http://www.eurekalert.org/pub_releases/2011-05/cfft-wis053011.php

Wikipedia improves students' work

Students become much more concerned with accuracy when their research is posted online

Fredericton, NB – A student writing an essay for their teacher may be tempted to plagiarize or leave facts unchecked. A new study shows that if you ask that same student to write something that will be posted on Wikipedia, he or she suddenly becomes determined to make the work as accurate as possible, and may actually do better research.

Brenna Gray, an instructor at Douglas College in New Westminster, B.C., was presenting the results of the study at the 2011 Congress of the Canadian Federation for the Humanities and Social Sciences at the University of New Brunswick in Fredericton. She became interested in why students seem to adopt some technological innovations (Wikipedia, for example) and reject things their schools would like them to use, such as the student-teacher interface Blackboard. Gray says it's easy to criticize Wikipedia because of the unstructured way it is set up.

She says despite its faults, it does promote solid values for its writers, including precise citations, accurate research, editing and revision. "Those ideals are the ones we espouse as English instructors," she said.

She decided to get first-year students in an English class to write short biographies of Canadian writers that would then be posted on Wikipedia. What she found was that the moment the students realized their work was going public in a forum over which they had no control, they took the work a lot more seriously. They became concerned, for example, with the accuracy of facts.

Gray says it's not only the fact that their work was going public that stimulated the students, it was the realization that in producing the Wikipedia entries they were acquiring skills that were transferable to other parts of their lives.

Gray says students, like most of the rest of us, are more time-crunched than ever. They have to prioritize, and are therefore reluctant to spend time learning skills that aren't useful outside school. That includes online tools like Blackboard, which they perceive as having no relevance to other parts of their life.

Because the Wikipedia skills are perceived as transferable, students became interested in acquiring them. And they were willing to work to Wikipedia's standards. Gray says teachers need to talk about Wikipedia and how it can be used. "The purpose of my paper is to start a discussion about it," she said.

http://www.physorg.com/news/2011-05-black-white-stinky-skunks-boldly.html

Black, white and stinky: Explaining coloration in skunks and other boldly colored animals

(PhysOrg.com) – ***In a first-of-its-kind analysis of the evolution of warning coloration in carnivores, the researchers explain why some species use bold coloration to warn predators while other species don't.***

Striped Skunks (Mephitis mephitis) **Image: Wikipedia, CCA3.**

In a first-of-its-kind analysis of the evolution of warning coloration in carnivores published this week by University of Massachusetts Amherst evolutionary biologist Ted Stankowich and colleagues, the researchers explain why some species such as skunks use bold coloration to warn predators either that they risk being sprayed with stinky gas or getting into a vicious fight, while other species don't.

Stankowich says most evolutionary research attention to date on warning coloration in animals has been paid to species like newts, poison dart frogs and insects, so this new investigation is a rare comprehensive analysis of mammalian warning coloration, also known as aposematic coloration, such as the skunk's bold stripes.

He adds, "It's important to be clear that bold coloration is not just advertising the ability to spray your anal glands, it's often an advertisement for ferocity. Some of these small black and white animals are extremely ferocious, for example the honey badger."

Stankowich, who is also a visiting postdoctoral and teaching fellow at Harvard, with Tim Caro of the University of California Davis and UMass Amherst undergraduate Matthew Cox, conducted this first systematic examination of the evolutionary drivers of bold coloration patterns and placement in carnivores such as skunks, badgers, civet cats and wolverines. The researchers collected data on 188 species of mammalian carnivores and found those who are more boldly colored are more likely to be stocky, able to spray noxious chemicals from their anal glands, burrowing, nocturnal and living in exposed environments. Results appear in the current online edition of the journal Evolution.

"One question we're asking is what are the possible evolutionary advantages of bold coloration in mammals," he says. "Why would you want to be so bold, calling more attention to yourself when camouflage is

such an effective strategy? We've tested how certain aspects of species ecology and lifestyle might shape the evolution of this phenomenon."

Among the evolutionary advantages these strategies may carry is the ability to move into a new habitat that is relatively exposed to predators but not exploited by other animals or the ability to remain living in a habitat that suddenly experiences an influx of new predators.

To investigate eight factors that are potentially involved in the evolution of aposematic coloration, Stankowich and colleagues categorized 188 carnivore species by pelage: from a single color to extravagantly and boldly marked, which contributes to a feature they call salience, an expression of how well a species stands out in its environment due to its color pattern. Other variables included in the analyses are the ability to spray noxious anal gland secretions, body shape and habitat openness.

The researchers then used a series of statistical steps including phylogenetic independent contrast methods, which are based on information about species' evolutionary relationships, to look at changes in a particular trait. They analyzed these contrast scores with a measure known as Akaike's information criterion (AIC) to obtain the relative goodness of fit for variables to a statistical model. AIC analysis reveals which variables play the strongest role in explaining the variation in the data, Stankowich notes.

In this case, the authors identified the 10 strongest models, then looked at which variables most commonly occurred in those models. These strongest models were used to calculate summary weights for each factor, an indicator of the importance of each predictor. They found that the evolution of boldly colored body patterns was best explained by body length, habitat openness, anal spray ability and burrowing behavior.

They also found that species with horizontal stripes along the body leading to the tail are more likely to be able to spray their anal gland secretions at predators in defense, suggesting that the stripes also direct the predator's attention to the area where the weapon is found. Similarly, a previous study found that facial stripes in this group were found in species that defend themselves by fighting, often with strong bites.

Overall, these anti-predator strategies appear to have evolved independently several times among the Carnivora, say Stankowich and colleagues. So, for example, other nocturnal, slow, stocky, small-to-medium animals with bold black-and-white coloration signaling the presence of noxious anal gland secretions and/or the ability to fiercely defend themselves can be found living in open areas in Africa as well as North and South America and Europe. *Provided by University of Massachusetts Amherst*

http://www.physorg.com/news/2011-05-ayurveda-east-current-health-culture.html

Ayurveda, 'far east' of the current health culture boom

For the first time, a seminal scripture of Ayurveda – the most ancient and important system of medicine in India – is being textually analysed and historically explored piece by piece through the existing manuscripts.

A project funded by the Austrian Science Fund FWF aims to reconstruct a more authentic version of this treatise and its content. Methods from evolutionary biology are also being used in order to assess the originality of the different versions of the text, which was written in Sanskrit. Such innovative approaches can only further enhance Vienna's status as a leading centre for critical editions and translations of ancient Indian writings.

Preserving health and curing diseases, and thereby fulfilling the meaning of our lives – these are the ambitions of the modern-day "cult" of health and wellness – which, however, have already been nurtured for thousands of years. The ancient Indian system of medicine, Ayurveda, which enjoys a 2000-year-old tradition, sought to live up to these goals. Given the enduring importance of these objectives, Ayurveda was continuously updated in the course of time. Not only were the old original works copied in the process, they were also rewritten and amended. Intentionally and unintentionally, this transmission gradually changed the original message. A project funded by the Austrian Science Fund FWF is now going about reconstructing the original wording of text passages from a specific Ayurvedic work as accurately as possible.

Traditionally, some of the most ancient and important Ayurvedic treatises are stored between two wooden boards and wrapped in cloth. Shelves with bundles of manuscripts, Howrah Sanskrit Samaj, Howrah, West Bengal.

The chosen document is the so-called Carakasamhita: the most ancient and important of Ayurvedic treatises. It is arranged in eight volumes which address different areas and subjects of medicine. The complexity and size of this written work require an incremental analysis of the individual sections: A Vienna-based team of scientists is therefore looking at the individual chapters of the third volume of the Carakasamhita, the

Vimanasthana, and the fourth volume, the Sarirasthana. The project leader, Professor Karin Preisendanz (Director of the Institute for South Asian, Tibetan and Buddhist Studies at the University of Vienna), explained the role of the chapters being studied: "These sections in particular actually deal with fundamental topics in Ayurvedic thinking. Knowledge about human anatomy, embryology, pathology and the natural healthy state was written down in them, as well as thoughts about and ways of realizing a full lifespan."

Initially passed down through oral tradition, the subsequently written records of the Carakasamhita were repeatedly copied in the course of nearly two thousand years of history. This inevitably led to changes in the wording, which means that today, diverging manuscripts abound. To date, it is not certain which parts of these "mutated texts" reflect the original way of thinking most accurately. And this is exactly what Professor Preisendanz and her team want to find out through their analysis. To do this, the scientists are using methods that are completely innovative in the field of text analysis − namely those from evolutionary biology, which analyses the evolutionary relationships of different species with the same origins using so-called cladograms. Put simply, these are branching diagrams with only two bifurcations in each branch, which allow scientists to trace the common origins of different organisms based on a comparison of characteristics.

This method has now been adapted for the purpose of studying the Carakasamhita. Computer-aided analyses help determine the common source of the different versions of the text. Based on the analyses and using methods of textual criticism, the project goal can be realised: the reconstruction of a version of the Carakasamhita that is closer to its original form. However, Prof. Preisendanz believes it is also important to amend this "archetypical version" or "critical edition" in a further step with detailed information: above all, insight into the analytical methods used and the transmission history of the work will be provided. This “critical edition” will then allow for content-related studies with regard to the history of Indian medicine, philosophy, religion and culture, as reflected in the Carakasamhita. The findings will be presented in scientific reports.

The project follows in the footsteps of Vienna’s more than 100-year long tradition of philological-historical research focusing on South Asia. Three earlier projects from 2001 onwards, also headed by Professor Preisendanz and completed under the auspices of the Austrian Science Fund, produced new resources, such as the largest digital archive of manuscripts of Sanskrit medical works in the world, which the current project will continue to build on and supplement. It is a reaffirmation of Vienna’s global renown as a leading centre of critical editions and translations of ancient Indian Sanskrit writings − a position that was attained and is being upheld with the support of the Austrian Science Fund. *Provided by Austrian Science Fund*

http://medicalxpress.com/news/2011-05-scientists-vitamins-minerals-age-related-diseases.html

Scientists discover how vitamins and minerals may prevent age-related diseases

Severe deficiency of the vitamins and minerals required for life is relatively uncommon in developed nations, but modest deficiency is very common and often not taken seriously.

A new research published online in the FASEB Journal, however, may change this thinking as it examines moderate selenium and vitamin K deficiency to show how damage accumulates over time as a result of vitamin and mineral loss, leading to age-related diseases.

"Understanding how best to define and measure optimum nutrition will make the application of new technologies to allow each person to optimize their own nutrition a much more realistic possibility than it is today." said Joyce C. McCann, Ph.D., a co-author of the study from the Nutrition and Metabolism Center at Children's Hospital Oakland Research Institute in Oakland, California. "If the principles of the theory, as demonstrated for vitamin K and selenium, can be generalized to other vitamins and minerals, this may provide the foundation needed."

