people may have witnessed but did nothing to stop. That original work identified numerous situational factors that seemed to explain why help was not rendered, including important social factors related to how the presence of other people may cause people to misinterpret the situation as not being an emergency or to abdicate personal responsibility to provide the aid, even if the need for help is clear.

More recently researchers have recognized the roles played by dispositions. Personality factors may lead some people to be more prosocial than others: those who empathize with others and "feel their pain" may be more likely to get involved and offer help. Individuals with a sense of self-efficacy, that is, a belief that they can accomplish whatever they set out to do, may also be more likely to help others.

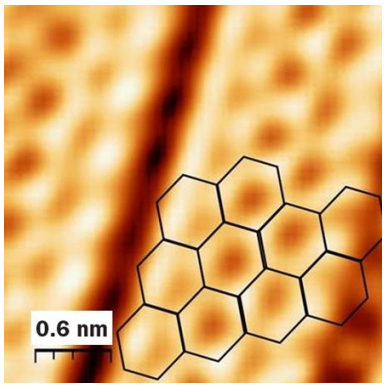
What the present research adds is that unconscious processes may also be important in determining whether we will act to help others. Sanna's work expands a multilevel perspective of prosocial behavior by recognizing that even the most subtle of situational cues (e.g., metaphorical devices that arouse relevant unconscious thought) may make people more helpful. Perhaps understanding the impact of these myriad factors more fully will help make our world a more helpful and cooperative place to live.

http://www.sciencenews.org/view/generic/id/71705/title/Silicene_It_could_be_the_new_graphene

Silicene: It could be the new graphene

Single-layer sheets of silicon might have electronic applications

By Devin Powell



Silicon atoms (bright spots) in a honeycomb pattern are a new type of material known as silicene. **Credit: Bernard Aufray / CNRS, Hamid Oughaddou / University of Cergy**

The hottest celebrity in the world of nanomaterials may soon face a new rival. Inspired by the Nobel Prize-winning creation of the carbon material known as graphene, physicists have now created atom-thin sheets of carbon's big brother, silicon.

Silicon shares many properties with carbon, which sits just above silicon on the periodic table. In 2007 Lok Lew Yan Voon and then-graduate student Gian Guzmán-Verri of Wright State University in Dayton, Ohio, proposed that silicon could exist in flat sheets similar to graphene, even though silicon doesn't naturally form the kind of atomic bonds needed to accomplish this. They coined the new term for this material: silicene.

"Silicon has the advantage of being more integratable in today's electronics," said Antoine Fleurence, a physicist at the Japan Advanced Institute of Science and Technology in Ishikawa. The semiconductor industry

has spent decades building the infrastructure needed to manipulate silicon to create the chips that run modern electronics.

Speaking March 24 at a meeting in Dallas of the American Physical Society, Fleurence described a new recipe for making silicene. He and his Japanese colleagues grew a thin layer of silicon on top of the ceramic material zirconium diboride. X-rays shined on this thin layer of silicon revealed a honeycomb of hexagons similar to the structure of graphene. This structure looks familiar to Guy Le Lay, a physicist at the University of Provence in Marseille, France. Last year, he created the first-ever silicene ribbons. Le Lay described these 1.6-nanometer wide stripes of honeycombed atoms, grown on top of silver, in the June 28 Applied Physics Letters.

"These ribbons can be more than a hundred nanometers long, perhaps micrometers," Le Lay says.

New data from Le Lay's group, also presented at the physical society meeting, suggests that silicene and graphene share not only a similar structure, but possibly similar electronic properties. Spectroscopic techniques provided evidence that silicene contains a Dirac cone - the entity that intrigues scientists because it allows electrons to move very quickly through graphene, which makes graphene a promising material for flexible electronics.

To prove silicene's worth, though, Le Lay will need to grow it not on silver - which, as an electrical conductor can interfere with the movement of electrons in the single-layer silicon - but on an insulating material. On an insulating platform, physicists will be able to do direct tests of the material's electronic properties and experiments to determine whether the same quantum effects that make graphene so remarkable are at work.

For silicene to compete with graphene in the long run, however, the process of creating it must be comparably simple, says Sankar Das Sarma, a physicist who studies graphene at the University of Maryland in College Park. "Graphene really took off in 2004 because it was so easy to make," he says.

Competing with graphene in this regard won't be easy: The Russian scientists who first made graphene in 2004 - and won the 2010 Nobel Prize in Physics for their efforts - did it using only a piece of Scotch tape and a chunk of graphite similar to pencil lead.

http://www.eurekalert.org/pub_releases/2011-03/acs-waf030911.php

Waste ash from coal could save billions in repairing US bridges and roads

ANAHEIM - ***Coating concrete destined to rebuild America's crumbling bridges and roadways with some of the millions of tons of ash left over from burning coal could extend the life of those structures by decades, saving billions of dollars of taxpayer money, scientists reported here today at the 241st National Meeting & Exposition of the American Chemical Society.***

They reported on a new coating material for concrete made from flyash that is hundreds of times more durable than existing coatings and costs only half as much.

Study leader Charles Carraher, Ph.D., explained that the more than 450 coal-burning electric power plants in the United States produce about 130 million tons of "flyash" each year. Before air pollution laws, those fine particles of soot and dust flew up smokestacks and into the air. Power plants now collect the ash.

"Flyash poses enormous waste disposal problems," Carraher said. "Some of it does get recycled and reused. But almost 70 percent winds up in landfills every year, where space is increasingly scarce and expensive. Our research indicates that this waste could become a valuable resource as a shield-like coating to keep concrete from deteriorating and crumbling as it ages."

Carraher, who is with Florida Atlantic University, said that the new material can be used to coat and protect from corrosion steel reinforcing bar, or "rebar," rods embedded in concrete to reinforce and strengthen it. The coating also is suitable for repairing damaged concrete. This is part of a joint project between industry (Felix Achille, of Blue World Crete) and academia (Charles E. Carraher, Ph.D., Dept. of Chemistry and Biochemistry; Madasamy Arockiasamy, Ph.D., Dept. of Civil Engineering; and Perambur Neelakantaswamy, Ph.D., Dept. Electrical Engineering and Computer Science).

Laboratory tests have shown that the coating has excellent strength and durability when exposed to heat, cold, rain, and other simulated environmental conditions harsher than any that would occur in the real world, Carraher said. The coating protected concrete from deterioration, for instance, that involved exposure to the acids in air pollution that were 100,000 times more concentrated than typical outdoor levels environment. Coated concrete remained strong and intact for more than a year of observation, while ordinary concrete often began to crumble within days, he said.

Carraher cited U.S. Environmental Protection Agency estimates for the cost for repair, restoration, and replacement of concrete in domestic wastewater and drinking water systems. They range up to $1.3 trillion, and by some accounts must be completed by 2020 to avoid environmental and public health crisis problems. Crumbling concrete roads and bridges will require hundreds of billions more.

Use of the coating could extend the lifespan of those structures, with enormous savings, while helping to solve the flyash disposal problem, Carraher noted.

http://www.eurekalert.org/pub_releases/2011-03/w-csr033011.php

Case study reports singing lowers patient's blood pressure prior to surgery

Singing may offer alternative therapy for chronic pain; surgical interventions in osteoarthritis

Doctors report that singing reduced the blood pressure of a 76-year-old woman who had experienced severe preoperative hypertension prior to total knee replacement surgery for osteoarthritis (OA). While the patient was unresponsive to aggressive pharmacologic interventions, the woman's blood pressure dropped dramatically when she sang several religious songs. This case-report appears in the April issue of Arthritis Care & Research, a journal published by Wiley-Blackwell on behalf of the American College of Rheumatology (ACR).

Traditional therapy for preoperative hypertension, doctors say, involves drug-based therapies that include diuretics, beta blockers, calcium-channel blockers, and angiotensin-converting enzyme (ACE) inhibitors. These medications are used to lower blood pressure to acceptable levels for surgery, however, a number of patients do not respond to these treatments. In patients unresponsive to standard therapies, as in the current case study patient, alternative hypertension interventions are needed.

Several studies suggest that listening to music can be effective in reducing blood pressure by calming or diverting patients prior to surgery, which lessens stress and anxiety," explains lead author Nina Niu, a researcher from Harvard Medical School in Boston. "Our case study expands on medical evidence by showing that producing music or singing also has potential therapeutic effects in the preoperative setting."

The current case subject was a 76-year-old woman from the Dominican Republic who had hypertension and a 15-year history of bilateral knee OA. The patient was treated with ACE inhibitors and calcium-channel blockers for high blood pressure and diclofenac, a non-steroidal anti-inflammatory drug (NSAID), for knee pain. She was accepted into Operation Walk Boston, a philanthropic program providing total join replacement to poor Dominican patients with advanced OA of the hip or knee. The case study authors served as members of her medical team.

Upon admission to the hospital for surgery the patient's blood pressure was 160/90 mm Hg, controlled by her normal regimen of nifedipine and lisinopril. In the preoperative area, the woman's blood pressure increased to 240/120 mm Hg and persisted, requiring doctors to postpone surgery. The Operation Walk medical team was onsite site at the Dominican hospital for a limited time; therefore it was imperative that the patient's blood pressure be reduced so surgery could proceed.

The patient asked doctors if she could sing, which the patient reported doing frequently to calm herself down and to help with sleeping. The medical team encouraged her to so, and after two songs checked her blood pressure which had lowered to 180/90 mm Hg. With continued singing for 20 minutes, the patient's blood pressure remained lower and persisted for several hours after. As instructed by doctors, the patient sang periodically through the night which kept her blood pressure at acceptable levels. The following morning, the woman was cleared for knee replacement surgery, which was successful and without complications.

Niu commented, "Singing is simple, safe, and free. Patients should be encouraged to sing if they wish." This single case study showed the positive effective of singing in reducing blood pressure and controlling pain. "To be formally considered as an alternative therapy for the OA patient population, larger studies are needed to explore the effects of signing on hypertension and chronic pain relief," said Niu.

This study is published in Arthritis Care & Research. Media wishing to receive a PDF of this article may contact healthnews@wiley.com.

Full citation: "Singing Intervention for Preoperative Hypertension Prior to Total Joint Replacement: A Case Report." Nina N. Niu, María Teresa Perez, and Jeffrey N. Katz. Arthritis Care and Research; Published Online: March 30, 2011 (DOI: 10.1002/acr.20406); Print Issue Date: April 2011. http://onlinelibrary.wiley.com/doi/10.1002/acr.20406/abstract

http://www.eurekalert.org/pub_releases/2011-03/bifa-nss032411.php

Nature study shows common lab dye is a wonder drug - for worms

Basic Yellow 1 profoundly extends lifespan in healthy nematodes, and slows Alzheimer's disease-like pathology in worms

Basic Yellow 1, a dye used in neuroscience laboratories around the world to detect damaged protein in Alzheimer's disease, is a wonder drug for nematode worms. In a study appearing in the March 30, online edition of Nature, the dye, also known as Thioflavin T, (ThT) extended lifespan in healthy nematode worms by more than 50 percent and slowed the disease process in worms bred to mimic aspects of Alzheimer's. The research, conducted at the Buck Institute for Research on Aging, could open new ways to intervene in aging and age-related disease. The study highlights a process called protein homeostasis – the ability of an organism to maintain the proper structure and balance of its proteins, which are the building blocks of life. Genetic

studies have long indicated that protein homeostasis is a major contributor to longevity in complex animals. Many degenerative diseases have been linked to a breakdown in the process. Buck faculty member Gordon Lithgow, PhD, who led the research, said this study points to the use of compounds to support protein homeostasis, something that ThT, did as the worms aged.

ThT works as a marker of neurodegenerative diseases because it binds amyloid plaques – the toxic aggregated protein fragments associated with Alzheimer's. In the nematodes ThT's ability to not only bind, but also slow the clumping of toxic protein fragments, may be key to the compound's ability to extend lifespan, according to Lithgow. "We have been looking for compounds that slow aging for more than ten years and ThT is the best we have seen so far," said Lithgow. "But more exciting is the discovery that ThT so dramatically improves nematode models of disease-related pathology as well," said Lithgow, who said the discovery brings together three crucial concepts in the search for compounds that could extend healthspan, the healthy years of life. "ThT allows us to manipulate the aging process, it has the potential to be active in multiple disease states and it enhances the animal's innate ability to deal with changes in its proteins."

The research was the brainchild of Silvestre Alavez, PhD, a staff scientist in the Lithgow lab. Alavez was trained in neuroscience and knew about the use of these compounds to detect disease-related proteins. With the idea that small molecules could impact protein aggregation, he looked at 10 compounds and found five that were effective in increasing lifespan in the worms. Alavez said curcumin, the active ingredient in the popular Indian spice turmeric, also had a significant positive impact on both healthy worms and those bred to express a gene associated with Alzheimer's. "People have been making claims about the health benefits of curcumin for many years. Maybe slowing aging is part of its mechanism of action," said Alavez. Curcumin is currently being tested in several human clinical trials for conditions ranging from colon cancer to rheumatoid arthritis to depression. Alavez says the study supports the concept that protein homeostasis should be the focus of future research. "We now have an exciting new avenue in the search for compounds that both extend lifespan and slow disease processes," said Alavez. "Any small molecule that maintains protein homeostasis during aging could be active against multiple disease states." Follow up research on ThT is now underway in mice bred to have Alzheimer's.

Other Buck Institute researchers involved in the study include Maithili C. Vantipalli; Ida M. Klang, a graduate student from the Karolinksa Institute in Stockholm, Sweden; and David Zucker, a student from Dominican University, CA. The work was supported by grants from the Larry L. Hillblom Foundation; the National Institutes of Health supporting the Buck Institute's Interdisciplinary Research Consortium on Geroscience; the National Institute on Aging (through the American Recovery and Reinvestment Act of 2009); and the Longevity Consortium.

http://www.eurekalert.org/pub_releases/2011-03/jhmi-cho033011.php

Could HIV-infected organs save lives?

Johns Hopkins researchers argue for reversing ban on transplanting infected organs and making them available to HIV-infected patients

If Congress reversed its ban on allowing people with HIV to be organ donors after their death, roughly 500 HIV-positive patients with kidney or liver failure each year could get transplants within months, rather than the years they currently wait on the list, new Johns Hopkins research suggests.

"If this legal ban were lifted, we could potentially provide organ transplants to every single HIV-infected transplant candidate on the waiting list," says Dorry L. Segev, M.D., Ph.D., an associate professor of surgery at the Johns Hopkins University School of Medicine and the study's senior author. "Instead of discarding the otherwise healthy organs of HIV-infected people when they die, those organs could be available for HIV-positive candidates."

Not only would HIV-positive transplant candidates get organs sooner if such transplants were legalized, Segev says, but by transplanting those patients and moving them off the waiting list, the time to transplant would be shorter for non-HIV-infected patients.

The ban on organ donation by HIV-positive patients is a relic of the 1980s, when it was still unclear what caused AIDS, at the time a devastating new epidemic sweeping the United States. Congress put the ban into the National Organ Transplant Act of 1984 and it has never been updated, despite the fact that HIV is no longer an immediate death sentence but a chronic disease managed with medication.

The number of HIV-positive patients receiving kidney or liver transplants - with non-HIV-infected organs - is on the rise as doctors become more comfortable with the idea, and patients are having good outcomes, Segev says. In 2009, more than 100 HIV-positive patients got new kidneys and 29 got new livers. HIV-infected patients may encounter accelerated rates of liver and kidney disease due in part to the toxic effects of antiretroviral therapy, the medications that keep HIV at bay.

Segev and his colleagues set out in their study, published early online in the American Journal of Transplantation, to estimate the number of people who die each year in the United States who are good potential organ donors except for that they are HIV-positive. They culled data from two main sources - the Nationwide Inpatient Study, which has information on in-hospital deaths of HIV-infected patients, and the HIV Research Network, a nationally representative registry of people with HIV. The team determined that the number of annual deaths with what are believed to be organs suitable for transplantation was approximately the same as estimated by each data source - an average of 534 each year between 2005 and 2008 in the Nationwide Inpatient Study and an average of 494 each year between 2000 and 2008 in the HIV Research Network.