McCann and colleagues reached their conclusions by compiling and assessing several general types of scientific evidence. They tested whether selenium-dependent proteins that are essential from an evolutionary perspective are more resistant to selenium deficiency than those that are less essential. They discovered a highly sophisticated array of mechanisms at cellular and tissue levels that, when selenium is limited, protect essential selenium-dependent proteins at the expense of those that are nonessential. They also found that mutations in selenium-dependent proteins that are lost on modest selenium deficiency result in characteristics shared by age-related diseases including cancer, heart disease, and loss of immune or brain function. Results should inform attempts to locate mechanistic linkages between vitamin or mineral deficiencies and age-related diseases by focusing attention on the vitamin and mineral-dependent proteins that are nonessential from an evolutionary perspective. Such mechanistic linkages are likely to present opportunities for treatment.

"This paper should settle any debate about the importance of taking a good, complete, multivitamin every day," said Gerald Weissmann, M.D., Editor-in-Chief of the FASEB Journal. "As this report shows, taking a multivitamin that contains selenium is a good way to prevent deficiencies that, over time, can cause harm in ways that we are just beginning to understand."

More information: Joyce C. McCann and Bruce N. Ames. Adaptive dysfunction of selenoproteins from the perspective of the triage theory: why modest selenium deficiency may increase risk of diseases of aging . FASEB J. 2011 25:1793-1814. doi: 10.1096/fj.11-180885

http://www.nytimes.com/2011/05/31/science/31qna.html

The Squeaky Joint

By C. CLAIBORNE RAY

Q. Is there research on whether fish oil supplements help ease joint pain?

A. There is considerable research on fish oils and the inflammation of rheumatoid arthritis, as well as some limited early research on fish oils and osteoarthritis, or degenerative joint disease, said Dr. Sheldon S. Hendler, co-editor of The PDR for Nutritional Supplements. The fish oils in the studies are eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), both omega-3 polyunsaturated fatty acids.

"Daily ingestion of at least three grams of a mixture of EPA and DHA for 12 weeks or longer has been found to reduce morning stiffness and the number of tender joints in those with rheumatoid arthritis," Dr. Hendler said. Those treated were reported to reduce or discontinue use of nonsteroidal anti-inflammatory drugs, he said.

In a recent pilot study, 250 osteoarthritis patients were given similar fish oil doses. They reported significant improvement in overall pain and reduction in NSAID use, with no ill effects from the fish oil, Dr. Hendler said.

Fish oils inhibit the synthesis of substances that contribute to inflammation. Osteoarthritis "mainly involves the breakdown of joint cartilage associated with aging," not inflammation, Dr. Hendler said, but as it progresses, some components of inflammation appear that may be inhibited by fish oil, which may also prevent the breakdown of cartilage.

http://www.nytimes.com/2011/05/31/health/31really.html

The Claim: A Diet High in Protein Is Bad for Your Kidneys

By ANAHAD O'CONNOR

THE FACTS Anyone who has tried a high-protein diet has probably heard this warning: You may lose weight, but you risk kidney damage.

The idea is that processing large amounts of protein strains your kidneys, which filter blood and remove waste. But there is little research backing that assertion.

In one study, in The International Journal of Sport Nutrition and Exercise Metabolism, researchers recruited bodybuilders and other athletes, then examined their kidney function over seven days as they followed high- and medium-protein diets. The researchers found that every marker of kidney function was within the normal range in all of the athletes who consumed large amounts of protein.

In a much larger study, published in The Annals of Internal Medicine, researchers looked at protein intake in 1,624 women over an 11-year period. They found that high-protein diets did not cause any problems in women with normal kidney function. But in women who had "mild renal insufficiency," they wrote, consuming large amounts of protein accelerated renal decline. University of Connecticut researchers reached a similar conclusion when they reviewed years of research on the subject in a 2005 report in the journal Nutrition & Metabolism.

For those considering such a diet, a physical and a kidney function test can reveal any underlying problems.
THE BOTTOM LINE Studies show that in healthy adults, increased protein intake does not put excess strain on the kidneys.

http://medicalxpress.com/news/2011-05-blood-instantly-depression.html

Blood test can instantly diagnose depression

(Medical Xpress) -- ***Backed by the medical research group Human Metabolome Technologies (HMT), researchers at Keio University have developed a test which measures the concentration of phosphoric acid in the blood as an indicator of depression.***

In a previous study, HMT made the connection between phosphoric acid and depression and found that those patients with depression have lower concentrations of ethanolamine phosphate. Researchers are able to use the blood test to diagnose patients with depression and have an 82 percent success rate.

Researchers presented the new test at the Japanese Society of Biological Psychiatry in Tokyo. They hope to make the new test available to physicians within the next two years.

This is not the first blood test created for the diagnosis of depression and there are many others under development. However, most of these other tests look at white blood cell DNA and are very time-consuming. HMT is currently developing a reagent that will be able to determine the level of ethanolamine phosphate in only minutes.

http://www.eurekalert.org/pub_releases/2011-05/chb-stw053111.php

Searching the web for dengue

Study shows Internet search queries can help monitor epidemics in developing countries; produces new Internet tool that could speed public health responses to tropical diseases

Boston, Mass. – Researchers at Children's Hospital Boston and Google.org have found web-based search data to be a viable source of information for early detection and monitoring of outbreaks of dengue, an emerging mosquito-borne virus found in tropical areas of the world. Because search data allows the capture of disease-related queries in near real time, it could help public health officials in the more than 100 countries affected by dengue respond more quickly to nascent epidemics.

A team from the Children's Hospital Informatics Program (CHIP), led by John Brownstein, PhD, together with collaborators at Google, published these findings today in the journal PLoS Neglected Tropical Diseases. An online tool developed by the researchers based on the findings is now available at http://www.google.org/denguetrends.

The team's work on the dengue tool – which tracks epidemics of dengue using web search results provided by Google – shows that, when compared against available national surveillance data, web-based search data is a viable, rapid source of information for early detection and monitoring of dengue outbreaks.

"By using search data, we're tapping into a freely-available, instant dataset that can be gathered, analyzed, and released much more quickly and at much lower effort and cost than through traditional national surveillance and reporting programs," said Brownstein, director of the Computational Epidemiology Group in CHIP and co-developer of the HealthMap and related DengueMap global disease surveillance systems. "The kind of information the tool provides can help direct public health officials target interventions aimed at mosquito control and disease prevention, such as education campaigns, as early as possible.

"This information can act as a supplement to traditional surveillance and reporting systems and give local authorities a leg up on an outbreak," he said.

Dengue is endemic to countries in Asia, Africa, the Pacific, and the Americas. A relatively recent disease in humans – it only entered our species in the last 100 to 800 years – it infects about 500 million people every year; 55 percent of the global population is currently at risk of dengue infection.

"Dengue affects large numbers of people," continued Brownstein, "but because it is endemic in many countries, it is not a disease where search data would be affected by panic-induced searching or a lot of 'noise.'"

The research team selected Bolivia, Brazil, India, Indonesia, and Singapore as the basis for their study because each has a sufficient level of endemic dengue transmission to provide baseline data, a large base of Internet users, and national data collected via passive reporting or sentinel site surveillance against which to assess the tool.

The dengue tool follows the methodology of Google Flu Trends, an application developed by Google and the US Centers for Disease Control and Prevention that mines web search data for patterns that can help public health officials get an early jump on seasonal flu epidemics.

http://news.discovery.com/space/project-icarus-helium-3-mining-uranus-110531.html

Project Icarus: The Gas Mines of Uranus

Guest contributor Adam Crowl looks at the fuel required for an interstellar trip and finds a gas giant with huge mining potential.

content provided by Adam Crowl, Module Lead for Fuel and Fuel Acquisition for Project Icarus.

Project Icarus is an ambitious five-year study into launching an unmanned spacecraft to an interstellar destination. Headed by the Tau Zero Foundation and British Interplanetary Society, a non-profit group of scientists dedicated to interstellar spaceflight, Icarus is working to develop a spacecraft that can travel to a nearby star.

Adam Crowl, Module Lead for Fuel and Fuel Acquisition for Project Icarus, investigates the pros and cons of various fusion fuels required to accelerate an interstellar vehicle to a nearby star.

One might think that fusion propulsion requires some exotic fuel to propel a rocket a million-or-so-times more energetically than standard chemical fuels. However, one fusion fuel option isn't so exotic. In fact, by drinking the recommended 8 glasses of water per day you've ingested about half a pound of the stuff: hydrogen. One-ninth of all water on Earth is hydrogen. But there's a snag in its widespread adoption as a fusion fuel.

Regular hydrogen fuses very, very slowly even in a place as unimaginably hot as the center of the sun. That's fortunate for all life on Earth -- because that's what allows stars to shine for billions of years -- but it does make it a very difficult fusion fuel to utilize. But there's an answer: Add a neutron to the single proton in the heart of every hydrogen atom and you have deuterium, also known as "heavy hydrogen."

Deuterium is incredibly easy to fuse compared to hydrogen and most of the sun's energy actually comes from fusing it. Inside the sun, deuterium is continuously made by banging two protons (hydrogen nuclei) together fast enough for one to become a neutron and stick to the other, and once made it fuses with another deuterium in less than a second.

Thus, no deuterium accumulates in the sun and in the rest of the natural world it's relatively rare -- 1 in every 6,500 atoms of the hydrogen we drink is deuterium. However, because deuterium, in so-called "Heavy-Water," is used to moderate neutrons in some nuclear reactor designs, it is separated from regular water on a large scale.

Pure deuterium can already be fused by technological means and was used in the first hydrogen bomb detonated in 1952, but fusing it with tritium (hydrogen with two neutrons, so it's heavier than deuterium) is even easier and this is the preferred reaction used by fusion research today.

Unfortunately, if this method was used to fuel a starship -- such as the Icarus interstellar vehicle -- the deuterium-tritium (D-T) reaction produces high-energy neutrons that transfer heat from the reaction directly to the engine's structure. About 80 percent of the fusion energy released is in the form of those neutrons, so the reaction isn't very healthy (or useful) for a starship.

Pure deuterium reactions also produce neutrons, though only about 1/3 of the fusion energy is released as such. That's better than the D-T reaction, but when we're talking about engine powers in the hundreds of gigawatts to terawatts, then such percentages mean gigawatts of heat that must be gotten rid of, adding to the mass of the engines and degrading the overall performance.

Seeking Helium-3

Fusion physics knows of other reactions. The reaction of boron-11 (an isotope of boron) and plain hydrogen produces all its energy in the form of charged particles which can be directed by a magnetic field, but the reaction is very difficult to sustain and many fusion physicists doubt it will ever prove practical. If it was successfully demonstrated as a viable fuel option, then the fuel mixture could be stored in solid form as decaborane, which remains solid below 100 degrees Celsius.