While no transplants of HIV-infected organs into HIV-infected patients have been done in the United States because of the ban, Segev says doctors in South Africa have started doing this type of transplant with excellent results.

Segev suggests that, in transitioning to a system where HIV-infected donor organs can be transplanted into HIV-infected patients, doctors can call on the lessons and experience of transplanting hepatitis C patients with organs from people with the same disease. This practice, which has not always been the standard, has substantially shortened the waiting list for these recipients without significantly compromising patient or graft survival. The decision of whether or not to use these organs is not a legal one, but one made by the clinician.

Using HIV-infected organs is not without concerns. There are medical and safety issues that need to be addressed. Doctors need to make sure that the harvested organs are healthy enough for transplant and that there is minimal risk of infecting the recipient with a more aggressive strain of the virus. There is also a fear that an HIV-infected organ could accidentally be transplanted into an HIV-negative recipient. Segev says that hepatitis C-infected organs are clearly marked as such and similar protocols can be developed with HIV-infected organs.

"The same processes that are in place to protect people from getting an organ with hepatitis C accidentally could be put in place for HIV-infected organs," Segev says. "When you consider the alternative - a high risk of dying on the waiting list - then these small challenges are overshadowed by the large potential benefit."

Segev says eliminating the prohibition on HIV-infected organ donation would have immediate results. At first, he predicts, there would be more HIV-infected organs than people on the waiting list. Then, as doctors realized that their HIV-infected patients would no longer have to wait five-to-seven years for a transplant, Segev says he thinks more and more HIV-infected patients would sign up for the shortened list for an HIV-infected organ.

"The whole equation for seeking a transplant for someone with HIV and kidney or liver failure would change if this source of organs became available," he says. "We want the decisions taken out of the hands of Congress and put into the hands of clinicians."

This research was supported by a grant from the National Institute of Diabetes and Digestive and Kidney Diseases.
Other Johns Hopkins researchers contributing to this study include Brian J. Boyarsky, B.A.; Erin C. Hall, M.D., M.P.H.; Andrew L. Singer, M.D., Ph.D.; Robert A. Montgomery, M.D., D.Phil.; and Kelly A. Gebo, M.D., M.P.H.
For more information: http://www.hopkinsmedicine.org/transplant/About/Segev.html

http://www.physorg.com/news/2011-03-media-uncommon-goodness-good-people.html

Study says media reports about uncommon acts of goodness can make good people even better

People with a strong moral identity are measurably inspired to do good after being exposed to media stories about uncommon acts of human goodness, according to research at the University of British Columbia's Sauder School of Business.

To appear in a forthcoming issue of the Journal of Personality and Social Psychology, the research shows a direct link between exposure to media accounts of extraordinary virtue and "moral elevation" – a suite of thoughts and emotions about being a better person that can lead to "pro-social" action.

"The news media have a tendency to celebrate bad behaviour, from Charlie Sheen's recent exploits to articles that focus the spotlight on criminal and other aberrant behaviour," says lead author Karl Aquino, a professor at the Sauder School of Business who studies issues such as social status and dominance, forgiveness and reconciliation, workplace victimization and moral behavior.

"Our study indicates that if more attention was devoted to recounting stories of uncommon acts of human virtue, the media could have a quantifiable positive effect on the moral behavior of a significant group of people."

Aquino and co-author Brent McFerran, an assistant professor of marketing at the University of Michigan, investigated whether people who experience moral elevation are more readily disposed to taking positive moral action, including giving to charity.

In one of the four studies reported in their paper, the researchers conducted an experiment with 63 subjects to determine if people influenced to identify in terms of their morality were more likely to experience moral elevation after reading a news item recounting a story of uncommon goodness.

The researchers also wanted to determine if these moral self-identifiers were more likely to display pro-social behavior after reading a news story recounting an act uncommon goodness versus a story focused merely on positive human interaction.

In the first part of the experiment, one random group of subjects was primed to see themselves in terms of their moral identity by completing a word search including morally connotative words, such as compassionate, honest and kind. A second group completed a word search comprised of morally neutral words.

The subjects were then randomly assigned to read one of two news stories. Both of the stories were about positive human interactions, but only one recounted an act of uncommon goodness. It described a 2006 shooting at an Amish schoolhouse in which parents offered forgiveness and financial assistance to the widow of the man that shot their children within days of the incident. The second story recounted a couples' experience of seeing a beautiful sunset.

Subjects then completed questionnaires asking them to divide 10 dollars between themselves and an unknown partner in another room. Participants who read the Amish story and who were influenced to think about themselves in terms of their moral identity gave 32 per cent more money on average to their partners than the subjects who were not influenced to think in terms of their moral identity.

Further, it was found that reading stories of uncommon moral goodness had a significant positive effect on the way moral self-identifiers shared funds. These subjects shared an average of 24 per cent more after reading the story of uncommon goodness over the amount they were willing to give after reading the merely positive story.

Based on his research, Aquino says the media could play a strategic role in helping the fundraising efforts for natural disasters like the recent earthquake in Japan. "Focusing on individual examples of extraordinary goodness within the crisis may be a more effective and subtle way to encourage people to donate than inundating them with stories and pictures of need and desperation." *Provided by University of British Columbia*

http://www.physorg.com/news/2011-03-asteroid.html

When is an asteroid not an asteroid?

PhysOrg.com - *On March 29, 1807, German astronomer Heinrich Wilhelm Olbers spotted Vesta as a pinprick of light in the sky.*

Two hundred and four years later, as NASA's Dawn spacecraft prepares to begin orbiting this intriguing world, scientists now know how special this world is, even if there has been some debate on how to classify it.

Vesta is most commonly called an asteroid because it lies in the orbiting rubble patch known as the main asteroid belt between Mars and Jupiter. But the vast majority of objects in the main belt are lightweights, 100-kilometers-wide (about 60-miles wide) or smaller, compared with Vesta, which is about 530 kilometers (330 miles) across on average. In fact, numerous bits of Vesta ejected by collisions with other objects have been identified in the main belt.

"I don't think Vesta should be called an asteroid," said Tom McCord, a Dawn co-investigator based at the Bear Fight Institute, Winthrop, Wash. "Not only is Vesta so much larger, but it's an evolved object, unlike most things we call asteroids." The layered structure of Vesta (core, mantle and crust) is the key trait that makes Vesta more like planets such as Earth, Venus and Mars than the other asteroids, McCord said. Like the planets, Vesta had sufficient radioactive material inside when it coalesced, releasing heat that melted rock and enabled lighter layers to float to the outside. Scientists call this process differentiation.

McCord and colleagues were the first to discover that Vesta was likely differentiated when special detectors on their telescopes in 1972 picked up the signature of basalt. That meant that the body had to have melted at one time.

Officially, Vesta is a "minor planet" - a body that orbits the sun but is not a proper planet or comet. But there are more than 540,000 minor planets in our solar system, so the label doesn't give Vesta much distinction. Dwarf planets – which include Dawn's second destination, Ceres - are another category, but Vesta doesn't qualify as one of those. For one thing, Vesta isn't quite large enough.

This image shows a model of the protoplanet Vesta, using scientists' best guess to date of what the surface of the protoplanet might look like. **Credit: NASA/JPL-Caltech/UCLA/PSI**

Dawn scientists prefer to think of Vesta as a protoplanet because it is a dense, layered body that orbits the sun and began in the same fashion as Mercury, Venus, Earth and Mars, but somehow never fully developed. In the swinging early history of the solar system, objects became planets by merging with other Vesta-sized objects. But Vesta never found a partner during the big dance, and the critical time passed. It may have had to do with the nearby presence of Jupiter, the neighborhood's gravitational superpower, disturbing the orbits of objects and hogging the dance partners.

Other space rocks have collided with Vesta and knocked off bits of it. Those became debris in the asteroid belt known as Vestoids, and even hundreds of meteorites that have ended up on Earth. But Vesta never collided with something of sufficient size to disrupt it, and it remained intact. As a result, Vesta is a time capsule from that earlier era.

"This gritty little protoplanet has survived bombardment in the asteroid belt for over 4.5 billion years, making its surface possibly the oldest planetary surface in the solar system," said Christopher Russell, Dawn's principal investigator, based at UCLA. "Studying Vesta will enable us to write a much better history of the solar system's turbulent youth."

Dawn's scientists and engineers have designed a master plan to investigate these special features of Vesta. When Dawn arrives at Vesta in July, the south pole will be in full sunlight, giving scientists a clear view of a huge crater at the south pole. That crater may reveal the layer cake of materials inside Vesta that will tell us how the body evolved after formation. The orbit design allows Dawn to map new terrain as the seasons progress over its 12-month visit. The spacecraft will make many measurements, including high-resolution data on surface composition, topography and texture. The spacecraft will also measure the tug of Vesta's gravity to learn more about its internal structure.

"Dawn's ion thrusters are gently carrying us toward Vesta, and the spacecraft is getting ready for its big year of exploration," said Marc Rayman, Dawn's chief engineer at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "We have designed our mission to get the most out of this opportunity to reveal the exciting secrets of this uncharted, exotic world." *Provided by JPL/NASA*

http://www.physorg.com/news/2011-03-repellent-treated-outdoor-workers.html

Repellent-treated clothing nearly eliminates tick bites for outdoor workers

PhysOrg.com - *A pilot study shows clothes treated with long-lasting insect repellant appear to offer outdoor workers significant protection against tick bites.*

The study, conducted by researchers at the University of North Carolina at Chapel Hill Gillings School of Global Public Health, found 93 percent fewer tick attachments among a group of state water quality employees who wore Insect Shield Repellent Apparel, compared to workers in similar environments who used spray repellants or other tick bite prevention methods.

The findings were published this month in the journal Vector-Borne and Zoonotic Diseases.

Tick-borne diseases are a significant concern for millions of people who live and work in tick-infested habitats. If not treated early, these diseases can lead to severe illness or even death, said Steve Meshnick, M.D., Ph.D., UNC epidemiology professor and lead author of the study. Over the past two decades, the rate of diseases such as Lyme disease and Rocky Mountain spotted fever has increased.

“The technology holds the promise of a safe, simple and effective way to protect people from ticks and other insects,” Meshnick said. “If further studies show similar results, the apparel could be used by people who are often outdoors for work or recreation or both. I can envision many uses around the world, including in developing countries to prevent malaria spread by mosquitoes.”

Apparel treated with a special process for treating clothes with permethrin (a synthetic chemical approved for use as a contact repellent and insecticide) has been shown to repel mosquitoes, ants, flies, chiggers and midges (no-see-ums) for up to 70 launderings.

Epidemiology graduate student and study co-author Meagan Vaughn conducted the pilot study from March through September 2009 in outdoor workers from the North Carolina Division of Water Quality. Sixteen employees from the wetlands and permitting unit were selected because of the high number of work-related tick bites they reported in previous years. Nine employees wore Insect Shield treated clothing, while seven were in a control group who wore untreated clothing and continued their usual efforts to repel ticks, including use of spray repellents.

Results showed that for every 100 hours spent outdoors, the group wearing treated clothing had 99 percent fewer tick attachments during work hours and 93 percent fewer tick attachments overall than the control group. Based on the pilot study results, researchers from UNC and N.C. State University were awarded a $1.2 million, four-year grant from the U.S. Centers for Disease Control and Prevention’s National Institute for Occupational Safety and Health. Researchers have enrolled more than 120 outdoor workers in the state’s Divisions of

Forestry, Parks and Recreation, and Wildlife Resources. Workers are randomly assigned to wear treated or untreated uniforms for two tick seasons. Neither participants nor investigators will know who is wearing which type of uniform. All participants will be monitored carefully for tick bites and tick-borne illnesses.

"Insect Shield is proud to partner with the UNC Gillings School of Global Public Health on these important research projects," said Richard Lane, the company's president. "We expect that the large study will corroborate the pilot study and further confirm that these treatments can prevent serious tick-borne diseases like Lyme disease and Rocky Mountain spotted fever."

More information: Journal link: http://www.liebert ... line.com/vbz Provided by University of North Carolina at Chapel Hill

http://www.dailymail.co.uk/news/article-1369595/Jacob-Barnett-12-higher-IQ-Einstein-develops-theory-relativity.html

Autistic boy,12, with higher IQ than Einstein develops his own theory of relativity

A 12-year-old child prodigy has astounded university professors after grappling with some of the most advanced concepts in mathematics.

Jacob Barnett has an IQ of 170 - higher than Albert Einstein - and is now so far advanced in his Indiana university studies that professors are lining him up for a PHD research role.

The boy wonder, who taught himself calculus, algebra, geometry and trigonometry in a week, is now tutoring fellow college classmates after hours. And now Jake has embarked on his most ambitious project yet - his own 'expanded version of Einstein's theory of relativity'.

His mother, not sure if her child was talking nonsense or genius, sent a video of his theory to the renowned Institute for Advanced Study near Princeton University.

Gifted: Aspergers syndrome and the conditions affecting child development

Autism: *A condition that starts in early childhood, usually involving serious developmental disabilities with social interaction and communication.*

People with this disorder can have a range of abilities, from being severely disabled to gifted. It is estimated one in every 150 child has the condition.

Aspergers: *A syndrome that is similar to autism, but with the distinction that those with it typically function better, have normal intelligence and near-normal language development.*

Savant: *Rare condition in which persons with developmental disorders have astonishing islands of ability, brilliance or talent that stand in stark contrast to overall limitations.*

According to the Indiana Star, Institute astrophysics professor Scott Tremaine -himself a world renowned expert - confirmed the authenticity of Jake's theory. In an email to the family, Tremaine wrote: 'I'm impressed by his interest in physics and the amount that he has learned so far.

'The theory that he's working on involves several of the toughest problems in astrophysics and theoretical physics. 'Anyone who solves these will be in line for a Nobel Prize.'

But for his mother Kristine Barnett, 36, and the rest of the family, maths remains a tricky subject. Speaking to the paper, Mrs Barnett said: 'I flunked math. I know this did not come from me.'

And it hasn't gone un-noticed by Jake, who added: 'Whenever I try talking about math with anyone in my family they just stare blankly.'

Jake was diagnosed with Aspergers syndrome, a mild form of autism, from an early age. His parents were worried when he didn't talk until the age of two, suspecting he was educationally abnormal. It was only as he began to grow up that they realised just how special his gift was. He would fill up note pads of paper with drawings of complex geometrical shapes and calculations, before picking up felt tip pens and writing equations on windows.

By the age of three he was solving 5,000-piece puzzles and he even studied a state road map, reciting every highway and license plate prefix from memory. By the age of eight he had left high school and was attending Indiana University-Purdue University Indianapolis advanced astrophysics classes.

His classroom presence is quite unnerving for many of the 18-plus year old students at his IPIU lectures.

Speaking to the Indy Star, Wanda Anderson, a biochemistry major said: 'When I first walked in and saw him, I thought, 'Oh my God, I'm going to school with Doogie Howser.' She added: 'A lot of people come to him for help when they don't understand a physics problem. 'People come up to him all the time and say, 'Hey Jake, can you help me'. 'A lot of people think a genius is hard to talk to, but Jake explains things that would still be over their head.'

And his Professor John Ross said his performance in lectures had been 'outstanding'. 'When he asks a question, he is always two steps ahead of the lecture. 'Everyone in the class gets quiet. Poor kid. . . . He sits right in the front row, and they all just look at him.

'He will come to see me during office hours and ask even more detailed questions. And you can tell he's been thinking these things through. 'Kids his age would normally have problems adding fractions, and he is helping out some of his fellow students.'

According to his parents Jake has trouble sleeping at night as he constantly sees numbers in his head. But far from complaining, Jake has turned the sleepless nights to his advantage - debunking the big bang theory. The next step, according to professor Ross, is for Jake to leave class altogether and take up a paid research role.

http://www.physorg.com/news/2011-03-lobster-shells-biodegradable-golf-ball.html

Researchers use lobster shells to create biodegradable golf ball

Golfers on the high seas can breathe a little easier - and so can the marine life around them - thanks to researchers at the University of Maine.

In conjunction with The Lobster Institute, UMaine Biological and Chemical Engineering Professor David Neivandt and undergraduate student Alex Caddell of Winterport, Maine, have developed a biodegradable golf ball made from lobster shells. The ball is intended for use on cruise ships.

Carin Poeschel Orr, who earned a master's in marine bio-resources at UMaine, suggested the idea to Bob Bayer of The Lobster Institute. Bayer turned to Neivandt, who is known on campus as an innovative problem-solver.

Though biodegradable golf balls already exist, this is the first to be made with crushed lobster shells with a biodegradable binder and coating, creating value from waste material.

"We're using a byproduct of the lobster canning industry which is currently miserably underutilized - it ends up in a landfill," Neivandt says. "We're employing it in a value-added consumer product which hopefully has some cachet in the market."

And that cachet doesn't come with a higher price tag. Biodegradable golf balls that are now on the market retail for a little under $1 per ball. The raw materials for the lobster shell balls cost as little as 19 cents per ball.

Caddell, a golfer, says the balls perform similarly to their traditional, white-dimpled counterparts. And they can be used with both drivers and irons.

"The flight properties are amazing," Caddell says. "It doesn't fly quite as far as a regular golf ball, but we're actually getting a similar distance to other biodegradable golf balls."

UMaine has filed a provisional patent for the lobster-shell mixture, which can also be used for such products as plant pots that decompose in the ground, surveying stakes and other applications.

For Caddell, a junior Biological Engineering major and Honors student, the opportunity to do research that has a real-world application has been a highlight of his UMaine experience.

"I didn't really think it would turn out to be this fruitful," Caddell says. "I think what really makes UMaine great is that there is a lot of funding available here, as opposed to private schools where it's hard to get research opportunities. Here, all sorts of professors are willing to take on students. You're not just taking classes, you can be surrounded by engineering by doing research, as well." *Provided by University of Maine*

http://www.scientificamerican.com/article.cfm?id=new-drugs-for-hepatitis-c

New Drugs for Hepatitis C on the Horizon

With the promise of two new drugs to fortify the current treatment protocol, doctors see promise of a better-tailored cocktail, similar to HIV treatments, to beat back this common and often debilitating infection

By Katherine Harmon

Some 3.2 million Americans have chronic hepatitis C, an infection that can linger in the body for years before producing symptoms. It can eventually lead to serious liver scarring and cancer. And most infections in the U.S. are the disease's particularly tough breed, known as genotype 1, which has a cure rate of less than 40 percent with the best current treatment.

Two new drugs for this type, however, are now racing toward approval by the U.S. Food and Drug Administration, which could come as soon as late May. Both compounds are protease inhibitors and are expected to hit the market at about the same time.

Hepatitis C is spread through contact with blood and occasionally other bodily fluids, and 65 to 70 percent of people infected with the disease are unaware that they have it, according to John Ward, director of the Division of Viral Hepatitis at the U.S. Centers for Disease Control and Prevention. In the U.S. about one in 30 baby boomers has hepatitis C, and one in four people with HIV has the infection, he noted at a 2010 talk. The disease is responsible for some $33.3 billion in medical costs each year.

"We've been waiting for these drugs for a long time," says Darryn Potosky, a hepatologist at the University of Maryland Medical Center, who often has to tell patients they face steep odds of beating the disease.

If the new drugs come to market, patients would take one or the other in addition to the current two-drug treatment regimen. "It seems hepatitis C therapy is moving in the direction of HIV therapy, with multiple drug cocktails," Potosky says. And with that come "hopes that we can tailor treatments to patients."

Two new studies of one of the drugs, boceprevir, will be published in the March 31 issue of the New England Journal of Medicine. Both phase III trials were funded by Schering-Plough (now part of Merck), which makes the drug. There have not yet been any studies comparing boceprevir and the other new protease inhibitor, telaprevir (made by Vertex), but given the drugs' similarity, experts say they both seem promising.

In the new boceprevir trials, adding the drug to the current standard treatment (of interferon and ribavirin) effectively doubled the percentage of patients who were able to suppress the virus - an effect called sustained viral response, which is a mark of being effectively "cured."

"Patients with hepatitis C genotype 1 infection can anticipate a significant therapeutic advance," says Donald Jensen, a professor of medicine at the University of Chicago Medical Center, who wrote an editorial on the new research for the same issue of NEJM. But because these new drugs will each need to be used in combination with the existing two-drug regimes, they "will be associated with more side effects and more complexity."

Long road to safety

Doctors have long hoped for a safe and effective drug to beat hepatitis C (HCV) genotype 1 - which, among strains of the disease, is "the most common and the hardest to treat at the same time," Potosky says. Some 70 to 80 percent of people infected with hepatitis C in the U.S. have this type.

With excitement building for these new drugs to arrive in the market, those who have been working on the problem have not forgotten that getting to this point "has been painstakingly slow," says Stuart Gordon of Henry Ford Hospital in Detroit, who coauthored one of the new studies.

Just finding the right compounds was challenging, he notes. An early protease-inhibitor contender, made by Boehringer Ingelheim, was found to be too toxic, and "many of the HCV polymerase inhibitors had to stop their development because of unacceptable side effects," Gordon notes. And because the new treatment regime must be shown to be better than the current standard of care, which is a 48-week course, "the sheer time involved in conducting these large trials" made for slow going. But a payoff might be near.

One new trial, of 1,097 patients with hepatitis C genotype 1 who had never been treated, found that after 24 or 44 weeks of adding boceprevir to their drug regimen some two-thirds of non-black patients showed they were effectively suppressing the virus. The drug combo was not as effective for black patients, who are less likely to have a gene alteration that is linked to responsiveness to one of the drugs. But adding boceprevir still boosted response rates in these patients from 23 percent to more than half in the 44-week treatment group.

In the other trial, 403 patients with the disease who had not responded to traditional treatment - either showing no improvement or relapsing - were studied. Adding boceprevir to the standard treatment for 32 or 44 weeks resulted in sustained viral response rates in 59 and 66 percent of patients, respectively, compared with 38 percent in the control group.

The studies were both somewhat unusual in that they started patients out with a month-long lead-in period in which patients received the two drugs already available - before boceprevir was introduced to some groups. This "allowed some prediction capability of both subsequent response as well as risk of developing resistant variants," Jensen explains.

Early studies showed that although a protease inhibitor given on its own was very effective initially, it often led to resistant strains of the virus in a matter of days, Gordon says. Even with interferon and ribavirin, resistance "remains a concern," he says. To keep it to a minimum, "clinicians must follow such patients very closely during therapy because if the viral level starts to rise after initially declining, then the protease inhibitor must be stopped to prevent the development of even more resistant strains."

Potosky notes that the extent of resistance will only become clear with time - and as more people take the new drugs. And just as they monitor HIV patients for telltale resistance patterns, doctors should be able to detect early signs of resistance in people being treated for hepatitis C as well.

Adding boceprevir also increased the amount of side effects patients experienced. More than 40 percent of subjects taking this third drug required treatment for anemia in one of the studies, and in the other, severe anemia led doctors to decrease dosage in some 20 percent of subjects. Even though some of these cases were serious, few patients dropped out of treatment.

With boceprevir and telaprevir likely in the home stretch to reach potentially millions of hepatitis C patients in the U.S., doctors and researchers are now turning their focus to the many challenges that remain.

Aside from keeping resistance low and dialing down side effects, the next steps are to try to simplify the treatment regimen. "Everyone wants to get rid of interferon and ribavirin because both have toxicity that make them often difficult to tolerate," Gordon notes. Interferon also currently is usually administered via injection, so moving to an all-oral, once-a-day dosing would make treatment better and more consistent.

Gordon also looks forward to finding ways to help special populations of patients, including those who have HIV, end-stage liver disease or renal disease, as well as children, "who are currently not eligible for our current therapies."

http://www.physorg.com/news/2011-03-genus-million-year-old-eudicot-china.html

Study names new genus of 125-million-year-old eudicot from China

PhysOrg.com - *A University of Florida researcher has helped describe the earliest known fossil remains of a flowering plant from China that has a direct evolutionary relationship with most plants humans depend on today.*

The study, scheduled to appear as the cover story in the March 31 issue of the journal Nature, describes the basal eudicot species, Leefructus mirus, which lived during the early Cretaceous period about 125 million years ago. It is most closely related to living plants in the buttercup family. Eudicots, known as "typical dicots," are one of the largest groups of flowering plants.

"It is one of the oldest, most complete megafossils in the buttercup family," said study co-author Hongshan Wang, paleobotany collections manager at the Florida Museum of Natural History on the UF campus. "Flowering plants are what we live on, the food we eat, the crops we have, even the furniture we sit on can come from the hardwood of flowering plants but for the early history of flowering plants, we know very little, especially when we get into the Cretaceous."

There are about 250,000 known species of angiosperms, or flowering plants, and this early evidence provides a link to understanding their rapid diversification during the Cretaceous period. Eudicots comprise about 75 percent of all angiosperms today, including peaches, apples, peas, sunflowers and roses.

The fossil was recovered from the middle Yixian Formation in Northeast China, which is part of the Jehol Biota, a community that has been extensively studied because of the unique plant and animal fossils found there.

Image credit: Hongshan Wang

"A lot of fossils have been found from this biota, which include feathered dinosaurs, early birds, mammals, even a gliding lizard," Wang said. "All sorts of animals have been found in this area, but I always wonder, 'What did these animals eat?' "

When Leefructus mirus lived, the angiosperms had just started to diversify, Wang said. Based on genetic research, flowering plants are thought to have originated from one common ancestor, and one of Darwin's "abominable mysteries" was how the many species of flowering plants we know today so quickly diversified from the lower Cretaceous until the middle Cretaceous, about 100 million years ago.

"These discoveries are pushing the age of angiosperms, or at least the age of a rapid diversification in angiosperms back in time," said William Crepet, chairman of the department of plant biology at Cornell University. "This will have significant implications for dating models of all sorts and may shift our investigations of likely fossils to those found in earlier sediments. This is hence an important discovery."

The fossil was the first eudicot found in the Yixian Formation and the fifth angiosperm found in the Jehol biota, Wang said. Crepet said the study analysis of the fossil eudicot matches estimates projected from studies using molecular genetics data.

"The authors are contributing importantly to our understanding of angiosperm history through their studies of fossils from these early Cretaceous sediments," Crepet said. "We are making stepwise but significant progress in addressing our understanding of angiosperm history."

Study co-authors include Ge Sun of Shenyang Normal University and Jilin University in China; David Dilcher of Shenyang Normal University, Jilin University and Indiana University; and Zhiduan Chen of the Chinese Academy of Sciences.

The fossil analyzed in the study is preserved as an impression in yellowish grey siltstone measuring about 16 centimeters from the stem to the tip of the leaves and the fish Lycoptera davidi was preserved on the same slab. The impression showed a major stem bearing leaves, fruit and a vegetative shoot.

Leefructus mirus was named “Lee,” after the collector, Shiming Li, “fructus,” which means fruiting and “mirus,” which comes from the Latin word mira, or beautiful. Some of the features distinguishing eudicots from other angiosperms are typically net-like vascular tissue in the leaves, pollen grains with three openings and floral organs usually occurring in multiples of four or five.

Previous studies of fossilized pollen show the first eudicots appeared about 127 million years ago, 2 million years before Leefructus mirus – the current study describes the first evidence of a fossilized eudicot plant.

“By the mid-Cretaceous, the angiosperms were already dominating almost every terrestrial ecosystem,” Wang said. “It’s important for us to understand the history and early evolution of flowering plants.”

More information: A eudicot from the Early Cretaceous of China, Nature 471, 625–628 (31 March 2011) doi:10.1038/nature09811 Provided by University of Florida

http://www.eurekalert.org/pub_releases/2011-03/sfhe-efu032811.php

Electronic faucets unsafe for use in high-risk patient hospital settings

Study shows automatic faucets carry high levels of bacteria

Dallas, TX – Researchers at The Johns Hopkins University School of Medicine have determined that electronic faucets are more likely to become contaminated with unacceptably high levels of bacteria, including Legionella spp., compared with traditional manually operated faucets. The study will be presented on Saturday at the annual meeting of the Society for Healthcare Epidemiology of America (SHEA).

Electronic-eye, non-touch faucets have been increasingly utilized in healthcare settings to lower water consumption and in an attempt to reduce recontamination of the hands of healthcare personnel.

Emily Sydnor, MD, infectious disease fellow at The Johns Hopkins University School of Medicine, and colleagues, working in conjunction with the facilities and engineering departments at Johns Hopkins Hospital examined bacterial growth from faucets of two clinical wards within the hospital from December 2008 through January 2009. Their study included 20 manual faucets and 20 electronic faucets, each receiving water from the same source.

Cultures obtained from the faucets showed that 50 percent of water cultures from electronic faucets grew Legionella spp. compared to 15 percent of water cultures from manual faucets. Sydnor also found that 26 percent of water cultures from electronic faucets had significant growth on heterotrophic plate count (HPC) cultures, an estimate of the number of bacteria in the water, compared to 13 percent of water cultures from manual faucets. While the HPC rates were not statistically different, Sydnor believes the differences are worth noting.

Additionally, following a flush of the water system using chlorine dioxide the disparity between electronic and manual faucets persisted. After the cleaning, 29 percent of electronic faucet cultures were still contaminated with bacteria compared with seven percent of manual faucet cultures.

Sydnor speculated that the increased bacterial growth in electronic faucets may be due to contamination of the numerous parts and valves that make up the faucet. During the course of collecting water samples, researchers discovered that all of the electronic faucet parts grew Legionella spp.

She explained that the study's findings should not create cause for concern over the use of electronic faucets by the general public. "The levels of bacterial growth in the electronic faucets, particularly the Legionella spp., were of concern because they were beyond the tolerable thresholds determined by the hospital.

Exposure to Legionella spp. is dangerous for chronically ill or immune compromised patients because it may cause pneumonia in these vulnerable patients.

The levels we found of both Legionella spp. and bacterial burden on HPC were still within the level that is well tolerated by healthy individuals," said Sydnor. Following the study, Johns Hopkins Hospital is replacing electronic faucets in clinical areas with manual faucets, and has decided not to install electronic faucets in clinical areas of its new hospital building now under construction.

Regardless of faucets type, Gordon noted that the importance of proper hand-hygiene practices by healthcare personnel to help reduce transmission of pathogens in healthcare settings should not be marginalized. "Proper hand hygiene practices are a basic and evidence-based element of helping to prevent HAIs."

"As infectious disease experts, our job is to remain vigilant about protecting patients from potential exposure to infection causing agents. This means that no matter how innovative the technology, the benefits must always be weighed against patient protection," said Steven Gordon, MD, president of SHEA.

http://www.eurekalert.org/pub_releases/2011-03/w-brr033011.php

Brain research reveals possible causes of sudden infant death syndrome

New research published today in The Journal of Physiology sheds light on areas of the brain thought to be the root cause of Sudden Infant Death Syndrome (SIDS) – the poorly understood condition also known as 'cot death'.

The research looks at specific areas of the brain and how they communicate to control breathing. It builds on previous studies that suspected abnormalities in the brain may be responsible for SIDS. It is hoped this research may vastly improve understanding of the condition.

The team from Macquarie University in Sydney have identified two areas of the brain that work together to control breathing and swallowing to enable breathing without choking – they hope that by understanding how these areas should work, they can identify what may be going wrong in SIDS babies.

Professor Paul Pilowsky, lead author of the paper, commented: "Until now, the centres in the brain that coordinate breathing and swallowing were poorly understood, but our research has finally teased apart the two mechanisms in the brain, demonstrating how they work together in the presence of an irritant.

"If irritants such as food or water 'go down the wrong way' and enter the airway, a powerful protective response is initiated in the brain to stop breathing and prevent foreign matter entering the lungs. Abnormalities in this reflex may underlie a number of life threatening conditions, including SIDS."

This protective reflex brings the vocal chords together and initiates coughing and swallowing. It is vital to everyone, but babies in particular as they have a tendency to regurgitate liquids after feeding and saliva tends to pool in their throats. It is also risky – without breathing, blood oxygen levels can drop to dangerously low levels, heart rate slows and blood is re-routed to the brain, depriving and potentially damaging other organs.