However, there is a very attractive reaction between deuterium and a light isotope of helium known as helium-3. Helium-3 has one less neutron than regular helium (helium-4) and is also produced in the sun and almost as quickly consumed in fusion reactions as deuterium.

Like deuterium, it is rare relative to helium-4, but, unlike hydrogen, helium doesn't form chemical compounds as abundant as water. Almost all Earth's helium has long since blown away and only small amounts are available on the planet -- much of it can be found in the gas mines of North America. What helium is available is depleted in helium-3 relative to what we see in the sun, because most of Earth's helium-4 is freshly made via natural radioactive decay of the elements uranium and thorium.

We know the sun contains lots of helium, and as the solar wind has been depositing helium into the rocky surface of the moon, perhaps we can extract it. Just how much is available can presently only be estimated at somewhere between 1 million and 2.5 million tons.

To extract it would require digging up much of the moon's upper few feet of soil and baking the soil to release the solar wind-implanted gases. Project Icarus Consultant, Bob Parkinson, has examined this resource and, surprisingly, concluded it might take more energy to extract than would be produced by fusing the helium-3 liberated.

The Gas Mines of Uranus

However, there is a surprising amount of helium-3 in the gas giant planets of the outer solar system, and in the original 1978 "Project Daedalus" report Bob Parkinson suggested mining it via floating robotic factories in the atmosphere of Jupiter. Since then a different planet has moved to the forefront of gas-mining plans because it lacks Jupiter's intense gravity, Saturn's gigantic rings of orbital debris and is closer than distant Neptune.

You guessed it; the best helium-3 supply in the solar system is from the "Gas Mines" of Uranus.

That the planet which is the butt of so many poor jokes should be relatively rich in methane as well is purely coincidental, but as a mining site it has several advantages. The surface gravity, which is defined from the 1 bar pressure level in a gas giant's atmosphere, is 90 percent that of Earth's and the speed needed to reach low orbit is lowest of all the gas planets. Uranus's rings are also high, thin and not showering the atmosphere below with a hail of meteors, unlike Saturn's.

Accessing the gas riches of Uranus will require nuclear power, however. Designs exist for nuclear powered ramjets that could fly indefinitely in the atmospheres of the gas giants -- this might prove a viable means of

keeping an extraction factory aloft. Else we'll be back to using balloons like "Project Daedalus," serviced by nuclear ramjets. An atmosphere composed of a cold gas mix that is lighter than helium and not much heavier than hydrogen, means that hot-air ballooning will need to be used. That the oldest technology of flight will find a role supporting the latest, fusion propulsion, has a certain poetic justice.

Getting the fuel home, where it can be used domestically as well as for tanking-up starships, could provide an early pay-off for developing a fusion propelled starship.

A Helium Market

The original "Daedalus" starprobe design had two stages. A Stage Two, by itself, would be well suited to being a deep space freighter, able to carry payloads of up to 500 tons at very high speed. Uranus is nearly three billion kilometers from the sun and Earth, thus traveling there, and back, requires a high-speed vehicle.

A Stage Two freighter could carry itself, with an empty mass of 500 tons, to Uranus in 70 days for just 114 tons of fuel, and then bring back a load of 614 tons using about 254 tons of fuel. Of the return load, 114 tons would be used to return the empty tanker to Uranus, while 500 tons would be used for starships and the terrestrial energy market.

A starprobe might launch by the year 2100 and if world energy demands continue to increase at their historic rate of 2.5 percent, then by 2100 about 14,000 tons of deuterium/helium-3 fuel-mix would supply the world's energy demand per year, adding an incentive to develop the gas-mines of Uranus.

Alternatively, a means might be found to put the neutrons from pure deuterium fusion to good use. Some fusion ignition designs can confine the fusion neutrons in the dense plasma formed by the reaction, sharing their energy with the rest of the fusion plasma, thus reducing the damage to the reactor walls. If such a design can be successfully used for a starship engine, then a source of deuterium can be sought closer to home.

Unlike helium-3 we know the moon has large amounts of hydrogen, as ice, and a significant fraction of it will be deuterium. The moon's low gravity also means that water composed of regular hydrogen and oxygen will escape quicker than heavy water, perhaps leading to a concentration of deuterium in the water of the moon. We won't know until we return to the moon for a closer look.

http://www.bbc.co.uk/news/world-europe-13608396

E. coli outbreak in Germany: Women more affected

By Stephen Evans BBC News, Berlin

One of the mysteries about the outbreak of the particularly vicious strain of E. coli is that most of the victims have been women.

In most outbreaks, the victims are children because they have not developed the immune system to fight off the food poisoning - but in the German case, it is adults and female adults, in particular. Scientists simply do not know why. One theory was that the victims were often people who liked eating what they thought was healthy food, say because it was low calorie (like cucumbers) or because it was organic.

But the scientists are now cautioning against that view. It may be too pat.

Dr Ulf Goebel of the Charite university hospital in Berlin said it might just be that this specific strain had something in it which found women's bodies suitable and not men's (just as some strains work on some ethnic groups and not others).

Intriguingly, a previous outbreak of this rare type of E. coli happened in the United States in 1994 - and again the victims were predominantly women, with the average victim being 36 years of age.

DNA tests

If it is simply that women are more susceptible to this particular type of E. coli, then that would point away from the "health food" theory.

As if to confuse matters further, the German authorities, having pointed the finger at Spain earlier,

How the cucumber crisis affects Europe	
Country	**Action**
Germany	Consumers told not to eat cucumbers, lettuces and raw tomatoes. 1,150 cases of E.coli confirmed; 14 deaths
Sweden	One death and 36 suspected E. coli infections, linked to travel in northern Germany.
Spain	Top European cucumber producer - threatens to seek compensation from the European Union for lost vegetables sales
Russia	Ban on all imports of cucumbers, tomatoes and fresh salad from Spain and Germany pending further notice
Czech Republic	Some Spanish-grown cucumbers removed from sale
France	Some Spanish-grown cucumbers removed from sale
Austria	Ban on sale of cucumbers, tomatoes and aubergines imported via Germany
Belgium	Reported to have banned cucumber imports from Spain
Netherlands	Halted all cucumber shipments to Germany
Denmark	Testing cucumbers for contamination

said tests on the suspect cucumbers had shown a trace of a different strain of E. coli - in other words: the cucumbers were not guilty of causing the current outbreak. All this matters greatly because once a country's farms are tainted, trade collapses. Information affects livelihoods, which explains the outrage in Spain at German accusations. There is some dismay in other cucumber-growing countries too.

A lack of clarity serves to put a cloud of suspicion over many. Some consumers simply shy away from the suspect vegetable without making a distinction about source. So the task of getting clarity is urgent.

There is an immense amount of extraordinarily clever work going into identifying the source, like studying the DNA of the bacterium.

But the true breakthrough will come, Dr Goebel says, through what amounts to detective work: simply asking all the surviving victims what they ate and when they ate it, and then comparing notes to find a pattern.

Simple, really - or not.

http://medicalxpress.com/news/2011-05-death-reinventing-american-medical.html

What can we do about death? Reinventing the American medical system

(Garrison, NY) ***In a feature article in The New Republic, Daniel Callahan and Sherwin Nuland propose a radical reinvention of the American medical system requiring new ways of thinking about living, aging, and dying.***

They argue that a sustainable -- and more humane -- medical system in the U.S. will have to reprioritize to emphasize public health and prevention for the young, and care not cure for the elderly.

An interesting twist on their argument, which would aim to bring everyone's life expectancy up to an average age of 80 years but give highest priority for medical treatment to those under 80, is that Callahan and Nuland are themselves 80 years old. Daniel Callahan, Ph.D., is cofounder and president emeritus of The Hastings Center and author most recently of Taming the Beloved Beast: How Medical Technology Costs Are Destroying Our Health Care System. Sherwin Nuland, M.D., is a retired Clinical Professor of Surgery at the Yale School of Medicine and author of How We Die and the Art of Aging. He is also a Hastings Center Fellow and Board member.

"The real problem is that we have medicine excessively driven by progress, which aims to rid us of death and disease and treats them as the targets of unlimited medical warfare," said Callahan and Nuland. "That warfare, however, has come to look like the trench warfare of World War I: great human and economic cost for little progress. Neither infectious disease nor the chronic diseases of an aging society will soon be cured. Cancer, heart disease, stroke, and Alzheimer's disease are our fate for the foreseeable future. Medicine and the public must adapt it to that reality, one that has mainly brought us lives that end poorly and expensively in old age."

The article notes that the Affordable Care Act might ease the financial burden of this system, but not eliminate it. It reports, for example, that the cost of Alzheimer's disease is projected to rise from $91 billion in 2005 to $189 billion in 2015, and to $1 trillion in 2025 – twice the cost of Medicare expenditures for all diseases now.

"We need to change our priorities for the elderly. Death is not the only bad thing that can happen to an elderly person," the authors write. "An old age marked by disability, economic insecurity, and social isolation are also great evils." They endorse a culture of care, not cure, for the elderly, with a stronger Social Security program and a Medicare program weighted toward primary care that supports preventative measures and independent living.

Callahan and Nuland point the way to a more sustainable path that reprioritizes the entire system. Among their recommendations:

* improve medicine at the level of public health and primary care, while reducing its use for expensive high-tech end-of-life care;
* shift resources for the elderly to greater economic and social security and away from more medical care;
* subsidize the education of physicians, particularly those who go into primary care, and decrease medical subspecialization;
* train physicians better to tell the truth to patients about the way excessively aggressive medicine can increase the likelihood of a poor death;
* shift the emphasis in chronic disease to care rather than cure;
* conduct a top-down, bottom-up, long-range study of the entire American system of health care, including the training of physicians, with a view toward reconstituting it along systematic lines that take science, humanistic concerns, economics, and social issues into account. *Provided by The Hastings Center*

http://medicalxpress.com/news/2011-05-association-biomarkers-disease-overstated.html

Association between biomarkers and disease often overstated, researcher finds

More than two dozen widely cited studies linking genes or other "biomarkers" to specific diseases vastly overstate the association, according to new research from an expert in scientific study design at the Stanford University School of Medicine.

As a result, clinicians may be making decisions for their patients based on inaccurate conclusions not supported by other, larger studies.

The widely cited studies include one linking the BRCA1 mutation with colon cancer, another that links levels of C-reactive protein in the blood with cardiovascular disease and one that links homocysteine levels with vascular disease.

The exaggeration is likely the result of statistical vagaries coupled with human nature and the competitive nature of scientific publication, said John Ioannidis, MD, DSc, chief of the Stanford Prevention Research Center, in a paper to be published in the June 1 issue of the Journal of the American Medical Association. "No research finding has no uncertainty; there are always fluctuations," he said. "This is not fraud or poor study design, it's just statistical expectation. Some results will be stronger, some will be weaker. But scientific journals and researchers like to publish big associations."