"The closing of the airway in adults is only a small compromise as breathing is only stopped temporarily. But for babies the response has more radical implications, particularly if breathing stops for a long time, as they can't take in oxygen or get rid of carbon dioxide. "The timing of breathing and swallowing is exquisitely coordinated. We suspect that coordination of the two may be going awry in SIDS, but to be sure of this, we need to know how the brain organises this response in the first place," added Prof. Pilowsky.

To understand how the central nervous system controls breathing and swallowing, the team recreated the brain and body's response to a throat irritant using electrical stimulation of the nerve (the superior laryngeal nerve) which normally carries information from the larynx (or voicebox) to the brain, to initiate the reflex response.

By artificially generating a response and measuring the neurotransmitters that indicate how the different regions of the brain are talking to one another, the team hopes to have a better understanding of what is going on in the brain to disrupt the reflex and cause breathing to stop for long periods.

"The next step is to work out why these regions 'decide' whether breathing should be stopped. The eventual hope is to have the ability to manipulate these two systems separately to prevent the excessively long breathing arrest that may cause SIDS," concluded Professor Pilowsky.

http://www.physorg.com/news/2011-03-relationship-migraine-headaches-children-common.html

Study suggests a relationship between migraine headaches in children and a common heart defect

Roughly 15% of children suffer from migraines, and approximately one-third of these affected children have migraines with aura, a collection of symptoms that can include weakness, blind spots, and even hallucinations.

Although the causes of migraines are unclear, a new study soon to be published in The Journal of Pediatrics suggests a connection between migraine headaches in children and a heart defect called patent foramen ovale, which affects 25% of people in the U.S.

Dr. Rachel McCandless and colleagues from the Primary Children's Medical Center and the University of Utah studied children 6-18 years old who were diagnosed with migraines between 2008 and 2009. The 109 children enrolled in the study were treated at the Primary Children's Medical Center, which serves kids from Utah, Idaho, Montana, Nevada, Colorado, and parts of Wyoming.

The researchers took two-dimensional echocardiograms of each child's heart, looking for a patent foramen ovale (PFO), a common defect in the wall between the two upper chambers of the heart. Although a PFO is not necessarily dangerous, it can allow unfiltered blood to bypass the lungs and circulate throughout the body. As Dr. McCandless explains, "Some adult studies have suggested a link between having a PFO and migraine headaches."

Of the studied children who had migraines with aura, 50% also had a PFO; this is nearly double the PFO rate of the general population. However, only 25% of children who had migraines without aura had a PFO. Dr. McCandless and colleagues hypothesize that if a causal relationship can be established, closure of a PFO with a

catheter device may help in the treatment of certain kinds of migraines, specifically migraines with aura. It is her hope that "our study will help guide future research about this difficult problem."

More information: "Patent Foramen Ovale in Children with Migraine Headaches" by Rachel T. McCandless, MD, Cammon B. Arrington, MD, Douglas C. Nielsen, James F. Bale, Jr., MD, and L. LuAnn Minich, MD, appears in The Journal of Pediatrics, DOI:10.1016/j.jpeds.2011.01.062 Provided by Elsevier

http://www.eurekalert.org/pub_releases/2011-03/uoc-oow033111.php

Out of work? Your resume is no good here

When the unemployed complain of fighting an uphill battle to reenter the job market, believe them.

Through a series of simple experiments, researchers from UCLA and the State University of New York–Stony Brook found that out-of-work Americans face discrimination that is unrelated to their skills sets or to the conditions of departure from their previous jobs.

"We were surprised to find that, all things being equal, unemployed applicants were viewed as less competent, warm and hireable than employed individuals," said lead researcher Geoffrey Ho, a doctoral student in human resources and organizational behavior at the UCLA Anderson School of Management. "We were also surprised to see how little the terms of departure mattered. Job candidates who said they voluntarily left a position faced the same stigma as job candidates who said they had been laid off or terminated."

The findings will be presented at an April 10 conference on unemployment at UCLA.

With a special emphasis on the psychological impact of being out of work, the conference, "Reconnecting to Work: Consequences of Long-Term Unemployment and Prospects for Job Creation," will bring together Ho and 31 other researchers on labor and unemployment.

"To our knowledge, this is the first study to examine the psychological stigma of unemployment," said Margaret Shih, a co-author on the study with Ho and an associate professor of human resources and organizational behavior at UCLA Anderson. "We found that individuals tend to make negative associations with those who are unemployed, which often leads to unfair discrimination."

Researchers have long known of the existence of a bias against the unemployed, said the study authors, who also include Todd L. Pittinsky, an associate professor of technology and society at Stony Brook, and Daniel Walters, a UCLA Anderson M.B.A. student.

In fact, economists have determined that the longer individuals remain unemployed, the lower their chances of finding work. But until now, the situation has been attributed to legitimate concerns over the unemployed worker's skills set or a lack of persistence in looking for work.

"Economists have tended to chalk up long-term unemployment to the probability of skill decay or discouragement, or employers' perceptions of skill decay," Shih said. "But we're finding that when there's no evidence that skills have deteriorated, out-of-work job applicants are still at a disadvantage. The stigma may help explain why the unemployed may have systematically lower chances of reconnecting to work."

For a series of studies, Ho, Shih and their colleagues recruited a random cross-section of Americans over the Internet and had them appraise fictitious job candidates. The researchers found that even when study participants were evaluating the same evidence about a job applicant, the unemployed applicant was at a disadvantage compared with the employed applicant.

In one study, Ho and Shih presented study participants with the same fictitious resume. They told half the participants that the resume belonged to an employed person and the other half that it belonged to a person who was out of work. The researchers then asked participants to rank the worker on qualities that have been shown by psychological research to be paramount in forming a desirable impression of an individual.

Although all participants saw exactly the same resume, they perceived the "unemployed" resume as belonging to somebody who was less competent, warm and proactive than the "employed" resume. As a consequence, participants reported that they would be less willing to interview or hire the individual who was out of work than the employed individual.

Ho and Shih found the same results when participants were presented with a short video of a job interview, a richer source of information about the supposed job candidate. Participants who believed the job candidate was employed perceived the interview to be more impressive than participants who believed the job candidate was unemployed.

The researchers also discovered that providing different reasons for unemployment did not alleviate the stigma. It made no difference whether the job applicant was unemployed because he left voluntarily or was terminated or laid off. Only when the job loss was in no way attributable to the individual - such as bankruptcy on the part of the employer - did the disadvantage of being unemployed disappear.

Moving forward, the UCLA–Stony Brook team plans to explore what, if any, role the state of the economy plays in the psychological stigma of unemployment. They also plan to sample human relations professionals to determine whether they share the same prejudices as the general public.

For more information about "Reconnecting to Work: Consequences of Long-Term Unemployment and Prospects for Job Creation," visit http://ucla.in/fXvsMu. Although registration is required, proceedings are free and open to the public and will take place in Ackerman Union and Kerckhoff Hall.

http://www.physorg.com/news/2011-03-mcmaster-vaccine-pet-owners-feline.html

McMaster vaccine has pet owners feline groovy

Good-bye itching, watering eyes and sneezing. McMaster University researchers have developed a vaccine which successfully treats people with an allergy to cats.

Traditionally, frequent allergy shots have been considered the most effective way to bring relief – other than getting rid of the family pet - for the eight to 10% of the population allergic to cats.

Both options – one difficult and costly, the other troubling - may now be tossed aside thanks to the work of immunologist Mark Larché, professor in the Department of Medicine in the Michael G. DeGroote School of Medicine and Canada Research Chair in Allergy & Immune Tolerance.

Building on research he's conducted for the past 10 years in Canada and Britain, Larché and his research team have developed a vaccine which is effective and safe with almost no side effects. The research is published in a recent (January 2011) issue of the Journal of Allergy & Clinical Immunology, a leading journal in the allergy field.

The researchers took one protein (molecule) that cats secrete on their fur which causes the majority of allergic problems. Using blood samples from 100 patient volunteers allergic to cats, they deconstructed the molecule and identified short regions within the protein which activate T-cells (helper cells that fight infection) in the immune system. Using the amino acid code for the whole protein, researchers made synthetic versions of these regions. For the cat allergy vaccine, they found seven peptides (strings of amino acids). "And those synthetic peptides are what we mix together to make the vaccine," said Larché. "We picked the peptides that would work in as much of the population as possible."

Known as "peptide immunotherapy", a low dose of the vaccine is given into the skin. Initially, four to eight doses a year may be required, but the side effects of the traditional allergy shots do not arise, Larché said. The optimal dose will be determined in phase three clinical trials which are getting underway with a much larger group of cat allergy sufferers.

The development of a vaccine to treat people allergic to cats is the first in a line of vaccines developed with Adiga Life Sciences, a company established at McMaster in 2008. It is a joint venture between McMaster University and Circassia Ltd., a UK-based biotech company. Adiga and McMaster are now collaborating on research into the use of peptide immunotherapy for house dust mite, ragweed, grass, birch tree and moulds.

Provided by McMaster University

http://www.eurekalert.org/pub_releases/2011-04/icl-ssm033111.php

Sugar-grain sized meteorites rocked the climates of early Earth and Mars, according to new study

Bombardments of 'micro-meteorites' on Earth and Mars 4 billion years ago may have caused the planets' climates to cool dramatically

Bombardments of 'micro-meteorites' on Earth and Mars four billion years ago may have caused the planets' climates to cool dramatically, hampering their ability to support life, according to research published today in the journal Geochimica et Cosmochimica Acta.

Scientists from Imperial College London studied the effects of the Late Heavy Bombardment (LHB), a period of time in the early Solar System when meteorite showers lasting around 100 million years barraged Earth and Mars. This bombardment discharged sulphur dioxide into the upper atmospheres of both planets and the researchers' analysis suggests that this may have had a catastrophic impact on their environments.

Micro-meteorites come from the rocky asteroid belt between Mars and Jupiter. These space rocks, which are the size of sugar grains, get dragged by gravity towards Earth and Mars. As they enter the planets' upper atmospheres, they heat up to temperatures of approximately 1000 degrees Celsius, releasing gases including sulphur dioxide. Sulphur dioxide in the atmosphere forms aerosols, consisting of solid and liquid particles, which deflect sunlight away from the surface, making planets cooler.

The authors of the new study have calculated that showers of micro-meteorites delivered approximately 20 million tonnes of sulphur dioxide each year into the upper atmosphere of Earth during the LHB. The team deduced that on Mars, these micro-meteorites delivered up to half a million tonnes of sulphur dioxide each year for the same period of time.

Professor Mark Sephton, an author of the study from the Department of Earth Science and Engineering at Imperial College London, says: "Far less of the Sun's energy was reaching Earth 4 billion years ago, which would have made it hard for early life to emerge. Recently denied of its protective magnetic field and constantly subjected to large meteorite impacts, Mars was also starting to lose its greenhouse gases at this time, causing global cooling. The influx of sulphur dioxide into the Mars's atmosphere would have dealt a further blow to a planet already on the ropes, making conditions for life even more of a challenge."

The team say that such a large influx of sulphur dioxide into early Earth's atmosphere had the same cooling effect on the climate as if there was an eruption of the size of the 1991 Mount Pinatubo eruption every year for 100 million years. The 1991 Mount Pinatubo eruption released 17 million tonnes of gases, including sulphur dioxide, into the atmosphere, preventing 10 percent of sunlight from reaching Earth and cooling the planet by half a degree Celsius.

On Mars during the LHB, the scientists predict that the cooling effects of sulphur dioxide on the red planet's atmosphere would have been the equivalent of an eruption 1/34th the size of Mount Pinatubo occurring every year for 100 million years.

The scientists say that the environmental consequences of sulphur dioxide in Earth's atmosphere could have been disastrous. At this time, the Sun's energy was 30 percent weaker than it is today, meaning less energy was reaching the surface. The team believe that a weaker Sun, combined with increasing levels of sulphur dioxide from micro-meteorites, could have plunged Earth into an Arctic winter, lasting millions of years and making conditions for primitive microbial life extremely difficult.

On Mars, being further away from the Sun, the scientists suggest the environmental consequences would have been even more dramatic. High levels of sulphur dioxide would cause temperatures to plunge and water on the surface, in the form of lakes and rivers, to disappear, turning a warm wet world into a cold arid one.

Dr Richard Court, who is lead author of the study from the Department of Earth Science and Engineering at Imperial College London, adds:

"These sugar-grain sized meteorites are left over material from the construction of our early Solar System, helping to build rocky planets such as Earth and Mars. Our study is helping us to see how these tiny space rocks could also bring environmental devastation on a global scale to early Earth and Mars."

The researchers came to their conclusions by simulating what happens to micro-meteorites as they entered the atmosphere, using a technique called flash pyrolysis to heat rock fragments that were identical to micro-meteorites to 1000 degrees Celsius. They then used infrared spectroscopy to measure the amount of sulphur dioxide released from these rocks. The team then used their results and calculations of meteorite in-fall rates during the LHB to determine how much sulphur dioxide was delivered to Earth and Mars from micro-meteorites.

This study is a continuation of earlier work by the team who have discovered that meteorites are not the source of the present-day methane in the atmosphere of Mars, raising hopes that the methane is being generated by life on the red planet. Their work has also shown that meteorites delivered other important gases to Earth during its early history that would have made it more habitable. In the future, the team will assess the contributions gases from meteorites on planets outside of the Solar System.

The research was funded by the Science and Technology Facilities Council.

1. "The contribution of sulphur dioxide from ablating micro-meteorites to the atmospheres of Earth and Mars", 1 April 2011, Geochimica et Cosmochimica Acta Richard W. Court [1], Mark A. Sephton [1]

http://www.bbc.co.uk/news/science-environment-12899961

Ring 'ripples' in Saturn and Jupiter linked to comets

By Neil Bowdler Science reporter, BBC News

Scientists say that strange ripples observed in the ring systems of Saturn and Jupiter were caused by comets.

The ripples, which the researchers say resemble the undulations of corrugated metal, were detected in both Saturn's rings and in Jupiter's lesser-known rings. The ripples in Jupiter's rings are believed to have been caused by the comet Shoemaker-Levy 9, which struck the planet in 1994. Details are published in two separate papers in the journal Science.

The researchers analysed images of Jupiter's rings taken by the Galileo spacecraft in 1996 and 2000 and by the New Horizons probe in 2007. They also looked at images of Saturn's rings taken by the Cassini spacecraft during 2009. What they found were undulations that the researchers liken to a corrugated tin roof, which when lit from a low angle, appear as alternating dark and light bands.

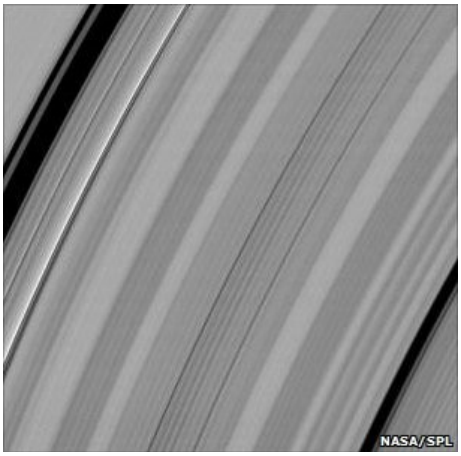
This corrugation was found across Saturn's entire C ring, stretching for thousands of kilometres. It appeared to be part of a similar pattern observed previously in the fainter D ring. At least two separate spirals were

meanwhile detected in Jupiter's rings. The researchers believe they were caused by debris, most likely from a comet, striking the rings, and tilting them.

"The material passes through the ring and basically causes the entire ring to be slightly tilted with respect to the planet's equatorial plane, and then it shears out to form this spiral pattern," said Dr Matthew Hedman of Cornell University in New York.

Over time, the spiral becomes more tightly wound, and it may be decades before the rings flatten out again, say the researchers. The team was then able to rewind the process using mathematical models to give an estimated date of the impact event. For Saturn, they arrived at a point in 1983, but have not yet found a possible candidate comet.

With Jupiter, they detected at least two spirals and so possibly two impact events. When they wound back the process for one of the spirals, they reached a point in 1994, the same year of the Shoemaker-Levy 9 impact.



Alternating light and dark bands in Saturn's C ring captured by the Cassini spacecraft in 2009

Dr Mark Showalter of California's SETI Institute remembers the moment he and Dr Hedman realised the significance of the date.

"Matt and I were talking, saying now wait a second doesn't that date sound a little bit familiar and honestly we had to run off to Wikipedia to ask 'When did Shoemaker-Levy 9 hit Jupiter?' and there was the eureka moment when we realised we had a smoking gun," he told the BBC.

The second spiral led them to an estimated impact event in 1990, which the scientists hypothesise may have been caused by debris from a previous close encounter with Shoemaker-Levy 9.

Images taken by the New Horizons spacecraft also suggested further impacts may have occurred across Jupiter's rings in September 2001 and December 2003, but additional detections will be needed to confirm these results.

Dr Showalter said ripples like those studied in the new papers could provide clues to the frequency of such events in the outer Solar System. "Rings are comet catchers," he says. "We probably already realised that comets hit rings periodically but we never realised before that every comet puts its own signature into the rings when it comes by and that that history gets recorded into these spiral patterns. "Decades later, you can actually look at the same ring, find these ripple patterns, and each of them then tells you something about what hit the ring and when it did so."

Commenting on the work, Professor Alan Fitzsimmons, a comet researcher at Queen's University Belfast, said: "The papers show exactly what you can do when you have these beautifully functioning spacecraft observing the outer planets close up." He said the gravitational forces of the giant planets were enough to tear apart fragile comets, creating fields of debris that could cause the effects seen in the ring systems.

Asteroids too could be torn apart by what are called tidal forces, he said, but this was more likely to be seen in the case of Jupiter, close to the Asteroid Belt.

He said the work would give researchers the ability to "directly calculate how often objects do hit the giant planets, which we've been struggling to pin down".

http://www.eurekalert.org/pub_releases/2011-04/uog-gac033111.php

Got a craving for fast food? Skip the coffee, study says

Eating a fatty fast food meal is never good for you, but washing that meal down with a coffee is even worse, according to a new University of Guelph study.

Researcher Marie-Soleil Beaudoin has discovered not only that a healthy person's blood sugar levels spike after eating a high-fat meal, but that the spike doubles after having both a fatty meal and caffeinated coffee – jumping to levels similar to those of people at risk for diabetes.

"The results tell us that saturated fat interferes with the body's ability to clear sugars from the blood and, when combined with caffeinated coffee, the impact can be even worse," said Beaudoin, a PhD student who conducted the study with U of G professors Lindsay Robinson and Terry Graham. "Having sugar remain in our blood for long periods is unhealthy because it can take a toll on our body's organs."

Published today in the Journal of Nutrition¸ the study is the first to examine the effects of saturated fat and caffeinated coffee on blood sugar levels using a novel fat cocktail which contains only lipids. This specially designed beverage allows researchers to accurately mimic what happens to the body when we ingest fat.

For the study, healthy men drank about one gram of the fat beverage for every kilogram of body weight for their first meal. Six hours later, they were given a second meal consisting of a sugar drink.

Typically when we ingest sugar, the body produces insulin, which takes the sugar out of the blood and distributes it to our muscles, said Beaudoin.

But the researchers found that the fatty meal affected the body's ability to clear the sugar out of the blood. The subjects' blood sugar levels were 32 per cent higher than they were when the men had not ingested the fat cocktail.

The researchers also tested the impact of caffeinated coffee combined with the fatty meal. For this test, participants received the equivalent of two cups of caffeinated coffee five hours after ingesting the fat beverage. An hour later, they were then given the sugar drink.

The results showed blood sugar levels increased by 65 per cent compared to what they were when participants had not ingested the fat and caffeinated coffee.

"This shows that the effects of a high-fat meal can last for hours," said Beaudoin. "What you eat for lunch can impact how your body responds to food later in the day."

Besides testing the participant's blood sugar levels, the researchers looked at gastro-intestinal effects by measuring incretin hormones released by the gut after ingesting the fat. These hormones signal the pancreas to release insulin to help clear the blood of sugar. The researchers discovered these hormones' responses to carbohydrates are blunted after ingesting the fat beverage.

"Ultimately we have found that fat and caffeinated coffee are impairing the communication between the gut and the pancreas, which could be playing a role in why participants couldn't clear the sugar from their blood as easily," said Beaudoin. The results of the study are particularly important for people at risk for metabolic diseases and Type 2 diabetes, she adds.

"We have known for many years that people with or at risk of Type 2 diabetes should limit their caffeine intake. Drinking decaffeinated coffee instead of caffeinated is one way to improve one's glucose tolerance. Limiting the intake of saturated fatty acids found in red meat, processed foods and fast food meals is also beneficial. This study has shown that the affects of these foods can be severe and long lasting."

http://www.eurekalert.org/pub_releases/2011-04/uog-use040111.php

UGA studies explain spread of invasive ladybugs

Athens, Ga. – *A University of Georgia researcher studying invasive ladybugs has developed new models that help explain how these insects have spread so quickly and their potential impacts on native species.*

In recent years, some people have noticed swarms of ladybugs amassing in the fall, even infesting their homes. These are Asian lady beetles, insects native to eastern Asia, introduced to the U.S. as a biocontrol for aphids and have since spread throughout the country and into Canada. When he found the beetles in his own home, Assistant Research Scientist Richard Hall, of the UGA Odum School of Ecology, was motivated to learn more about them.

Hall knew that the Asian lady beetle had only recently, in 2004, arrived in his native England, and is already found all over the U.K. Data collected as part of a citizen science effort based at Cambridge University shows it to be one of the fastest documented invasions ever by an insect. He also knew that in the U.S., the Asian lady beetle has excluded many indigenous ladybugs from parts of their original range.

"I wanted to know how this insect could have invaded the U.K. so quickly," Hall said. "And I also wanted to know what the impacts on native species are likely to be." He has just published two new papers that explore these questions in the journals Biology Letters and Ecology.

"What makes this insect a good biocontrol also makes it a good invader," Hall said. "It has multiple generations per year, compared to just one for native British ladybugs. It tolerates a wide range of environmental conditions. And it has a generalist diet - it likes aphids, but it will also eat other ladybugs. In other words, it eats its own competition."

Hall explained that when an invader expands into an open niche, with no native competitors present, invasion happens faster than if a competitor was already there; native competitors slow the rate of invasion. If an invader can eat the native competitor, however, it not only gains a source of nutrition but also reduces competition for lower-level food resources. If the resource benefit is a good one - the native competitor is a rich source of nutrition - the invader that eats its competition can invade even faster than if there were no competition at all. This may be the case with the Asian lady beetle.

Hall developed a model, published in the current issue of Biology Letters, that explains his findings and predicts that invasive species that feed on both lower-level food sources and species that compete for these same food sources will be more successful, and spread faster, than those that only feed on lower-level sources.

Predicting the potential impacts on native species was more complicated.

Native ladybugs in the U.K. have a natural enemy, a parasitoid wasp that lays eggs in adult ladybugs. When the eggs hatch, the larvae emerge and use the ladybug as both food and protection against predators. These wasps are now parasitizing Asian lady beetles in the U.K.

In a paper in the February 2011 issue of the journal Ecology, Hall described a model he developed to explain the interaction between the three species - invasive ladybug, native ladybug and the parasitoid wasp that is their common predator - and predict effects.

"The shared natural enemy changes the equation," said Hall. "There are a couple of possible outcomes. If the wasp prefers to lay its eggs in the invader, that might allow the native species to persist. But the invader may turn out to be a 'sink' host - the wasps may have less reproductive success on the invasive ladybugs, since they didn't co-evolve. In that case, you could lose both the native ladybug and its native predator, the ladybug due to predation and competition by the invader and the wasp due to reproductive failure."

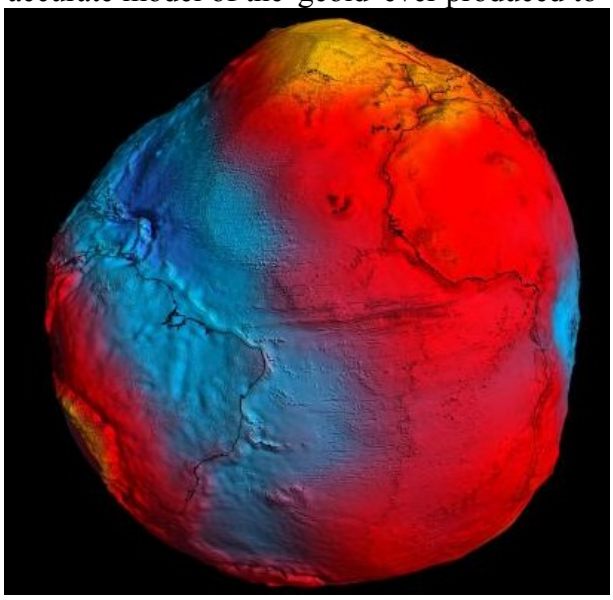
Hall said that both models could be applied to other species where the invader preys on, as well as competes with, a native species. "It is important to take into account the effects of a natural enemy on that interaction in order to avoid incorrect predictions about which species will persist," he said. "And accurate predictions are crucial for developing successful management strategies."

http://www.physorg.com/news/2011-04-earth-gravity-revealed-unprecedented-video.html

Earth's gravity revealed in unprecedented detail (w/ video)

ESA's GOCE mission has delivered the most accurate model of the 'geoid' ever produced, which will be used to further our understanding of how Earth works.

PhysOrg.com - After just two years in orbit, ESA's GOCE satellite has gathered enough data to map Earth's gravity with unrivalled precision. Scientists now have access to the most accurate model of the 'geoid' ever produced to further our understanding of how Earth works.



The new geoid was unveiled today at the Fourth International GOCE User Workshop hosted at the Technische Universität München in Munich, Germany. Media representatives and scientists from around the world have been treated to the best view yet of global gravity.

The geoid is the surface of an ideal global ocean in the absence of tides and currents, shaped only by gravity. It is a crucial reference for measuring ocean circulation, sea-level change and ice dynamics – all affected by climate change.

Prof. Reiner Rummel, former Head of the Institute for Astronomical and Physical Geodesy at the Technische Universität München, said, "We see a continuous stream of excellent GOCE gradiometry data coming in. With each new two-month cycle, our GOCE gravity field model is getting better and better.

A precise model of Earth's geoid is crucial for deriving accurate measurements of ocean circulation, sea-level change and terrestrial ice dynamics. The geoid is also used as a reference surface from which to map the topographical features on the planet. In addition, a better understanding of variations in the gravity field will lead to a deeper understanding of Earth's interior, such as the physics and dynamics associated with volcanic activity and earthquakes.

Credits: ESA/HPF/DLR

"Now the time has come to use GOCE data for science and applications. I am particularly excited about the first oceanographic results. "They show that GOCE will give us dynamic topography and circulation patterns of the oceans with unprecedented quality and resolution. I am confident that these results will help improve our understanding of the dynamics of world oceans."

The two-day workshop provides the science community with the latest information on the performance of the satellite and details about data products and user services. Participants are also discussing how the GOCE geoid will make advances in ocean and climate studies, and improve our understanding of Earth's internal structure.

For example, the gravity data from GOCE are helping to develop a deeper knowledge of the processes that cause earthquakes, such as the event that recently devastated Japan. Since this earthquake was caused by tectonic plate movement under the ocean, the motion cannot be observed directly from space. However, earthquakes create signatures in gravity data, which could be used to understand the processes leading to these natural disasters and ultimately help to predict them.

The GOCE satellite was launched in March 2009 and has now collected more than 12-months of gravity data.

Volker Liebig, Director of ESA's Earth Observation Programmes said, "Benefiting from a period of exceptional low solar activity, GOCE has been able to stay in low orbit and achieve coverage six weeks ahead of schedule.

"This also means that we still have fuel to continue measuring gravity until the end of 2012, thereby doubling the life of the mission and adding even more precision to the GOCE geoid."

GOCE has achieved many firsts in Earth observation. Its gradiometer – six highly sensitive accelerometers measuring gravity in 3D – is the first in space. It orbits at the lowest altitude of any observation satellite to gather the best data on Earth's gravity.

The design of this sleek one-tonne satellite is unique. In addition, GOCE uses an innovative ion engine that generates tiny forces to compensate for any drag the satellite experiences as it orbits through the remnants of Earth's atmosphere.

Prof. Liebig added, "You could say that, at its early conception, GOCE was more like science fiction. GOCE has now clearly demonstrated that it is a state-of-the-art mission."

Rune Floberghagen, ESA's GOCE Mission Manager, noted "This is a highly significant step for the mission. We now look forward to the coming months, when additional data will add to the accuracy of the GOCE geoid, further benefiting our data users." *Provided by European Space Agency*

http://www.physorg.com/news/2011-04-fireball-season.html

Spring is fireball season

What are the signs of spring? They are as familiar as a blooming Daffodil, a songbird at dawn, a surprising shaft of warmth from the afternoon sun. And, oh yes, don't forget the meteors.

"Spring is fireball season," says Bill Cooke of NASA's Meteoroid Environment Center. "For reasons we don't fully understand, the rate of bright meteors climbs during the weeks around the vernal equinox."

In other seasons, a person willing to watch the sky from dusk to dawn could expect to see around 10 random or "sporadic" fireballs. A fireball is a meteor brighter than the planet Venus. Earth is bombarded by them as our planet plows through the jetsam and flotsam of space-i.e., fragments of broken asteroids and decaying comets that litter the inner solar system.

In spring, fireballs are more abundant. Their nightly rate mysteriously climbs 10% to 30%.

"We've known about this phenomenon for more than 30 years," says Cooke. "It's not only fireballs that are affected. Meteorite falls-space rocks that actually hit the ground-are more common in spring as well1."

Researchers who study Earth's meteoroid environment have never come up with a satisfactory explanation for the extra fireballs. In fact, the more they think about it, the stranger it gets.

Consider the following:

There is a point in the heavens called the "apex of Earth's way." It is, simply, the direction our planet is traveling. As Earth circles the sun, the apex circles the heavens, completing one trip through the Zodiac every year. The apex is significant because it is where sporadic meteors are supposed to come from.

If Earth were a car, the apex would be the front windshield. When a car drives down a country road, insects accumulate on the glass up front. Ditto for meteoroids swept up by Earth.

Every autumn, the apex climbs to its highest point in the night sky. At that time, sporadic meteors of ordinary brightness are seen in abundance, sometimes dozens per night.

Read that again: Every autumn.

"Autumn is the season for sporadic meteors," says Cooke. "So why are the sporadic fireballs peaking in spring? That is the mystery."

Meteoroid expert Peter Brown of the University of Western Ontario notes that "some researchers think there might be an intrinsic variation in the meteoroid population along Earth's orbit, with a peak in big fireball-producing debris around spring and early summer. We probably won't know the answer until we learn more about their orbits2."

To solve this and other puzzles, Cooke is setting up a network of smart meteor cameras around the country to photograph fireballs and triangulate their orbits. As explained in the story What's Hitting Earth?, he's looking for places to put his cameras; educators are encouraged to get involved. Networked observations of spring fireballs could ultimately reveal their origin.

"It might take a few years to collect enough data," he cautions.

Until then, it's a beautiful mystery. Go out and enjoy the night sky. It is spring, after all.

Provided by Science@NASA

http://www.scientificamerican.com/article.cfm?id=patent-watch-apr-11

Patent Watch: "StunRay" Disables with a Flash of Light

Patent No. 7,866,082 **By Adam Piore**

Incapacitating light beam: The suspect is going for his gun, and the police officer doesn't want to shoot. The founders of a company called Genesis Illumination hope police officers will soon be reaching for a StunRay instead of a gun or Taser.

They claim their newly patented device can render an assailant helpless with a brief flash of high-intensity light. It works by overloading the neural networks connected to the retina, saturating the target's world in a blinding pool of white light. "It's the inverse of blindness - the technical term is a loss of contrast sensitivity," says Todd Eisenberg, the engineer who invented the device. "The typical response is for the person to freeze. Law enforcement can easily walk up and apprehend [the suspect]."