Once published, the perception of a strong link between a marker and a disease often persists - in part because of the scientific practice of referencing, or citing, previous supporting research in each new study. As landmark studies are repeatedly cited, their results become accepted as incontrovertible even in the face of larger, subsequent studies that report less-spectacular or even statistically negligible associations.

For this paper, Ioannidis and colleague Orestis Panagiotou, MD, from the University of Ioannina School of Medicine in Greece, analyzed 35 widely cited studies. They found that fewer than half of the biomarkers in these studies had statistically significant associations with disease risk in larger follow-up studies. Indeed, only one of every five of the original selected studies increased a patient's relative risk for a condition by more than 1.37. (Relative risk is calculated by dividing the proportion of people with the marker who develop the condition under study by those without the marker who also develop the condition. A relative risk of 1 means there is no difference between the two groups; a relative risk of 2 means that the proportion of people with the condition is double in those who have the marker than in those without the marker. The median relative risk for reported by the 35 highly-cited studies was 2.5.)

Much of Ioannidis' own work involves strengthening the way that research is planned, carried out and reported, and he was called "one of the world's foremost experts on the credibility of medical research" in a profile published last year in The Atlantic magazine. Ioannidis, the C.F. Rehnborg Professor in Disease Prevention at Stanford, outlined some of the problems he observed in a 2005 essay in PLoS-Medicine titled, "Why most published research findings are false." The essay remains the most-downloaded article in the history of the Public Library of Science, according to the journal's media relations office.

In the current study, Ioannidis analyzed 35 of the most highly cited studies published between 1991 and 2006 in 10 well-regarded biomedical journals. Each of the studies had been referenced by at least 400 subsequent papers; some had citations numbering in the thousands. The studies analyzed the relationships between biomarkers such as the presence of specific genes or infections, levels of blood proteins and other markers with the likelihood of developing conditions such as cancer and heart disease.

"We found that a large majority of these highly cited papers suggested substantially stronger effects than that found in the largest study of the same markers and outcomes," said Ioannidis. He noted that studies with greater numbers of patients or studies called meta-analyses, which compile the results of several independent studies, are more likely to be accurate than smaller pilot studies. To use the example of flipping a coin, you might not be surprised to come up with two, three or even four heads in a row, but over the course of hundreds of flips you will approach a ratio of 50:50.

In addition to statistical aberrations, you also have the potential for superimposed bias, Ioannidis said. "Researchers tend to play with their data sets, and to analyze them in creative ways. We're certainly not pointing out any one investigator with this study; it's just the societal norm of science to operate in that fashion. But we need to follow the scientific method through to the end and demand replication and verification of results before accepting them as fact."

One way to do so could be to implement a system of ongoing review and reassessment for each proposed association between biomarkers and disease, Ioannidis said. For example, the results of each new study assessing the interaction between a specific marker and disease could feed into an ongoing analysis of the strength of the proposed link. Over time, the true strength of the association should become apparent - just as repeatedly flipping a coin will eventually yield the correct head-to-tails ratio. Researchers in the field of

genomics are already becoming more aware of the potential for bias and the need for large-scale studies and consortiums of researchers to replicate results, he added.

The findings hold true for negative results as well. For example, one highly cited paper in the New England Journal of Medicine concluded that infection with penicillin-resistant bacteria did not increase a patient's chance of dying from pneumococcal pneumonia - a conclusion that did not make intuitive sense to many clinicians. However, subsequent studies indicated that infection with the resistant bacteria does increase the risk of death by about 50 percent.

"We have to learn to trust the bigger picture," said Ioannidis. "And it's better to demand this proof upfront rather than waiting for it to happen on a case-by-case basis. It is vitally important to validate original published findings with subsequent large-scale evidence to make progress in the field of biomarkers and risk association."

More information: JAMA. 2011;305[21]2200-2210 Provided by Stanford University Medical Center

http://www.eurekalert.org/pub_releases/2011-06/uocm-pwb060111.php

Patients with bowel disease eager to test 'fecal' therapy

The first study of the social and ethical issues associated with a provocative approach to treatment for ulcerative colitis has found that the majority of potential patients are eager for what is now called "fecal microbiota transplantation" to become available, although many have concerns about donor selection, screening, and methods of delivery.

Bacterial aggregates derived from fecal matter have been used sporadically to treat gastrointestinal disease for more than 50 years. These were often last-ditch efforts aimed at restoring microbial balance for patients with raging intestinal infections. More recently, the approach has produced lasting remissions for a small number of patients with a common disease: ulcerative colitis.

"Once patients get past the yuck factor they find the concept appealing," said study author David Rubin, MD, associate professor of medicine at the University of Chicago. "They perceive it as 'natural,' similar to probiotics. Patients with severe inflammatory bowel disease tend to develop a high tolerance for therapies that others might consider unorthodox."

Fecal microbiota transplantation (FMT) - also known as fecal bacteriotherapy, among other names - is an effort to calm a troubled bowel by reintroducing the vast diversity of collaborative bowel inhabitants after the usual mix has been disturbed. More than 1,000 different strains of bacteria co-exist peacefully in the typical healthy bowel. But when the delicate balance is altered, by antibiotics or other causes, a few strains can become dominant, leading to severe diarrhea, inflammation and tissue damage.

The first FMT cases, dating back to 1958, were used to treat life-threatening infections caused by aggressive bacteria that had overwhelmed the bowel, driving out the competition. When antibiotics were unable to control the infection, physicians were able to restore balance by injecting the full range of gut bacteria. They did this by collecting fecal matter from a healthy donor and injecting it into the patient's colon.

In 2003, a team led by Australian physician Thomas Borody published a report on successful treatment of six patients with longstanding ulcerative colitis with this approach. "Complete reversal of UC was achieved in all 6 patients following the infusion of human fecal flora," the authors reported. "These 6 cases document for the first time the total disappearance of chronic UC without the need for maintenance treatment."

"This is a fascinating idea, and the early studies show great promise, but we found that no one had looked at the social issues surrounding fecal transplantation," said Rubin. "Before we offer this, we wanted to find out how patients understood the process and take a look at the ethical issues that could also be raised by this therapy."

Like an organ transplant, fecal microbiota transplantation begins with finding a donor, often a family member. The treatment team collects a fresh stool sample, at least 200 to 300 grams. The sample is mixed with salt water in a blender and filtered to remove particulate matter. It can be administered to the recipient through a colonoscope, as an enema, or - when the inflamed region is higher in the colon - through a naso-gastric tube.

Rubin and colleagues Stacy Kahn, MD, and Rita Gorawara-Bhat, PhD, organized six focus groups in 2009-2010 with patients or parents of children with ulcerative colitis to "explore the attitudes and concerns" raised by this approach. They published their findings in the June issue of the journal Inflammatory Bowel Disease.

They found that 21 out of 22 patients or parents of patients were interested in trying FMT for themselves or their child; most wished it were already available. They viewed the treatment as more 'natural' than using drugs to control the disease, and easier and safer than currently available therapies. Many compared it to probiotics, a popular alternative therapy among patients with colitis.

The major concerns were focused on how donors would be selected and screened. Patients wanted healthy donors, usually family members, and asked that even their diet and medications be considered. A donor who had eaten peanuts recently, for example could be hazardous for a recipient with peanut allergies.

Physicians recommend a workup similar to that of an organ donor, with careful screening for multiple pathogens, including HIV, hepatitis and other viruses, as well as various parasites and worms.

The "yuck" factor came up in the focus group discussions of bacterial delivery. Patients and parent were comfortable with the idea of a "spray" colonoscopy or delivery via enemas, but were disturbed by the idea of using a naso-gastric tube for the transfer of fecal bacteria, although this method has been used to treat Clostridium difficile infections.

"What our study ultimately tells us is that patients are not only tolerant of this therapy but are eager for it to become available," Rubin said. "A few have already tried this strategy at home, using 'protocols' they found on the internet and tools available at any drug store." "We hope to begin offering FMT this fall," he said, "in a carefully controlled, clinical-trial setting."

"We are getting at least one phone call a week from patients asking about the treatment and when we are going to start treating patients," said co-author Stacy Kahn, MD, instructor of pediatrics at the University of Chicago.

There are many things we do not yet know about the risks and benefits of FMT, the authors agreed. The safety of such a treatment and broader implications of risk remain unconfirmed, so careful preparation and more study is necessary before this can be offered to patients with ulcerative colitis.

"Many patients do benefit from proven traditional therapies," Rubin said, "which should always be considered before experimental treatments, no matter how attractive they may sound."

http://www.eurekalert.org/pub_releases/2011-06/esoc-sro053011.php

Surgical removal of the tonsils and appendix associated with risk of early heart attack

But because of the young age of participants, the absolute risk differences were small

The surgical removal of the appendix and tonsils before the age of 20 was associated with an increased risk of premature heart attack in a large population study performed in Sweden.(1) Tonsillectomy increased the risk by 44% (hazard ratio 1.44) and appendectomy by 33% (HR 1.33). The risk increases were just statistically significant, and were even higher when the tonsils and appendix were both removed. However, there was no risk association evident when the operations were performed in people over the age of 20.

Both the appendix and tonsils are lymphoid organs and thus components of the body's immune system, albeit of modest importance. The recurrence of tonsillitis and appendicitis - caused by infection - are the usual reasons for removal. Behind the study lay evidence that removal was associated with moderate long-term effects on the immune system and alterations in risk for some autoimmune disorders. Studies suggest that between 10 and 20% of all young people have tonsils or appendix removed.

"Given the strong biological and epidemiological evidence linking inflammation with coronary heart disease," said investigator Dr Imre Janszky from the Department of Public Health Science of the Karolinska Institute in Stockholm, "one might anticipate that surgical removal of the tonsils and appendix, with their consequent effects on immunity, might also have a long-term effect on CHD. However, we were aware of no studies evaluating the potential effects of appendectomy or tonsillectomy on atherosclerosis or CHD risk."

The study, published online today in the European Heart Journal, examined the national health records of every Swedish resident born between 1955 and 1970 and identified each one who had had tonsils and/or appendix removed. Each of these "cases" was then matched with five randomly chosen "controls" who had not had the operations. These subjects were then followed up through the health records for an average of 23.5 years to cross-check for the occurrence of fatal or non-fatal heart attack (acute myocardial infarction, AMI). Because the appendix and tonsils appear to have reduced function after adolescence, the primary analyses were restricted to individuals below the age of 20 at the time of surgery, which amounted to 54,449 appendectomies and 27,284 tonsillectomies.

Results showed that these cases had a higher prevalence of AMI than the controls, with 89 of the appendectomies and 47 of the tonsillectomies experiencing an AMI within the follow-up period. When compared with controls, the added risk was calculated as a hazard ratio of 1.33 (95% confidence interval 1.05 – 1.70) for appendectomy and 1.44 (95% CI 1.04 – 2.01) for tonsillectomy.

Dr Janszky, the study's first author, emphasises that the absolute numbers of AMI cases in the study are small, with only slightly more than 400 and 200 total cases of AMI in more than 7.5 million and nearly 4 million person-years of follow-up. "As expected from the young age of the population," he says, "the observed moderate increases in relative risk actually corresponded to very small risk increases in absolute terms." The investigators also note that the study population, despite its size, was restricted to childhood exposure, with participants still relatively young at the end of follow-up. "Consequently," they write, "we cannot directly extrapolate our findings to cases of AMI that occur among older men or women, in whom risk is highest."

In explaining the results the authors also implicate some "complex" long-term effect of the immune system, noting that the appendix and tonsils are secondary lymphoid organs whose removal can affect several aspects of

immune activity, including decreased production of immunoglobulins. They also note that atherosclerosis, the underlying pathophysiology of AMI, is widely considered to be an inflammatory process.

"In the light of our current knowledge on the complex relationship between atherosclerosis and the immune system, the findings are biologically plausible," said Dr Janszky. "There is already some evidence that removal of the spleen, another secondary lymphoid organ, is also associated with accelerated atherosclerosis and increased cardiovascular risk."

http://medicalxpress.com/news/2011-06-problem-dont-brain-body.html

Want to solve a problem? Don't just use your brain, but your body too

When we've got a problem to solve, we don't just use our brains but the rest of our bodies, too. The connection, as neurologists know, is not uni-directional. Now there's evidence from cognitive psychology of the same fact.

"Being able to use your body in problem solving alters the way you solve the problems," says University of Wisconsin psychology professor Martha Alibali. "Body movements are one of the resources we bring to cognitive processes."

These conclusions, of a new study by Alibali and colleagues - Robert C. Spencer, also at the University of Wisconsin, and Lucy Knox and Sotaro Kita of the University of Birmingham - are augmented by another, counter-intuitive one – even when we are solving problems that have to do with motion and space, the inability to use the body may force us to come up with other strategies, and these may be more efficient.

The findings will be published in an upcoming issue of Psychological Science, a journal of the Association for Psychological Science.

The study involved two experiments. The first recruited 86 American undergraduates, half of whom were prevented from moving their hands using Velcro gloves that attached to a board. The others were prevented from moving their feet, using Velcro straps attached to another board. The latter thus experienced the strangeness of being restricted, but also had their hands free. From the other side of an opaque screen, the experimenter asked questions about gears in relation to each other - e.g., "If five gears are arranged in a line, and you move the first gear clockwise, what will the final gear do?" The participants solved the problems aloud and were videotaped.

The videotapes were then analyzed for the number of hand gestures the participants used (hand rotations or "ticking" movements, indicating counting); verbal explanations indicating the subject was visualizing those physical movements; or the use of more abstract mathematical rules, without reference to perceptual-motor processes.

The results: The people who were allowed to gesture usually did so - and they also commonly used perceptual-motor strategies in solving the puzzles. The people whose hands were restrained, as well as those who chose not to gesture (even when allowed), used abstract, mathematical strategies much more often.

In a second experiment, 111 British adults did the same thing silently and were videotaped, and described their strategies afterwards. The results were the same.

The findings evince deeper questions about the relationship of mind and body and their relationship to space, says Alibali. "As human thinkers, we use visual-spatial metaphors all the time to solve problems and conceptualize things - even in domains that don't seem physical on their face. Adding is 'up,' subtracting is 'down.' A good mood is 'high,' a bad one is 'low.' This is the metaphoric structuring of our conceptual landscape."

Alibali, who is also an educational psychologist, asks: "How we can harness the power of action and perception in learning?" Or, conversely: What about the cognitive strategies of people who cannot use their bodies? "They may focus on different aspects of problems," she says. And, it turns out, they may be onto something the rest of us could learn from.

More information: "Spontaneous Gestures Influence Strategy Choices in Problem Solving", Psychological Science. Provided by Association for Psychological Science

http://medicalxpress.com/news/2011-06-puzzle.html

The learning puzzle

In a collaborative study, researchers found that incentives raised IQ scores by 10 points on average, with greater gains for lower-IQ participants.

Gone are the days of using careful pen strokes to change "Ds" to "Bs" on report cards. Students now have access to far more advanced technology - Photoshop for instance, can work wonders. But what if all the effort that went into dodging academic accountability could instead be channeled into a hunger for learning? Questions like this have long been driving Angela Lee Duckworth, Assistant Professor of Psychology, to investigate new ways to improve student outcomes.

One of Duckworth's main avenues of research involves motivation and its potential effect on IQ testing. Her collaborative study on the topic was recently published in the journal Proceedings of the National Academy of Sciences, and has received wide media attention. Duckworth and her team synthesized findings from prior studies that tested the effects of incentives on IQ scores. They found that incentives raised IQ scores by 10 points on average, with greater gains for lower-IQ participants.

Duckworth's interest in self-control and motivation in young students began when she was an undergraduate at Harvard. She spent the majority of her free time volunteering as a tutor and Big Sister. Upon completion of her master's at Oxford, she worked a brief stint at a consulting firm but knew her true calling was back in education.

"I took a job as a math teacher," she says. "These questions of motivation kept popping up, and it was like a puzzle for me: I knew if I could reach them, every single one of these kids had the potential to be an accomplished student - what I wanted to teach them was within their intellectual reach. And so I decided that in order to start solving this puzzle, I would need a background in psychology, which ultimately brought me to Penn."

Duckworth sought out Martin Seligman, Penn faculty member and founder of positive psychology. She met with him in person, and he encouraged her to apply. As part of her Ph.D., she focused on trying to understand self-control in children. Qualities, like grit - the term Duckworth uses to describe individual perseverance - are distinct from talent or raw intelligence, she says. Self-control and grit are dispositions to put forth effort when the rewards for that effort are deferred - and such dispositions may in theory be improved through deliberate intervention.

"We have partnerships with Philadelphia and New York public schools that allow us to measure, and sometimes even intervene, in student lives," Duckworth says. "These educators are open to any and all innovations - anything to help improve these kids'; education. What we've found, examining the way emotions play out in children, is that those who are able to take a step back from their situations and put it in perspective are much better at controlling themselves."

Duckworth and her collaborator Gabriele Oettingen at New York University also developed an intervention program in which children are asked to articulate a wish related to their academic progress. Children are then prompted to elaborate, mentally and in writing, on why they chose that. Finally, children list an obstacle to their wish and create a short plan stating when where, and how they will get around it. This strategy, based upon years of prior research with adults, helps turn "high expectations" into actual behavior change.

"Increasing self-control would not necessarily mean children working longer and longer hours. Such a picture would be grim indeed," Duckworth says."If you look at world-class performers - Olympic-level athletes, for instance - their most deliberate, strenuous training takes about a four–hour period daily. This suggests that if we can improve the quality of the work children do, improve their concentration and effort, we should vastly increase the efficiency of their studying and learning time. So, paradoxically, and wonderfully, we should free up more time for play, running around and just enjoying childhood." *Provided by University of Pennsylvania*

http://news.discovery.com/human/early-humans-dads-home-110601.html

Early Human Dads Stayed at Home While Females Roamed

Although these early dads didn't travel, that doesn't mean they pitched in with raising the children.

By Jennifer Viegas

Males within two human ancestral species that existed roughly 2.7 to 1.7 million years ago were stay-at-home fellows, while females of these same species traveled, according to a new Nature paper.

The finding not only suggests that homebody males today may have a genetic predisposition for their lifestyle choice, but that certain female dispersal patterns among humans may mirror those of chimpanzees and bonobos. These two other primates also have stay-put males and traveling females.

"In any primate society, the females, the males, or some of both must eventually leave their birth community and join or form other communities," lead author Sandi Copeland, an adjunct professor in the Department of Anthropology at the University of Colorado at Boulder, told Discovery News. "One important reason for this is to prevent inbreeding."

For the study, Copeland and her team analyzed 19 teeth from both Australopithecus africanus and Paranthropus robustus individuals. These early human relatives lived at different time periods, but in two adjacent South African cave systems: Sterkfontein and Swartkans.

The researchers used a technique known as laser ablation, which zaps the teeth with lasers, measuring isotope ratios of the metallic element strontium. Unique strontium signals are tied to specific geological substrates, such as granite and sandstone, and therefore "strontium isotope ratios are a direct reflection of the foods these hominids ate, which in turn are a reflection of the local geology," Copeland explained.

The strontium "signatures" lock into the molars of humans probably when they are about 8 or 9 years old. The measurements revealed males tended to not stray far from home. The majority of the females, on the other hand, had moved from the place where they were born.

Copeland said, "It is possible that female hominins chose to leave their natal groups in order to mate with unrelated males, an indirect result of the males in their natal group choosing not to leave." But, she added, "We cannot exclude the possibility that female hominins did not move of their own free will, as abduction of females is known to occur in modern humans, rarely in chimpanzees, and often in Hamadryas baboons."

The skull of one of the primates, Australopithecus africanus, appears here. **Courtesy of Darryl de Ruiter**

Chimpanzees have actually been observed taking females away from their home communities and attacking them if they resist leaving. Whether or not this occurred among the early human relatives remains unclear.

The findings, however, suggest that our ancestors did not live as gorillas do today, with males traveling and females staying put and living in harems. The fact that early human ancestral males did not travel, however, does not mean that they helped to raise children. Chimpanzees, which exhibit the same dispersal patterns, have males that stay at home but yet "don't participate in childcare," Copeland says.

Another possible implication is that two-legged walking emerged in humans for reasons other than improved locomotion. "If one interprets our results as indicating that male australopiths rarely moved long distances, then one is left to wonder if the need for energetic efficiency was sufficient to drive the origins of bipedalism," co-author Matt Sponheimer explained.

Margaret Schoeninger, a University of California at San Diego anthropologist, authored a commentary in Nature about the new findings.

Schoeninger echoed Copeland's reasoning for why females dispersed, saying "it eliminates the potential genetic problems that can appear due to inbreeding." Based on the new research, and prior determinations, she told Discovery News that we now know the australopithecines lived within small ranges, were relatively stationary (with perhaps even the traveling females not moving very far away) and that they "lived in areas with lots of large predators."

Speaking of A. africanus, whose most famous representative is Ethiopian "Lucy," she said, "This is one weird ape-like primate," mentioning that many questions remain about it, such as if it sat to eat.

Sponheimer agrees that important questions remain.

"This study is one example of how we can sometimes, if we are lucky, coax old bones and teeth to relinquish a few of their secrets," he said. "And I don't doubt that we are getting better and better and getting more from less and less, but I think we have a long road before us. Much about our forebears continues to be resolutely mysterious."

http://news.discovery.com/human/can-cat-fur-color-shape-allergies.html

Can Cat Fur Color Shape Human Allergies?