The device consists of a 75-watt lamp, combined with optics that collect and focus the visible light into a targeted beam, which can be aimed like a flashlight. Recovery time ranges from "seconds to 20 minutes," Eisenberg says. "It's very analogous to walking from a very bright room into a very dark room."

The inventors say the StunRay has a number of advantages over taser guns, which work best within a range of 12 to 15 feet. The StunRay can be effective from as far away as 150 feet. And whereas Tasers can cause cardiac arrest, the StunRay is reasonably safe. One downside is that the target must be facing the light for it to work. But "if the target has turned and is running away, the objectives of stopping an aggressive behavior or avoiding a potentially lethal confrontation have still been met," Eisenberg notes.

http://www.newscientist.com/article/mg21028063.800-computer-network-model-finds-parkinsons-tipping-point.html

Computer network model finds Parkinson's tipping point

*** 01 April 2011 by Mark Buchanan**

TOO much of a good thing can be bad for you. The synchronous firing of neurons is crucial for many ordinary brain functions, but excessive, uncontrolled synchronisation might be behind the symptoms of Parkinson's disease.

Now a computer model has backed up the idea.

Parkinson's disease has been linked to a lack of dopamine, a chemical that, among other things, dampens the transmission of signals across nerve junctions called synapses. Measuring this effect in humans is not currently possible, so Leonid Rubchinsky and colleagues at Indiana University-Purdue University Indianapolis turned instead to a computer model of neural networks.

As they boosted signal strength, the network became more prone to switching from non-synchronised to synchronised firing. By comparing the pattern of neural signals recorded from people with Parkinson's against those predicted by the model, the team found that in Parkinson's, the brain readily switches between synchronised and non-synchronised behaviour even when it is relaxed. This might explain the disease's motor symptoms.

A healthy brain fires synchronously in a brief and controlled way to coordinate motor behaviour and perform tasks. The stronger connections in the brains of people with Parkinson's mean that attempts to coordinate behaviour trigger sustained synchrony, which may make it difficult to end a task or begin a new one (Physical Review E, in press).

"This is a simple and elegant study," says Peter Brown of the University of Oxford. "The model beautifully captures the dynamic behaviour of the system."

http://www.physorg.com/news/2011-04-regenerative-medicine-success-muscles.html

Regenerative medicine success for muscles

PhysOrg.com - ***An innovative strategy for regenerating skeletal muscle tissue using cells from the recipient's own body is outlined in UCL research published today.***

The paper, authored by Dr. Paulo de Coppi (UCL Institute of Child Health and surgeon at Great Ormond Street Hospital) and colleagues, shows that damaged muscle tissues treated with satellite cells in a special degradable hydrogel showed satisfactory regeneration and muscle activity. Muscle activity in repaired muscle in a mouse model was comparable with untreated muscles. This is the first time muscle function has been proved by physiological tests.

The research is published in the Journal of the Federation of American Societies for Experimental Biology and represents an impressive development in the growing field of regenerative medicine.

Satellite cells (SCs), freshly isolated or transplanted within their niche, are presently considered the best source for muscle regeneration. They are located around existing muscles. Hence, a patient's own cells can be used, from a muscle biopsy.

A key issue for regeneration is how cells grow as a structure, as they usually require some form of framework. A hard framework would impede muscle growth and muscle cell penetration. The hydrogel, by contrast, provides a supportive structural skeleton but degrades quickly as muscle tissue returns and the support becomes unnecessary. The gel is initially liquid, hardens in place under UV light, and is easily penetrated by muscle cells.

"We focused on a simple, robust, and reproducible technique that could be easily adapted to clinical requirements" said Dr. De Coppi. "This is using the patients own cells, without any lengthy culturing process, which means we could take a biopsy, produce the cells in a couple of hours, and implant them where needed - it can be done in theatre as one process. Using the patient's own cells eliminates any tissue rejection."

"Nor are there ethical debates as for embryonic stem cells, or culturing and availability issues, such as amniotic stem cells."

The lab model has the potential to be translated into significant clinical benefit for babies and children born with defective organs, or caused by injury or pathological conditions, that currently require complicated and potentially devastating reconstructive surgery.

Professor Andrew Copp, Director of the UCL Institute of Child Health, said: "This is a very exciting research finding that may significantly advance our ability to repair muscle damage or defects in future. It is a great example of translational research in action, from the laboratory to a near-clinical application."

The focus for initial clinical research in humans will be relatively small muscles at first, like deformities in the face and palate, or in the hand. It will be technically more demanding to grow larger muscles with more structure, which would require their own nerves and blood supply.

"We want to move to safe and effective human trials" said Dr de Coppi, "but of course we are not there yet. Furthermore scaling up from small muscles to larger structures will undoubtedly be challenging."

More information: Research paper in The FASEB Journal Provided by University College London

http://www.physorg.com/news/2011-04-painful-price-friendship.html

Paying the painful price for friendship

People will suffer more pain for their close friends than for their acquaintances and sometimes more than they would for themselves, an Oxford University scientist has found.

PhysOrg.com - People will suffer more pain for their close friends than for their acquaintances and sometimes more than they would for themselves, an Oxford University scientist has found.

Dr. Freya Harrison of Oxford University's Department of Zoology asked 19 members of a research group at the University to squat against a wall with knees at right angles – a ski training exercise which becomes increasingly painful with time. Individuals performed the exercise five times, once for themselves and once for four different colleagues, to whom they claimed varying strengths of social tie.

They were paid 1p per second squatted and were asked to perform the exercise for as long as they wanted. When close friends won the money, people squatted for much longer than when they squatted for acquaintances – and often squatted longer (on average around 1.5 times longer) for their closest friends than when they were paid the money themselves.

The study by Dr. Harrison and colleagues at the University of Bath, published in this week's PLoS ONE, is thought to be one of the first to measure co-operation between friends and colleagues rather than between strangers. The researchers believe that, in humans, social ties increase co-operation, a finding that echoes similar studies on other species. For example: the guppy, a popular aquarium fish, works most closely on predator look-out duties with other guppies with which it has social ties. Similarly, spider monkeys more readily share food with those they groom.

Dr. Harrison does not believe that the scientific expertise of many of the 19-member research group was a factor in her findings. "People will always try to second guess an experiment but because all we asked was whether people would suffer pain for others, I don't think the nature of our group skewed the results."

She believes the outcome from a more tightly structured group might be different however: "If you were low down the pecking order in the police, say, you might expect the fact that someone had power over you to cancel out friendships. And in the armed forces you would imagine a very strong alignment of interests."

The Oxford University study reports analogous results to research published in 2007 that found that participants squatted longer to earn money for closer relatives. Social closeness therefore seemed to have exactly the same effect on willingness to cooperate with others as biological relatedness. However, in the earlier study people seemed unwilling to squat longer for relatives than for themselves. "Maybe that's because friends are a lot more important in determining social benefits than relatives," said Dr Harrison. "Alternatively, it could be that the role of a relative doesn't need working on because family members have genes in common already.

"Perhaps we can rely on help from our parents or siblings because it's almost always in our best interest to help someone who shares our genes. The old adage that one can choose one's friends, but not one's relatives, may well have a bearing on social investment rules.' *Provided by Oxford University*

http://green.blogs.nytimes.com/2011/04/01/is-a-pesticide-harming-all-those-bees/

Is a Pesticide Harming All Those Bees?

By FELICITY BARRINGER

For several years, Tom Theobald, a beekeeper in Boulder, Colo., has been trying to check out his suspicions that a relatively new class of pesticides has been interfering with the normal breeding and development of his stock.

The pesticides, based on the chemistry of nicotine, are generically called neonicotinoids. They are applied to seeds of crops like corn and soybeans. When the plants grow, the pesticides, which have been marketed under the names Clothianidin and Imidacloprid, permeate all of the plants' systems.

Mr. Theobald discovered, and later reported, that the pesticides had been banned in Italy and in Germany, the home country of their manufacturer, Bayer, which reaps hundreds of millions of dollars in revenue annually from their sale. Yet the Environmental Protection Agency gave the pesticides provisional approval several years ago based on a peer-reviewed field study.

That study is itself facing questions. Most pertinently: Are its results relevant to bee populations in the United States, particularly those near the abundant acreage of corn treated with the pesticide?

Word of Mr. Theobald's research clearly made it to the E.P.A. Late last year he obtained a Nov. 2 memorandum by agency scientists saying that a new field study should be undertaken along with at least one other study to ensure that the Clothianidin, now widely used on crops in the country's agricultural centers, is not harmful to pollinators.

Bayer officials put up a post in December that said in part, "Clothianidin is the leading seed treatment on corn in the United States and has been used extensively for over six years without incident to honeybees."

This week Mr. Theobald got reinforcements from two very different quarters. First, Senator Robert Menendez of New Jersey sent a letter to Lisa P. Jackson, the E.P.A. administrator, that said in part:

While large farming operations import managed honeybees for pollination, farmers with smaller, polyculture farms in New Jersey rely heavily on about 350 native species of bees.

Alarmingly, several species of bumblebees are believed to have already vanished and next to nothing is known about the health of other native species of bees.

Among his questions were: What steps is the E.P.A. taking to clarify and assess the risks to pollinators from chronic, sub-lethal neonicotinoid exposure, for example, when insecticide treatments involve seed coatings or injections into root systems? How will its risk assessment account for the accumulation of neonicotinoids in soil over the years?

Then The Independent newspaper in Britain reported on Tuesday that the Department for Environment, Food and Rural Affairs, the British equivalent of the E.P.A., was reconsidering its benign attitude toward neonicotinoids.

A British scientist who advises the agency, Robert Watson, had pointed out that recent laboratory studies indicate that the pesticide makes bees more susceptible to a dangerous viral infection.

The journalist Tom Philpott took note of The Independent's report this week at the environmental Web site Grist, which also reported on the E.P.A. scientists' concerns in December.

Senator Menendez's office released a statement on Friday saying that native bumblebees "mean big business for New Jersey - creating farming jobs and securing our food supply."

"They are simply too essential not to understand basic threats to their existence," it continued. "We must improve our understanding of the risks these chemicals pose to all bees."

http://www.physorg.com/news/2011-04-good-cholesterol-nanoparticles-cancer-cells.html

'Good cholesterol' nanoparticles seek and destroy cancer cells

High-density lipoprotein's hauls excess cholesterol to the liver for disposal, but new research suggests "good cholesterol" can also act as a special delivery vehicle of destruction for cancer.

Synthetic HDL nanoparticles loaded with small interfering RNA to silence cancer-promoting genes selectively shrunk or destroyed ovarian cancer tumors in mice, a research team led by scientists from The University of Texas MD Anderson Cancer Center and the University of North Texas Health Science Center reports in the April edition of Neoplasia.

"RNA interference has great therapeutic potential but delivering it to cancer cells has been problematic," said Anil Sood, M.D., the study's senior author and MD Anderson's director of Ovarian Cancer Research and co-director of the Center for RNA Interference and Non-Coding RNA at MD Anderson. "Combining siRNA with

HDL provides an efficient way to get these molecules to their targets. This study has several important implications in the ability to fight certain cancers."

Sood and Andras Lacko, Ph.D., professor of Molecular Biology and Immunology at UNT Health Science Center, jointly developed the nanoparticles, which build on Lacko's original insight about HDL's potential for cancer drug delivery.

The next step is to prepare for human clinical trials, the two scientists said. "If we can knock out 70, 80 or 90 percent of tumors without drug accumulation in normal tissues in mice, it is likely that many cancer patients could benefit from this new type of treatment in the long run," Lacko said.

Only cancer and liver cells express HDL receptor

Previous studies have shown that cancer cells attract and scavenge HDL by producing high levels of its receptor, SR-B1. As cancer cells take in HDL, they grow and proliferate. The only other site in the body that makes SR-B1 receptor is the liver. This selectivity for cancer cells protects normal, healthy cells from side effects.

Previous attempts to deliver siRNA by lipsomes and other nanoparticles have been hampered by toxicity and other concerns. The tiny bits of RNA, which regulate genes in a highly targeted fashion, can't simply be injected, for example.

"If siRNA is not in a nanoparticle, it gets broken down and excreted before it can be effective," Sood said. "HDL is completely biocompatible and is a safety improvement over other types of nanoparticles."

The team developed a synthetic version of HDL, called rHDL, because it's more stable than the natural version.

Fewer and smaller tumors, less toxicity

Using rHDL as a delivery method has other advantages as well. rHDL has not shown to cause immunologic responses, helping to minimize potential side effects, Lacko said, and it exhibits longer time in circulation than other drug formulations or lipoproteins. Also, because SR-B1 is found only in the liver, an rHDL vehicle will help block and treat metastasis to that organ.

Researchers first confirmed the distribution of SR-B1 and the uptake of rHDL nanoparticles in mice injected with cancer cells. They found that siRNA was distributed evenly in about 80 percent of a treated tumor. As expected, the nanoparticles accumulated in the liver with minimal or no delivery to the brain, heart, lung, kidney or spleen. Safety studies showed uptake in the liver did not cause adverse effects.

Using siRNA tailored to the individual gene, the researchers separately shut down the genes STAT3 and FAK in various types of treatment-resistant ovarian cancer tumors. STAT3 and FAK are important to cancer growth, progression and metastasis; however, they also play important roles in normal tissue so targeting precision is vital. The siRNA/rHDL formulation alone reduced the size and number of tumors by 60 to 80 percent. Combinations with chemotherapy caused reductions above 90 percent.

Conventional approaches to target STAT3 have met limited success, Sood said. FAK, which is over expressed in colorectal, breast, ovarian, thyroid and prostate cancers, is particularly aggressive in ovarian cancer and one reason for its poor survival rate. While previous attempts have targeted FAK with liposomal nanoparticles or small molecule inhibitors, these methods are not tumor-specific and are more likely to harm normal cells, the scientists noted.

Next Step: Clinical Studies

"In order to help expedite the study's progress to a clinical setting, we have identified 12 genes as biomarkers for response to STAT3-targeted therapy," Sood said. "Next, we'll work with the National Cancer Institute Nanoparticle Characterization Lab to develop a formulation of the HDL/siRNA nanoparticle for human use."

Provided by University of Texas M. D. Anderson Cancer Center

http://www.eurekalert.org/pub_releases/2011-04/eaft-qts040111.php

Quadruple therapy shows 100 percent SVR for HCV patients previously unresponsive to treatment

Is this treatment approach the next HCV therapy frontier?

Berlin, Germany - Exciting new data presented today at the International Liver CongressTM 2011 show that quadruple therapy in chronic hepatitis C (HCV) patients suppressed the emergence of resistant variants and resulted in a 100% rate of sustained virological response - undetectable HCV RNA - 12 weeks after treatment (SVR12).1

In the quadruple therapy study, HCV patients were given four drugs in combination; pegylated Interferon-alpha (PegIFN-alpha); ribavirin (RBV); and two different direct-acting antivirals (DAAs) BMS-650032 (an HCV NS3 protease inhibitor) and BMS-790052 (an HCV NS5A replication complex inhibitor).

The current standard of care (SoC) for HCV therapy is PegIFN-alpha plus RBV – a dual therapy. The addition of DAAs (currently in phase-III clinical trials) marks the next step in treatment evolution – a triple

therapy. However, the new data presented today suggests that quadruple therapy could be the next generation of treatment for chronic HCV patients.

Professor Heiner Wedemeyer, EASL'S Secretary General, said: "Quadruple therapy is possibly the future of HCV treatment; this study goes a way to confirming that. While it's expected that the first DAAs and triple therapy will be approved for use later this year, quadruple therapy appears to have a more profound effect on virological response, with less of a resistance problem."

The study may also provide new hope for a growing number of HCV patients who cannot be effectively treated for chronic hepatitis with current treatments.

The Phase-IIa trial looked at a cohort of 21 HCV genotype 1 null responders (patients who have failed to respond to previous treatment), of whom 19 had an unfavourable IL28B genotype, which predisposes HCV patients to treatment failure.