By Marianne English

Does a cat's coat color actually influence the severity of its owner's allergies?

Strange as it sounds, the question has been thrown around in previous years and even studied by scientists. A ***recent write-up*** on the website Improbable Research revisits whether cats with darker coats wreak more havoc on their owners' immune systems.

Pet dander, skin flakes, saliva and urine can aggravate owners' allergies and asthma, but for cats in particular, a specific protein called "Fel d 1" is a common culprit. It's secreted by cats' salivary and sebaceous (or oil) glands, so when a cat grooms itself, it spreads the allergen to the outermost surface of the fur, increasing human exposure to the protein.

But does allergen production vary among cats with different coat colors, with darker ones creating more allergy problems for humans than lighter cats?

So far, the results are mixed, but there's not much evidence to support the claim. One study presents a correlation through measuring owners' reactions, while another shows no correlation after measuring the amounts of Fel d 1 produced. It's likely that owners' household cleanliness and efforts to reduce pet dander in

the home affect their exposure, making it hard to draw conclusions from research unless those factors are better controlled.

A ***New York Times article*** examined the same question and came up with no conclusive answer, but provided evidence from one study showing that male cats produce more allergens than their female counterparts. The difference results from males producing more testosterone, which amplifies the amount of Fel d 1 in their bodies, according to the Auckland Allergy Clinic.

Human variation also plays a role, as some people possess antibodies more sensitive to cat dander while others don't. At this time, scientists don't know why some people's immune systems treat animal particles as threatening, but family history often serves as a decent predictor.

Identifying the factors that lessen pet allergies may help the 10 million people living with allergies to their furry cohabitants, according to the American Academy of Allergy, Asthma and Immunology.

http://wpost.com/national/discovery-of-worms-from-hell-deep-beneath-earths-surface-raises-new-questions/2011/05/31/AGnzJTGH_story.html

'Worms from hell' unearth possibilities for extraterrestrial life

By Marc Kaufman

For the first time, scientists have found complex, multi-celled creatures living a mile and more below the planet's surface, raising new possibilities about the spread of life on Earth and potential subsurface life on other planets and moons.

Nicknamed "worms from hell," the nematodes, or roundworms, were found in several gold mines in South Africa, where researchers have also made breakthrough discoveries about deep subterranean single-cell life.

The two lead researchers, Gaetan Borgonie of the University of Ghent in Belgium and Tullis Onstott of Princeton University, said the discovery of creatures so far below ground, with nervous, digestive and reproductive systems, was akin to finding "Moby Dick in Lake Ontario."

"This is telling us something brand new," said Onstott, whose pioneering work in South Africa over the past decade has revolutionized the understanding of microbial life known generally as extremophiles, which live in places long believed to be uninhabitable.

"For a relatively complex creature like a nematode to penetrate that deep is simply remarkable," he said.

An article introducing the subterranean nematodes, one of which was formally named Halicephalobus mephisto after the "Lord of the Underworld," appears in Wednesday's edition of the journal Nature. H. mephisto was found in water flowing from a borehole about one mile below the surface in the Beatrix gold mine.

Head of a nematode "Halicephalobus Mephisto" **Courtesy of Gaetan Borgonie at University of Ghent**

The research is likely to trigger scientific challenges and cause some controversy because it places far more complex life in an environment where researchers have generally held it should not, or even cannot, exist.

Borgonie led the South African nematode investigation largely without professional support or funds. He contacted his future partner with a cold call. Onstott, who began his own deep mine work with similarly limited funds and amid similar professional skepticism, was both intrigued and inclined to help a fellow risk-taker.

Borgonie said that although nematodes are known to exist on the deep ocean floor, they have generally not been found more than 10 to 20 feet below the surface of the ground or the ocean bed. But he saw no reason they wouldn't be found farther down. The nematodes he ultimately discovered live in extremely hot water coming from boreholes fed by rock fissures and pools.

In addition to uncovering a new realm of biology on Earth, Borgonie and Onstott wrote that this could have important implications for extraterrestrial research, or astrobiology.

Scientists seeking life beyond Earth are intrigued by the possibility that microbes could be living below the surface of Mars, in particular - a planet that is now cold, dry and bombarded by harmful radiation but was once much wetter, warmer and better-protected by an atmosphere.

"What we found shows that harsh conditions do not necessarily exclude complexity," Borgonie said.

He said that if life did originate on Mars and if it had sufficient time to go underground deep enough to survive worsening conditions, "then evolution of Martian life might have continued underground. . . . Life on Mars could be more complex than we imagined."

Carl Pilcher, director of NASA's Astrobiology Institute in California, said that the nematode discovery illustrates the usefulness of research on Earth for learning about possible extraterrestrial life.

"It is entirely plausible, in fact extremely likely, that subsurface environments like those described in these papers exist on other worlds in this solar system and in other planetary systems," he said of the new work and Onstott's earlier discoveries. "We can now say that worlds with such subsurface environments could, in theory, harbor subsurface life, both microbial and multicellular," Pilcher said. "That knowledge . . . can help guide us in developing missions and experiments to study other worlds."

At least one of the bacteria species discovered earlier by Onstott and Lisa Pratt of Indiana University lives entirely disconnected from anything on the Earth's surface or produced by photosynthesis. It uses the radioactive decay of nearby rocks as the energy source to break apart molecules that it then feeds on.

Borgonie speculates that the nematodes, which feed on bacteria, traveled through the cracks and crevices of rock in search of food. While they were determined to have lived deep underground for 3,000 to 10,000 years, the bacteria discovered by Onstott was found to have lived at its great depth between 3 million and 40 million years. A major difference between the two appears to be that while the nematodes adapted, the bacteria have evolved.

Complete worms, up to one-third of an inch in length, were found in two mines, and DNA of another was found in a third. They were found in water flowing from boreholes in the rock of the mines at depths from two-thirds of a mile to more than two miles. The worms nearer the surface were brought to a lab and survived, while the specimen at the deepest level was a DNA sample from a nematode but otherwise impossible to identify.

A primary hurdle the team had to overcome was proving that the nematodes had not come into the mines on the shoes or clothing of miners or through mine ventilation water. The contamination issue was resolved through extensive testing of the soil and mining water, which contains two disinfectant bleaches that would kill nematodes.

Borgonie, working with a team from South Africa's University of the Free State in Bloemfontein, descended into the deep mines about 25 times to collect samples. He said there is good reason to believe nematodes, and other multi-celled organisms, also live deep below the surface of many other parts of the world, and especially below ocean beds. Research into the distribution of underground microbes in recent decades has led scientists to conclude that more than half of the biological mass on Earth is below the surface.

http://www.eurekalert.org/pub_releases/2011-06/rsrt-abr060111.php

Adult brain requires MeCP2 for proper functioning

A paper published online today in Science provides evidence that the Methyl-CpG-Binding Protein 2 (MeCP2) is required throughout life to maintain healthy brain function.

The findings are reported from the Baylor College of Medicine lab of Huda Zoghbi, HHMI investigator and Director of the Jan and Dan Duncan Neurological Research Institute.

Mutations in MeCP2 cause the autism spectrum disorder Rett Syndrome, and have been seen in some cases of classic autism, childhood schizophrenia and milder neuropsychiatric conditions such as anxiety and learning disabilities.

Rett Syndrome strikes little girls almost exclusively, with first symptoms usually appearing before the age of 18 months. These children lose speech, motor control and functional hand use, and many suffer from seizures, orthopedic and severe digestive problems, breathing and other autonomic impairments. Most live into adulthood, and require total, round-the-clock care.

Using sophisticated genetic engineering tools, Christopher McGraw, an MD/PhD student in the Zoghbi lab, inhibited production of the Mecp2 protein in mature adult mice at 9 weeks of age. He characterized the mice and found that by 19 weeks the animals began displaying symptoms reminiscent of the classic Rett Syndrome mice which are missing Mecp2 protein from conception: impaired gait and locomotion, hind-limb clasping, motor abnormalities, impaired learning and memory. Lethality in both sets of mice took place approximately 13 weeks after removing MeCP2.

Rett Syndrome has been considered a neurodevelopmental disorder, due to the onset of symptoms in early childhood. The appearance of these symptoms after removal of Mecp2 in adult mice suggests that there may be no discrete time period during which MeCP2 is critical for normal development, and argues against categorizing the disorder as neurodevelopmental.

Joshua Sanes, the Director of the Center for Brain Science at Harvard and Professor in Harvard's Department of Molecular and Cellular Biology, commented on the broader impact of Zoghbi's findings. "This work not only sheds new light on the pathogenesis of Rett Syndrome, but also raises fascinating questions about a central dogma in neuroscience - that genes affecting the brain act differently during the "critical period" than they do in adulthood. In at least some instances, Zoghbi's result tells us, this may not be the case". Sanes was not involved in this work.

The findings are also valuable from a clinical perspective, since they suggest that certain potential treatments for the disorder, such as small molecule drugs, may need to be maintained throughout the lifetime of individuals afflicted with Rett Syndrome. "Given the parallels between autism and Rett Syndrome with regard to age of onset of symptoms and clinical features, these findings raise the possibility that several autism spectrum disorders might indeed result from failure of maintaining neuronal function rather than alterations of key developmental programs," says Zoghbi.

Monica Coenraads, Executive Director of the Rett Syndrome Research Trust which helped fund this work, and mother of a teenaged daughter with Rett Syndrome, says "Although Rett is a relatively rare disorder, it provides opportunity for broader neurological insights. Huda Zoghbi's new work challenges some central tenets in neuroscience. It is gratifying to see that Rett research is teaching us important lessons about the brain."

About Rett Syndrome Research Trust

The Rett Syndrome Research Trust is the premier organization devoted exclusively to promoting international research on Rett Syndrome and related MECP2 disorders. The goal is clear: to heal children and adults who will otherwise suffer from this disorder for the rest of their lives. With experience and tight focus, RSRT has an unparalleled knowledge base and extensive networking abilities in the world of high level research. RSRT is in a unique position to stimulate, evaluate, support and monitor ambitious and novel scientific projects. www.reverserett.org

http://www.eurekalert.org/pub_releases/2011-06/uol-tta053111.php

Trans-Atlantic team announces Huntington's disease breakthrough

New research offers promise of medical intervention for this devastating disorder

Medical researchers may have uncovered a novel approach to treat an incurable and ultimately fatal neurodegenerative disease that affects hundreds of thousands of people.

Two international studies, one led by the University of Leicester, and the other a collaboration with Leicester led by scientists in the USA, hold out promise for slowing down the development of Huntington's disease – and potentially, Alzheimer's and Parkinson's diseases. The research, which is in its early stages, represents an important milestone in understanding these debilitating conditions.

Huntington's disease is a devastating inherited neurodegenerative disorder that is always fatal. The disorder of the central nervous system causes progressive degeneration of cells in the brain, slowly impairing a person's ability to walk, think, talk and reason. Approximately 1 in 10,000 individuals are affected worldwide.

In the world-famous Department of Genetics at Leicester, the groups of Dr Flaviano Giorgini and Prof Charalambos Kyriacou found that by genetically targeting a particular enzyme in fruit-flies, kynurenine 3-monooxygenase or KMO, they arrested the development of the neurodegeneration associated with Huntington's disease. Furthermore by directly manipulating metabolites in the KMO cellular pathway with drugs, they could manipulate the symptoms that the flies displayed.

The fruit-fly study, to be published in Current Biology on 7 June, was also aided by the groups of Prof Robert Schwarcz (Maryland Psychiatric Research Center, University of Maryland School of Medicine, Baltimore), who pioneered work in this area, and Dr Paul Muchowski (Gladstone Institutes, University of California, San Francisco). The two latter workers and Dr Giorgini have simultaneously ***published a paper in Cell***, announcing a similar breakthrough in understanding the therapeutic relevance of KMO in transgenic mouse models of Huntington's and Alzheimer's diseases.

The fruit -fly research at Leicester took place over three years and was funded by the Huntington's Disease Association and the CHDI Foundation, Inc. Dr Giorgini, who led the UK study, states, "This work provides the first genetic and pharmacological evidence that inhibition of a particular enzyme - KMO - is protective in an animal model of this disease, and we have also found that targeting other points in this cellular pathway can improve Huntington's disease symptoms in fruit flies. This breakthrough is important as no drugs currently exist that halt progression or delay onset of Huntington's disease. We are tremendously excited about these studies, as we hope that they will have direct ramifications for Huntington's disease patients.

Our work combined with the study in our companion publication in Cell, provides important confirmation of KMO inhibition as a potential therapeutic strategy for these individuals. As many KMO inhibitors are available, and more are being developed, it is hoped that such compounds can ultimately be tested in clinical trials for this as well as other neurodegenerative disorders."

In Leicester the experiments were carried out by Drs Susanna Campesan, Edward Green, and Carlo Breda and in Baltimore, by Dr Korrapati Sathyasaikumar. The collaborating teams will continue their studies aimed at enhancing the development of medical intervention in Huntington's and other neurodegenerative disorders.

Cath Stanley, Chief Executive of the Huntington's Disease Association, said: "This is an exciting piece of research that will offer hope to the many people affected by Huntington's disease."

http://www.eurekalert.org/pub_releases/2011-06/uocp-edc060211.php

Eating dirt can be good for the belly, researchers find

Most of us never considered eating the mud pies we made as kids, but for many people all over the world, dining on dirt is nothing out of the ordinary.

Now an extensive meta-analysis forthcoming in the June issue of The Quarterly Review of Biology helps explain why. According to the research, the most probable explanation for human geophagy - the eating of earth - is that it protects the stomach against toxins, parasites, and pathogens.

The first written account of human geophagy comes from Hippocrates more than 2,000 years ago, says Sera Young, a researcher at Cornell University and the study's lead author. Since then, the eating of earth has been reported on every inhabited continent and in almost every country.

Despite its ubiquity, scientists up to now have been unable to definitively explain why people crave earth. Several hypotheses had been considered plausible. Some researchers think geophagy is simply a consequence of food shortage. In other words, people eat dirt to ease the pangs of hunger, even though it doesn't provide any nutritional value. Others have suggested that nutrition is exactly why dirt is consumed; perhaps people crave dirt because it provides nutrients they lack, such as iron, zinc, or calcium. Still others posit that earth has a protective effect, working as a shield against ingested parasites, pathogens, and plant toxins.

To sort through the possible explanations, Young and her colleagues analyzed reports from missionaries, plantation doctors, explorers, and anthropologists to put together a database of more than 480 cultural accounts of geophagy. The database includes as many details as possible about the circumstances under which earth was consumed, and by whom. The researchers could then use patterns in the data to evaluate each potential explanation. They found the hunger hypothesis unlikely. Studies in the database indicate that geophagy is common even when food is plentiful. Moreover, when people eat dirt they tend to eat only small quantities that are unlikely to fill an empty stomach.

The nutrition hypothesis was also a poor fit to the data. The database shows that the kind of earth people eat most often is a type of clay that contains low amounts of nutrients like iron, zinc, and calcium. Plus, if calcium deficiency drove people to eat dirt, one would expect them to do it most often at life stages when they need calcium the most - adolescence or old age. But that isn't the case, according to the database. Reports do indicate that geophagy is often associated with anemia, but several studies have shown that cravings for earth continue even after people are given iron supplements. What's more, some research suggests that clay can bind to nutrients in the stomach, making them hard to digest. If that's true, it's not a lack of nutrients that causes geophagy; rather it could be the other way around.

Overall, the protection hypothesis fits the data best, the Cornell researchers found. The database shows that geophagy is documented most commonly in women in the early stages of pregnancy and in pre-adolescent children. Both categories of people are especially sensitive to parasites and pathogens, according to Young and her colleagues. In addition, geophagy is most common in tropical climates where foodborne microbes are abundant. Finally, the database shows that people often eat earth during episodes of gastrointestinal stress. It's unlikely the intestinal problems are caused by the dirt itself because the type of clay people usually eat comes from deep in the ground, where pathogens and parasites are unlikely to contaminate it. Plus, people usually boil the clay before eating it.

More study would be helpful to confirm the protection hypothesis, the researchers say, but the available data at this point clearly support it over the other explanations. "We hope this paper stimulates [more] research," Young and her colleagues write. "More importantly, we hope readers agree that it is time to stop regarding geophagy as a bizarre, non-adaptive gustatory mistake." "With these data, it is clear that geophagy is a widespread behavior in humans … that occurs during both vulnerable life stages and when facing ecological conditions that require protection."

Sera L. Young, Paul W. Sherman, Julius Beau Lucks, Gretel H. Pelto, "Why on Earth?: Evaluating Hypotheses about the Physiological Functions of Human Geophagy." The Quarterly Review of Biology 86:2 (June 2011). Young has also released a book on the subject called Craving Earth: Understanding Pica - the Urge to Eat Clay, Starch, Ice, and Chalk.

http://www.eurekalert.org/pub_releases/2011-06/uops-cts060211.php

Combination therapy shows promise for rare, deadly cancer caused by asbestos

Photodynamic therapy added to lung sparing surgery provides superior results for overall survival in mesothelioma patients

Philadelphia – Pleural mesothelioma patients who undergo lung-sparing surgery in combination with photodynamic therapy (PDT) show superior overall survival than patient treated using the conventional therapy of extrapleural pneumonectomy (EPP) (or en bloc removal of the lung and surrounding tissue) with PDT,

indicates new research from the Raymond and Ruth Perelman School of Medicine at the University of Pennsylvania. The research is published in the June 2011 issue of the Annals of Thoracic Surgery.

"Unlike patients who receive traditional lung sacrificing surgery for mesothelioma, the patients in our study who underwent lung sparing surgery and photodynamic therapy, a light-based cancer treatment, have experienced unusually long overall survival rates. The median survival for those patients had not been reached at over two years when the results were analyzed. That's unusual in this field, especially when the majority of those patients are older and have advanced cancer," said Joseph Friedberg, MD, co-director of the Penn Mesothelioma and Pleural Program and the thoracic surgeon who performed the operations cited in the study. "In addition to the overall survival statistics, the difference between having and not having a lung, both with respect to the risk of surgery and the ability to enjoy a normal life after surgery, is crucial for these patients."

Mesothelioma is one of the most aggressive and deadliest forms of cancer and is usually caused by exposure to asbestos. Exposure to asbestos typically precedes development of the cancer by anywhere from 10 - 50 years, but once it occurs, the average survival rate following diagnosis is often only 9-12 months.

Although mesothelioma can occur in other locations like the abdomen, pleural mesothelioma is the most common form of the disease and accounts for roughly 70 percent of cases. This form originates in the pleura – the membrane surrounding the lung and lining the chest – where it starts off as a microscopic sheet of malignant cells that coats the interior of the chest and can grow to be several inches thick. The coating and enveloping nature of the cancer makes it impossible to completely remove it with surgery alone. As a result, the conventional surgery-based approach to treatment involves radical surgery that includes removing the lung, in combination with chemotherapy and whole chest radiation. Even with this aggressive treatment, the disease will recur in almost all patients.

The current study had two goals. The first was to determine if using a new combination of PDT and surgery would allow a less extensive surgical procedure to be used in lieu of an EPP. The second was to determine if, based on previous research from Penn with PDT, the treatment would have any positive effect on survival for patients.

Unlike radiation, which passes through the body, the PDT therapy used in the current study penetrates only a short distance which allows the lung to be preserved. The PDT treatment aims to eradicate the remaining microscopic disease trigger a patient's own immune system to help fight cancer. Penn is one of only two centers in the world where PDT is used to treat pleural mesothelioma.

In the study, 28 patients (19 men, 9 women) underwent surgical resection plus PDT for pleural mesothelioma. Patients were aged from 27 to 81 years. All patients were seen in a multidisciplinary setting and educated about the spectrum of treatment options available, including surgical intervention and its currently investigational status. Of the study group, 14 patients were treated by modified extrapleural pneumonectomy (MEPP) and 14 by radical pleurectomy (RP) and intraoperative PDT. Twenty-two of the 28 patients also received chemotherapy.

Demographics in the MEPP and RP cohorts were similar in age, sex, stage, nodal status, histology, and adjuvant treatments. Stage III/IV disease was present in 12 of 14 patients (86 percent) in both groups. The median overall survival for the patients who received the MEPP treatment was 8.4 months. At a follow-up 2.1 years after the end of treatment, a median survival rate for the patients who received a radical pleurectomy had not yet been reached. The results yielded by the radical pleurectomy and adjuvant PDT were superior to other studies of surgical treatment plans with patients of similar demographics.

"Our primary motivation in attempting the lung sparing surgery was preservation of quality of life, and we were hoping the survival results would at least be similar to the more traditional pneumonectomy approach," said Friedberg. "Although our pneumonectomy results were in line with what is often reported for similar patients having surgery-based treatments, we were completely caught off guard when the analysis revealed a significantly longer survival for the patients who retained both lungs."

Although all patients in the current study received the PDT therapy in combination with a different surgical technique, the researchers further note that the use of intraoperative PDT is the evident difference between the multimodal protocol used in the current study and other standard treatment options presently in use, and it seems worth speculating on any potential direct contributions of the PDT to the overall survival rates.