Only about 30% of null responders to PegIFN-alpha/RBV treatment achieve sustained virological response (SVR) when retreated with PegIFN-alpha/RBV plus telaprevir, demonstrating a high unmet medical need.1

http://www.eurekalert.org/pub_releases/2011-04/eaft-nds033111.php

New data show non-alcoholic fatty liver disease will reach epidemic status in the US

Berlin, Germany ***- According to new data presented today at the International Liver CongressTM, the United States (U.S.) could soon be faced with an epidemic of Non-Alcoholic Fatty Liver Disease (NAFLD)1, one of the major contributing factors of chronic liver disease (CLD), considered as one of the major causes of morbidity and mortality worldwide.***

The study highlights that if the current rates of obesity and diabetes continue for another two decades, the prevalence of NAFLD in the US is expected to increase by 50% in 2030.

The study analysed pre-existing clinical survey data over a 10 year period (1988-1994, 1999-2004 and 2005-2008), which included 39,500 adults from three survey cycles. Over the three cycles the prevalence of NAFLD doubled from 5.51% to 11.0% respectively. Furthermore, during the first survey cycle (1988-1994) 46.8% of all CLD's was related to NAFLD but by 2005-2008 this had increased to 75.1%. In addition, the prevalence of obesity and diabetes, the two key risk factors for NAFLD also steadily increased.

Mark Thursz EASL's Vice Secretary commented: "Non-alcoholic fatty liver disease is fast becoming one of the top concerns for clinicians due to the obesity epidemic and it's potential to progress to advanced liver disease which significantly impacts on overall liver-related mortality. This data highlights a serious concern for the future, and the enormous increasing health burden of NAFLD. If the obesity epidemic is anything to go by, the U.S. NAFLD epidemic may have a ripple effect worldwide. It is imperative that health systems continue to drive effective educational programmes to reinforce awareness among the general public to alert them of the risks of obesity and promote the importance of diet and exercise".

NAFLD is the term used to describe fat build-up in liver cells in people who do not drink alcohol excessively and is the most common persistent liver disorder in Western countries with an estimated overall prevalence of 20-30%.2 NAFLD encompasses a spectrum of liver disease associated with insulin resistance, diabetes and obesity and as such people most at risk of NAFLD are those who are obese, have insulin resistance associated with diabetes, high blood pressure and cholesterol.3

http://www.eurekalert.org/pub_releases/2011-04/eaft-tse033111.php

Thalidomide shows efficacy as adjuvant therapy for hepatocellular carcinoma patients

Well-known drug provides new hope for difficult to treat liver cancer patients

Berlin, Germany - Thalidomide has shown potential to be used as the first adjuvant therapy for hepatocellular carcinoma (HCC), according to data presented at the International Liver CongressTM 2011.1

A new study found thalidomide gave HCC patients who'd undergone grossly curative resection surgical removal of the cancerous part of the liver double the two-year disease free survival rate (65%) compared to placebo (33%).

However, the study did find that the two-year overall survival rate was comparable between patients treated with thalidomide and patients given placebo – 84.2% and 85.7% respectively.

Daniele Prati, EASL's Scientific Committee Member and Press Committee Chairman, commented: "Current options for adjuvant therapy in HCC are very limited and clinical trial results have been disappointing. Thalidomide has already been proven to work well in a number of other areas and this study shows it could potentially benefit HCC patients who are particularly difficult to treat. Overall, it is important to continue research in evaluating adjuvant therapy in HCC."

Surgery is the main form of treatment for HCC, but is only possible for a small proportion of those afflicted. Even after curative resection, recurrence is common and is the main cause of death. Adjuvant therapy that is, chemotherapy after surgery – is thus attempted to try to improve outcomes.2

The study is promising because there is currently no adjuvant therapy for HCC patients following curative resection. Indeed, the most up-to-date Cochrane Review of adjuvant therapies for HCC (conducted prior to this thalidomide study) found insufficient evidence to show that previously investigated adjuvant therapies increased survival for HCC, and only limited evidence to suggest that adjuvant therapy was useful in disease-free survival.2

In the double-blind, placebo controlled, randomized, comparative phase-II study, 42 patients were given 200mg per day oral dose of thalidomide (Arm A, 21 patients) or 200mg per day oral dose of placebo (Arm B, 21 patients). Patients started treatment within 6 weeks of complete tumor resection and carried on treatment for 12 months, or until they encountered disease recurrence, intolerably toxicity, or withdrew consent. Overall, thalidomide showed a good tolerability profile.

Thalidomide is currently approved by the European Medicines Agency (EMA) and Food and Drug Administration (FDA) in the US for the treatment of multiple myeloma (a cancer of the bone marrow).3,4

http://www.newscientist.com/article/mg21028064.100-backward-stars-point-to-galactic-cannibalism.html

Backward stars point to galactic cannibalism

STARS orbiting the wrong way in their galaxy's heart are probably the remnants of another galaxy that was eaten.

Astronomers have noted for years that the stars at the heart of some galaxies orbit in the opposite direction to that of their neighbours further out.

One suggestion has been that the stars were part of a smaller galaxy swallowed up by the host, but it was hard to find evidence to clinch the case. Now, observations by Kaj Kolja Kleineberg of La Laguna University in Tenerife, Spain, and colleagues bolster the galactic cannibalism theory.

They measured the light spectrum of stars in NGC 1700, an elliptical galaxy about 160 million light years away with a counter-rotating core. They found that the core stars appear to be younger than those in the outer regions - which would not be expected if the stars were all born in the same galaxy.

Core stars orbiting the "right" way in elliptical galaxies also tend to have high levels of heavy elements, but the inner stars in NGC 1700 contain just a fraction of these elements. This, too, suggests they were once part of a smaller galaxy, the team concludes in a paper to appear in Astrophysical Journal Letters.

http://www.nytimes.com/2011/04/03/science/03meltdown.html

From Far Labs, a Vivid Picture of Japan Crisis

By WILLIAM J. BROAD

For the clearest picture of what is happening at Japan's Fukushima Daiichi nuclear power plant, talk to scientists thousands of miles away.

Thanks to the unfamiliar but sophisticated art of atomic forensics, experts around the world have been able to document the situation vividly. Over decades, they have become very good at illuminating the hidden workings of nuclear power plants from afar, turning scraps of information into detailed analyses.

For example, an analysis by a French energy company revealed far more about the condition of the plant's reactors than the Japanese have ever described: water levels at the reactor cores dropping by as much as three-quarters, and temperatures in those cores soaring to nearly 5,000 degrees Fahrenheit, hot enough to burn and melt the zirconium casings that protect the fuel rods.

Scientists in Europe and America also know from observing the explosions of hydrogen gas at the plant that the nuclear fuel rods had heated to very dangerous levels, and from radioactive plumes how far the rods had disintegrated. At the same time, the evaluations also show that the reactors at Fukushima Daiichi escaped the deadliest outcomes - a complete meltdown of the plant.

Most of these computer-based forensics systems were developed after the 1979 partial meltdown at Three Mile Island, when regulators found they were essentially blind to what was happening in the reactor. Since then, to satisfy regulators, companies that run nuclear power plants use snippets of information coming out of a plant to develop simulations of what is happening inside and to perform a variety of risk evaluations.

Indeed, the detailed assessments of the Japanese reactors that Energy Secretary Steven Chu gave on Friday - when he told reporters that about 70 percent of the core of one reactor had been damaged, and that another reactor had undergone a 33 percent meltdown - came from forensic modeling.

The bits of information that drive these analyses range from the simple to the complex. They can include everything from the length of time a reactor core lacked cooling water to the subtleties of the gases and radioactive particles being emitted from the plant. Engineers feed the data points into computer simulations that churn out detailed portraits of the imperceptible, including many specifics on the melting of the hot fuel cores.

Governments and companies now possess dozens of these independently developed computer programs, known in industry jargon as "safety codes." Many of these institutions - including ones in Japan - are relying on

forensic modeling to analyze the disaster at Fukushima Daiichi to plan for a range of activities, from evacuations to forecasting the likely outcome. “The codes got better and better” after the accident at Three Mile Island revealed the poor state of reactor assessment, said Michael W. Golay, a professor of nuclear science and engineering at the Massachusetts Institute of Technology.

These portraits of the Japanese disaster tend to be proprietary and confidential, and in some cases secret. One reason the assessments are enormously sensitive for industry and government is the relative lack of precedent: The atomic age has seen the construction of nearly 600 civilian power plants, but according to the World Nuclear Association, only three have undergone serious accidents in which their fuel cores melted down.

Now, as a result of the crisis in Japan, the atomic simulations suggest that the number of serious accidents has suddenly doubled, with three of the reactors at the Fukushima Daiichi complex in some stage of meltdown. Even so, the public authorities have sought to avoid grim technical details that might trigger alarm or even panic.

“They don’t want to go there,” said Robert Alvarez, a nuclear expert who, from 1993 to 1999, was a policy adviser to the secretary of energy. “The spin is all about reassurance.”

If events in Japan unfold as they did at Three Mile Island in Pennsylvania, the forensic modeling could go on for some time. It took more than three years before engineers lowered a camera to visually inspect the damaged core of the Pennsylvania reactor, and another year to map the extent of the destruction. The core turned out to be about half melted.

By definition, a meltdown is the severe overheating of the core of a nuclear reactor that results in either the partial or full liquefaction of its uranium fuel and supporting metal lattice, at times with the atmospheric release of deadly radiation. Partial meltdowns usually strike a core’s middle regions instead of the edge, where temperatures are typically lower.

The main meltdowns of the past at civilian plants were Three Mile Island in 1979, the St.-Laurent reactor in France in 1980, and Chernobyl in Ukraine in 1986.

One of the first safety codes to emerge after Three Mile Island was the Modular Accident Analysis Program. Running on a modest computer, it simulates reactor crises based on such information as the duration of a power blackout and the presence of invisible wisps of radioactive materials.

Robert E. Henry, a developer of the code at Fauske & Associates, an engineering company near Chicago, said that a first sign of major trouble at any reactor was the release of hydrogen - a highly flammable gas that has fueled several large explosions at Fukushima Daiichi. The gas, he said in an interview, indicated that cooling water had fallen low, exposing the hot fuel rods.

The next alarms, Dr. Henry said, centered on various types of radioactivity that signal increasingly high core temperatures and melting.

First, he said, “as the core gets hotter and hotter,” easily evaporated products of atomic fission - like iodine 131 and cesium 137 - fly out. If temperatures rise higher, threatening to melt the core entirely, he added, less volatile products such as strontium 90 and plutonium 239 join the rising plume.

The lofting of the latter particles in large quantities points to “substantial fuel melting,” Dr. Henry said.

He added that he and his colleagues modeled the Japanese accident in its first days and discerned partial - not full - core melting.

Micro-Simulation Technology, a software company in Montville, N.J., used its own computer code to model the Japanese accident. It found core temperatures in the reactors soaring as high as 2,250 degrees Celsius, or more than 4,000 degrees Fahrenheit - hot enough to liquefy many reactor metals.

“Some portion of the core melted,” said Li-chi Cliff Po, the company’s president. He called his methods simpler than most industry simulations, adding that the Japanese disaster was relatively easy to model because the observable facts of the first hours and days were so unremittingly bleak - “no water in, no injection” to cool the hot cores.

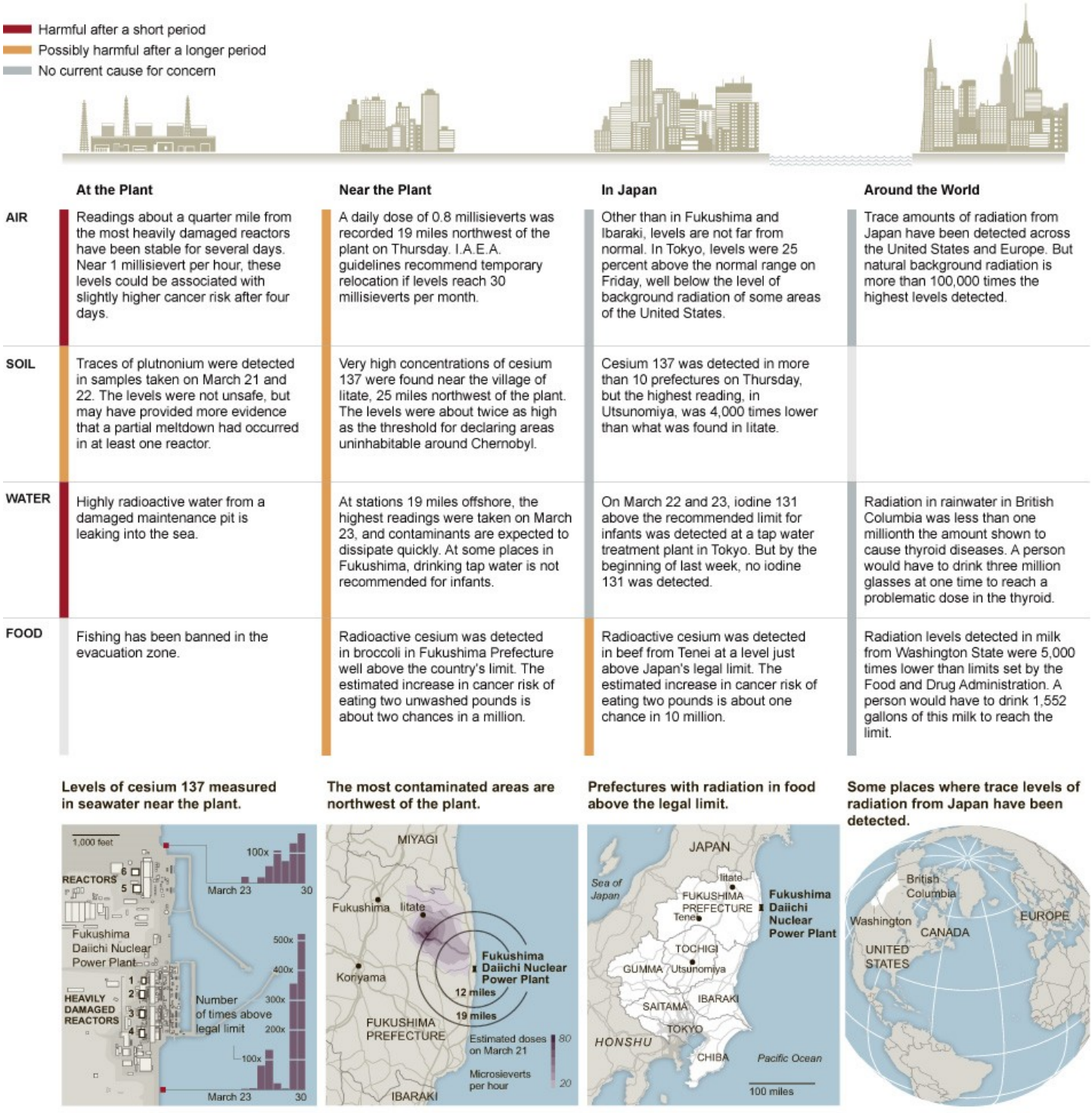
“I don’t think there’s any mystery or foul play,” Dr. Po said of the disaster’s scale. “It’s just so bad.”

The big players in reactor modeling are federal laboratories and large nuclear companies such as General Electric, Westinghouse and Areva, a French group that supplied reactor fuel to the Japanese complex.

The Sandia National Laboratories in Albuquerque wrote one of the most respected codes. It models whole plants and serves as a main tool of the Nuclear Regulatory Commission, the Washington agency that oversees the nation’s reactors.

Areva and French agencies use a reactor code-named Cathare, a complicated acronym that also refers to a kind of goat’s milk cheese.

On March 21, Stanford University presented an invitation-only panel discussion on the Japanese crisis that featured Alan Hansen, an executive vice president of Areva NC, a unit of the company focused on the nuclear fuel cycle.



"Clearly," he told the audience, "we're witnessing one of the greatest disasters in modern time."

Dr. Hansen, a nuclear engineer, presented a slide show that he said the company's German unit had prepared. That division, he added, "has been analyzing this accident in great detail."

The presentation gave a blow-by-blow of the accident's early hours and days. It said drops in cooling water exposed up to three-quarters of the reactor cores, and that peak temperatures hit 2,700 degrees Celsius, or more than 4,800 degrees Fahrenheit. That's hot enough to melt steel and zirconium - the main ingredient in the metallic outer shell of a fuel rod, known as the cladding.

"Zirconium in the cladding starts to burn," said the slide presentation. At the peak temperature, it continued, the core experienced "melting of uranium-zirconium eutectics," a reactor alloy.

A slide with a cutaway illustration of a reactor featured a glowing hot mass of melted fuel rods in the middle of the core and noted "release of fission products" during meltdown. The products are radioactive fragments of split atoms that can result in cancer and other serious illnesses.

Stanford, where Dr. Hansen is a visiting scholar, posted the slides online after the March presentation. At that time, each of the roughly 30 slides was marked with the Areva symbol or name, and each also gave the name of their author, Matthias Braun.

The posted document was later changed to remove all references to Areva, and Dr. Braun and Areva did not reply to questions about what simulation code or codes the company may have used to arrive at its analysis of the Fukushima disaster.

“We cannot comment on that,” Jarret Adams, a spokesman for Areva, said of the slide presentation. The reason, he added, was “because it was not an officially released document.”

A European atomic official monitoring the Fukushima crisis expressed sympathy for Japan’s need to rely on forensics to grasp the full dimensions of the unfolding disaster.

“Clearly, there’s no access to the core,” the official said. “The Japanese are honestly blind.”

http://www.eurekalert.org/pub_releases/2011-04/imc-sfr033111.php

Study finds routine periodic fasting is good for your health, and your heart

Fasting found to reduce cardiac risk factors, such as triglycerides, weight, and blood sugar levels

Murray, UT – Fasting has long been associated with religious rituals, diets, and political protests. Now new evidence from cardiac researchers at the Intermountain Medical Center Heart Institute demonstrates that routine periodic fasting is also good for your health, and your heart.

Today, research cardiologists at the Intermountain Medical Center Heart Institute are reporting that fasting not only lowers one's risk of coronary artery disease and diabetes, but also causes significant changes in a person's blood cholesterol levels. Both diabetes and elevated cholesterol are known risk factors for coronary heart disease.

The discovery expands upon a 2007 Intermountain Healthcare study that revealed an association between fasting and reduced risk of coronary heart disease, the leading cause of death among men and women in America. In the new research, fasting was also found to reduce other cardiac risk factors, such as triglycerides, weight, and blood sugar levels.

The findings were presented Sunday, April 3, at the annual scientific sessions of the American College of Cardiology in New Orleans.

"These new findings demonstrate that our original discovery was not a chance event," says Dr. Benjamin D. Horne, PhD, MPH, director of cardiovascular and genetic epidemiology at the Intermountain Medical Center Heart Institute, and the study's principal investigator. "The confirmation among a new set of patients that fasting is associated with lower risk of these common diseases raises new questions about how fasting itself reduces risk or if it simply indicates a healthy lifestyle."

Unlike the earlier research by the team, this new research recorded reactions in the body's biological mechanisms during the fasting period. The participants' low-density lipoprotein cholesterol (LDL-C, the "bad" cholesterol) and high-density lipoprotein cholesterol (HDL-C, the "good" cholesterol) both increased (by 14 percent and 6 percent, respectively) raising their total cholesterol – and catching the researchers by surprise.

"Fasting causes hunger or stress. In response, the body releases more cholesterol, allowing it to utilize fat as a source of fuel, instead of glucose. This decreases the number of fat cells in the body," says Dr. Horne. "This is important because the fewer fat cells a body has, the less likely it will experience insulin resistance, or diabetes."

This recent study also confirmed earlier findings about the effects of fasting on human growth hormone (HGH), a metabolic protein. HGH works to protect lean muscle and metabolic balance, a response triggered and accelerated by fasting. During the 24-hour fasting periods, HGH increased an average of 1,300 percent in women, and nearly 2,000 percent in men.

In this most recent trial, researchers conducted two fasting studies of over 200 individuals - both patients and healthy volunteers - who were recruited at Intermountain Medical Center. A second 2011 clinical trial followed another 30 patients who drank only water and ate nothing else for 24 hours. They were also monitored while eating a normal diet during an additional 24-hour period. Blood tests and physical measurements were taken from all to evaluate cardiac risk factors, markers of metabolic risk, and other general health parameters.

While the results were surprising to researchers, it's not time to start a fasting diet just yet. It will take more studies like these to fully determine the body's reaction to fasting and its effect on human health. Dr. Horne believes that fasting could one day be prescribed as a treatment for preventing diabetes and coronary heart disease.

To help achieve the goal of expanded research, the Deseret Foundation (which funded the previous fasting studies) recently approved a new grant to evaluate many more metabolic factors in the blood using stored

samples from the recent fasting clinical trial. The researchers will also include an additional clinical trial of fasting among patients who have been diagnosed with coronary heart disease.

"We are very grateful for the financial support from the Deseret Foundation. The organization and its donors have made these groundbreaking studies of fasting possible," added Dr. Horne.

Members of the Intermountain Medical Center Heart Institute research team included Dr. Horne, Jeffrey L. Anderson, MD, John F. Carlquist, PhD, J. Brent Muhlestein, MD, Donald L. Lappé, MD, Heidi T. May, PhD, MSPH, Boudi Kfoury, MD, Oxana Galenko, PhD, Amy R. Butler, Dylan P. Nelson, Kimberly D. Brunisholz, Tami L. Bair, and Samin Panahi.

http://www.eurekalert.org/pub_releases/2011-04/jhmi-hdc033011.php

Heart drug cuts prostate cancer risk; holds potential for therapeutic use

Johns Hopkins scientists and their colleagues paired laboratory and epidemiologic data to find that men using the cardiac drug, digoxin, had a 24 percent lower risk for prostate cancer.

The scientists say further research about the discovery may lead to use of the drug, or new ones that work the same way, to treat the cancer.

Digoxin, made from the foxglove plant, has been used for centuries in folk medicine and for decades to treat congestive heart failure and heart rhythm abnormalities. It also emerged as a leading candidate among 3,000 drugs screened by the Johns Hopkins team for the drugs' ability to curb prostate cancer cell growth, according to the investigators, who published their findings in the April 3 issue of Cancer Discovery.

Additional research, by the team, in a cohort of more than 47,000 men revealed that those who took digoxin for heart disease had a significantly lower risk of prostate cancer. The scientists cautioned, however, that their work does not prove digoxin prevents prostate cancer nor are they suggesting the drug be used to prevent the disease. "This is not a drug you'd give to healthy people," says Elizabeth Platz, Sc.D., M.P.H., professor of epidemiology, oncology, and urology at the Johns Hopkins Bloomberg School of Public Health. Serious side effects include male breast enlargement and heart rhythm irregularities, and the drug commonly causes nausea, vomiting and headache.

In the first stage of research, Johns Hopkins assistant professor Srinivasan Yegnasubramanian, M.D., Ph.D, Kimmel Cancer Center director and professor William G. Nelson, M.D., Ph.D., and professor Jun Liu, Ph.D., identified 38 compounds already FDA-approved or with a history of medical use out of a database of more than 3,000. The 38 candidate drugs reduced prostate cancer cell growth in the laboratory by at least 50 percent. They did not include known chemotherapy drugs among the 38.

Nelson and Yegnasubramanian then took the list of 38 drugs to Platz, a prostate cancer research collaborator. "They literally burst into my office and asked, 'Can you look at this list of drug candidates and see if you can study any of them in an epidemiologic cohort?'" recalls Platz.

"We realized that combining our laboratory and epidemiologic approaches could reduce the possibility that results on the candidate drugs might be due to chance," says Platz. "Adding the epidemiology study to the drug screen step provided an assessment of the drug's potential activity in people."

The top hit on the list of anti-prostate cancer drugs, disulfiram, is used to treat chronic alcoholism, but because it is rarely used among the general population, it could not be evaluated effectively in the epidemiologic study. The second candidate was digoxin, they report, which was prescribed often enough to be studied.

To see if they could identify a link between digoxin and prostate cancer in humans, they turned to a cohort of about 47,000 men aged 40-75 who participated in Harvard's Health Professionals Follow-up Study from 1986 through 2006 and did not have a cancer diagnosis before 1986. Study participants had completed a questionnaire every two years, reporting on demographic information, medical history, medication use and lifestyle factors. For men who reported a prostate cancer diagnosis, researchers evaluated their medical records and pathology reports.

Among the study participants, 5,002 cases of prostate cancer were reported. Two percent of all study participants reported regular use of digoxin at the beginning of the study, and those men had a 24 percent lower relative risk of getting prostate cancer compared with men who did not use the drug. Those who used digoxin for more than 10 years had about half the risk of developing prostate cancer as those who did not.

Even after ruling out such potentially "confounding factors" as PSA screening, family history of prostate cancer, and use of other heart drugs, the lower risk of prostate cancer among digoxin users held up, the researchers say.

Platz and Yegnasubramanian say that the next steps will be to determine the mechanism of digoxin's effect on prostate cancer cells, which will support testing digoxin or other drugs that work in the same way in clinical trials as a potential prostate cancer therapy. Digoxin alters enzymatic pathways for sodium and potassium in heart cells, and according to the researchers, may also have an effect on the same or different pathways in prostate cancer.

Funding for the research was provided by the National Cancer Institute, National Institutes of Health, the Patrick C. Walsh Prostate Cancer Research Fund at Johns Hopkins, and the National Heart, Lung, and Blood Institute.
Additional scientists who conducted the research included Curtis R. Chong and Joong Sup Shim from Johns Hopkins; and Stacey A. Kenfield, Meir J. Stampfer, Walter C. Willett, and Edward Giovannucci from the Harvard School of Public Health and the Channing Laboratory, Department of Medicine, Harvard Medical School and Brigham & Women's Hospital.

http://www.physorg.com/news/2011-04-census-spotlights-india-girls.html

Census spotlights India's 'missing girls'

The problem of India's "missing girls" has been put under a harsh spotlight by new census data showing the ratio of female to male children at its lowest level since independence in 1947.

According to the latest national headcount, there are now just 914 girls for every 1,000 boys under the age of six, down from a ratio of 927 for every 1,000 a decade ago.

Despite India's steady economic rise in the past 10 years, the figures show the social bias against having girls remains as strong as ever, with illegal sex-selective abortions facilitated by cheap ultrasound technology.

"The figures should make us think 100 times before we call ourselves citizens of a progressive nation," said Delhi University social scientist Gitika Vasudev.

India's sex ratio has been falling continuously since 1961, when it stood at 976 girls for every 1,000 boys, and Vasudev said the latest data was "proof of India's collective failure" to protect girl children.

The global average is 1,050 girls for every 1,000 boys.

Married women in India face huge pressure to produce male heirs who are seen as breadwinners, family leaders and carers when parents age.

Girls are often viewed as a burden to the family as they require hefty dowries to be married off.

"Measures put in place over the last 40 years have not had any impact on the ratio," conceded India's home secretary G.K. Pillai, announcing the need for a "complete" family planning policy review.

India has a long history of female infanticide -- of girls suffocated, poisoned, drowned or left to die.

More common now, thanks to technological advances, is the abortion of female foetuses, or "female foeticide" -- a simple, cheap and difficult to police process with ultrasound tests costing as little as $10.

Signboards at clinics stipulating: "No sex determination tests done here" often pay little more than lip service to the law, and portable ultrasound machines mean tests can be carried out in the most remote villages.

As many as half a million female foetuses are estimated to be aborted each year in India, according to a 2006 study by British medical journal Lancet.

Social activists say legal safeguards have been rendered toothless by official apathy.

"It's not difficult to trace doctors who perform these tests but the government has not found it important enough to nab them," says gynaecologist D.P. Roy, director of "Beti ka Saath" or "A Daughter is a Companion", a voluntary group in the northern state of Haryana.

"Instead of spending money on seminars and public meetings, the government should post a cash reward for anyone who helps catch offenders," she said.

In the last few decades, successive governments have launched an array of schemes to change attitudes towards girls, including offering cash incentives, but they have had little impact.

There had been hopes that the growing affluence produced by India's rapid economic rise would help erode long-held prejudices, but some analysts say it has actually reinforced them.

"It's a misconception that English-speaking, suave, rich Indians do not use sex determination tests," said P.M. Kulkarni, a demography expert at New Delhi's Jawaharlal Nehru University. "Shockingly, some rich Indians believe they have a right to choose whether they want a boy or a girl," Kulkarni said. "Society has to change, mindsets have to change, attitudes need to change to save the girl child."

http://www.physorg.com/news/2011-04-cow-valve-heart-implant.html

'Cow valve' heart implant hailed as breakthrough

A new type of heart valve made with cow tissue and inserted by catheter was hailed on Sunday as a major breakthrough that could eliminate the need for open heart surgery in some patients, US doctors said Sunday.

The method is aimed at high-risk patients who suffer from severe aortic stenosis, a clogged valve that impedes the pathway of oxygen-rich blood by making the heart work harder to pump blood through a narrowing opening. The condition affects nine percent of Americans over 65. Without treatment, up to half of patients die within two years.

The technique of inserting the bioprosthetic valve through a tube in the artery is less invasive than conventional surgery and showed similar survival rates to conventional surgery, but also raised the risk of stroke and other major heart complications.

The research was part of the multi-year PARTNER study, the world's first randomized trial comparing the two methods, and was showcased at the American College of Cardiology conference in New Orleans.

"The progress has been quite dramatic over several years," said Craig Smith, chair of the Columbia University College of Physicians and co-principal investigator on the study.

The method lowered costs involved with rehospitalization in frail, elderly patients and was found to increase life expectancy by as much as 1.9 years, said the research.

The process is already being done in Europe but has yet to gain Food and Drug Administration approval in the United States, where the valve is considered an investigational device.

"You are all witnessing history in the making," said David Moliterno, professor of medicine at the University of Kentucky. "This probably will be seen as one of the biggest steps in cardiovascular medicine, as far as intervention is concerned, potentially in our lifetime," said Moliterno, who was not involved in the study. After balloon angioplasty and the invention of stents, "this will be seen as the next major turning point," he said.

The study compared results among 699 patients with a median age of 84, who were randomly assigned to either transcatheter aortic valve replacement (TAVR) or open heart surgery to replace the aortic valve (AVR).

The TAVR process involves taking a wire mesh stent that holds three stitched-in valve flaps made of cow tissue, and inserting that into the heart via a catheter in a leg artery or under the rib cage.

The bioprosthetic, called the Edwards SAPIEN heart valve, is made by Edwards Lifesciences in California.

The valve is treated with an anti-calcium building agent that helps cut back on the causes of stenosis. It is not yet available on the US market. Early results from the study at the 30-day marked favored the catheter insertion of the bioprosthetic, showing a death rate of 3.4 percent compared to 6.4 percent for the open heart surgery method. Death rates evened out over time and were similar at one year.

Those in the catheter-group also saw lower risk of major bleeding (9.3 percent compared to 19.3 percent in surgery patients) and irregular heart rhythm (8.6 percent compared to 16 percent in the other group).

"These results clearly show that TAVR is an excellent alternative to surgical AVR in high-risk patients," said Smith.

However, the new method carried significantly higher risk of "major vascular complications," at a rate of 11 percent after TAVR compared to 3.2 percent in patients who underwent conventional surgery.

Major stroke risk was also higher in TAVR patients -- 3.8 percent versus 2.1 percent at the 30-day mark and 5.1 percent versus 2.4 percent after one year.

Smith declined to elaborate about the suspected causes of stroke in patients who underwent TAVR, but said the subject was being studied and would be addressed at a future conference on thoracic surgery.

Both the valves typically used in open heart surgery and the type used in the TAVR method are made with cow tissue, or bovine flaps, but the open heart surgery valves are bulkier, Smith said.

The catheter-inserted valves are smaller in size but have a slightly larger opening than the heart surgery valves. A next-generation device is being formulated that includes some improvements to the design and can be inserted through a smaller catheter, researchers said.