"Why this is happening is unclear and has emerged as the focus of our continuing research," said Friedberg. The possibility exists that the residual PDT-treated microscopic disease induced an autologous tumor vaccine effect or potentially enhanced the effect of adjuvant treatments.

"This study has limitations, as many mesothelioma studies do, but these results are very encouraging. The findings from our study are particularly notable because many of the patients in this study would often be excluded from surgery-based therapy because of their advanced age or unfavorable oncologic characteristics

such as the large bulk of their cancers or the spread to the lymph nodes," said Dr. Friedberg. "Based on these results this lung-sparing technique, combined with photodynamic therapy, has become the backbone of our surgery-based treatment protocols."

A larger study investigating the efficacy of this multimodal approach is currently underway at Penn.

The Penn Mesothelioma and Pleural Program is a unique program that consists of a multidisciplinary team of dedicated specialists with a passion and expertise for treating patients with these difficult cancers. The Penn Program offers a true multidisciplinary approach, presenting patients with essentially all treatment options offered world wide and a number of treatments offered only at Penn.

http://www.eurekalert.org/pub_releases/2011-06/osu-mdf060211.php

Mechanism discovered for health benefit of green tea, new approach to autoimmune disease

CORVALLIS, Ore. – *One of the beneficial compounds found in green tea has a powerful ability to increase the number of "regulatory T cells" that play a key role in immune function and suppression of autoimmune disease, according to new research in the Linus Pauling Institute at Oregon State University.*

This may be one of the underlying mechanisms for the health benefits of green tea, which has attracted wide interest for its ability to help control inflammation, improve immune function and prevent cancer.

Pharmaceutical drugs are available that perform similar roles and have been the subject of much research, scientists say, but they have problems with toxicity. A natural food product might provide a long-term, sustainable way to accomplish this same goal without toxicity, researchers said.

"This appears to be a natural, plant-derived compound that can affect the number of regulatory T cells, and in the process improve immune function," said Emily Ho, an LPI principal investigator and associate professor in the OSU Department of Nutrition and Exercise Sciences. "When fully understood, this could provide an easy and safe way to help control autoimmune problems and address various diseases," Ho said.

The findings have been published in Immunology Letters, a professional journal.

There are many types of cells that have different roles in the immune system, which is a delicate balancing act of attacking unwanted invaders without damaging normal cells. In autoimmune diseases, which can range from simple allergies to juvenile diabetes or even terminal conditions such as Lou Gehrig's disease, this process goes awry and the body mistakenly attacks itself.

Some cells exist primarily to help control that problem and dampen or "turn off" the immune system, including regulatory T cells. The number and proper function of those regulatory T cells, in turn, is regulated by other biological processes such as transcription factors and DNA methylation.

In this study, OSU scientists did experiments with a compound in green tea, a polyphenol called EGCG, which is believed to be responsible for much of its health benefits and has both anti-inflammatory and anti-cancer characteristics. They found it could cause a higher production of regulatory T cells. Its effects were not as potent as some of those produced by prescription drugs, but it also had few concerns about long-term use or toxicity. "EGCG may have health benefits through an epigenetic mechanism, meaning we aren't changing the underlying DNA codes, but just influencing what gets expressed, what cells get turned on," Ho said. "And we may be able to do this with a simple, whole-food approach."

Laboratory studies done with mice, Ho said, showed that treatment with EGCG significantly increased the numbers and frequencies of regulatory T cells found in spleen and lymph notes, and in the process helped to control the immune response. "Epigenetic regulation can be potentially exploited in generating suppressive regulatory T cells for therapeutic purposes, and is of significant clinical importance for the suppression of autoimmune diseases," the researchers said in their study.

The research was done by scientists from OSU, the University of Connecticut, and Changwon National University in South Korea. The work was supported by the National Institute of Environmental Health Sciences and the Oregon Agricultural Experiment Station.

http://www.eurekalert.org/pub_releases/2011-06/uos-sfc060211.php

Study finds copper proves effective against new E. coli strains

As the World Health Organisation suggests the E. coli outbreak in Germany is a strain never before seen in an outbreak – O104:H4 – laboratory science conducted at the University of Southampton indicates a role for copper in preventing the spread of such infections.

Professor Bill Keevil, Head of the Microbiology Group and Director of the Environmental Healthcare Unit at the University of Southampton, explains: "A study looking at copper's efficacy against new strains of E. coli has just been completed. Although it did not specifically look at O104, all the strains investigated have died rapidly on copper."

On a dry copper surface, the study shows 10 million E. coli bacteria are eliminated within 10 minutes. On a wet copper surface, one could expect a total kill within around 45 minutes. This antimicrobial property is inherent to the metal, and shared with alloys such as brass and bronze.

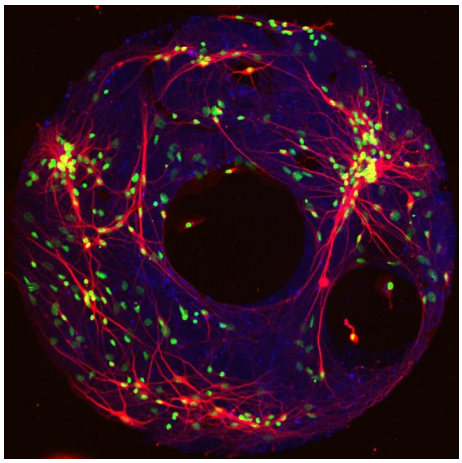
In the wake of this outbreak, hand washing and careful food preparation have been highlighted as key concerns, as has cross-contamination. Any raw food placed on a work surface can contaminate other food, or have bacteria transferred onto it from previous items resting there. Deployed as a touch surface in food preparation areas, copper will continuously kill any pathogens that settle on it, reducing the risk of cross-contamination, and helping to prevent the spread of infection.

http://news.discovery.com/tech/petri-dish-brain-has-short-term-memory-110602.html

Petri Dish Brain Has 'Short-Term Memory'

By Nic Halverson

This psychedelic donut may look like a blacklight poster on the wall of that dude who was really into Pink Floyd freshman year, but it's actually more mind-blowing than any poster glowing on the wall of a dorm room.



In a way, it's "A Saucerful of Secrets," but in reality it's the creation of a few scientists attempting to grow an active brain in a petri dish.

The artificial microbrain consists of about 40 to 60 rat neurons and is capable of sustaining 12 neuronal seconds of network activity.

Although this sounds like a lost Syd Barrett song, the University of Pittsburgh researchers behind this project were able to keep a leash on their consciousness and create something far beyond a trippy song and dance.

A fluorescent image of the neural network model developed at Pitt reveals the interconnection (red) between individual brain cells (blue). Adhesive proteins (green) allow the network to be constructed on silicon discs for experimentation. **Credit: Ashwin Vishwanathan, Guo-Qiang Bi and Henry C. Zeringue, University of Pittsburgh**

To cultivate their microbrain, Henry C. Zeringue and his colleagues took a silicon disk and stamped it with a layer of adhesive proteins. After the proteins had cultured and dried, brain (hippocampus) cells from embryonic rats were fused to the proteins and given time to grow and connect, forming a natural ring-shaped network capable of transmitting and receiving electrical signals.

By stimulating the neurons with an electrical pulse, the researchers found that the pulse could surge around the microbrain for 12 seconds, which was 11.75 seconds long than the team anticipated. This meant the neurons were storing and transmitting the signal in sequence, creating a sort of short-term memory.

"Persistent activity in the brain is involved in working memory and motor planning," states the study the team published in the journal Lab on a Chip. "The ability of the brain to hold information ‘online' long after an initiating stimulus is a hallmark of brain areas such as the prefrontal cortex."

The ***researchers plan to use the microbrain*** to study how our brains transmit electrical signals and how our neural networks so efficiently process and store data. Shine On You Crazy Diamonds!

http://www.scientificamerican.com/article.cfm?id=new-double-slit-experiment-skirts-uncertainty-principle

New 'Double Slit' Experiment Skirts Uncertainty Principle

Physicists show that in the iconic double-slit experiment, uncertainty can be eased.

By Edwin Cartlidge of Nature magazine

An international group of physicists has found a way of measuring both the position and the momentum of photons passing through the double-slit experiment, upending the idea that it is impossible to measure both properties in the lab at the same time.

In the classic double-slit experiment, first done more than 200 years ago, light waves passing through two parallel slits create a characteristic pattern of light and dark patches on a screen positioned behind the slits. The patches correspond to the points on the screen where the peaks and troughs of the waves diffracting out from the two slits combine with one another either constructively or destructively.

In the early twentieth century, physicists showed that this interference pattern was evident even when the intensity of the light was so low that photons pass through the apparatus one at a time. In other words, individual photons seem to interfere with themselves, so light exhibits both particle-like and wave-like properties.

However, placing detectors at the slits to determine which one a particle is passing through destroys the interference pattern on the screen behind. This is a manifestation of Werner Heisenberg's uncertainty principle, which states that it is not possible to precisely measure both the position (which of the two slits has been traversed) and the momentum (represented by the interference pattern) of a photon.

What quantum physicist Aephraim Steinberg of the University of Toronto in Canada and his colleagues have now shown, however, is that it is possible to precisely measure photons' position and obtain approximate information about their momentum, in an approach known as 'weak measurement'.

Steinberg's group sent photons one by one through a double slit by using a beam splitter and two lengths of fibre-optic cable. Then they used an electronic detector to measure the positions of photons at some distance away from the slits, and a calcite crystal in front of the detector to change the polarization of the photon, and allow them to make a very rough estimate of each photon's momentum from that change.

Average trajectory

By measuring the momentum of many photons, the researchers were able to work out the average momentum of the photons at each detector. They then moved the crystal progressively further away from the slits, and so by "connecting the dots" were able to trace out the average trajectories of the photons. They did this while still recording an interference pattern at each detector position.

Intriguingly, the trajectories closely match those predicted by an unconventional interpretation of quantum mechanics known as pilot-wave theory, in which each particle has a well-defined trajectory that takes it through one slit while the associated wave passes through both slits. The traditional interpretation of quantum mechanics, known as the Copenhagen interpretation, dismisses the notion of trajectories, and maintains that it is meaningless to ask what value a variable, such as momentum, has if that's not what is being measured.

Steinberg stresses that his group's work does not challenge the uncertainty principle, pointing out that the results could, in principle, be predicted with standard quantum mechanics. But, he says, "it is not necessary to interpret the uncertainty principle as rigidly as we are often taught to do", arguing that other interpretations of quantum mechanics, such as the pilot-wave theory, might "help us to think in new ways".

"Experiments are only relevant in science when they are crucial tests between at least two good explanatory theories," Deutsch says. "Here, there was only one, namely that the equations of quantum mechanics really do describe reality."David Deutsch of the University of Oxford, UK, is not convinced that the experiment has told us anything new about how the universe works. He says that although "it's quite cool to see strange predictions verified", the results could have been obtained simply by "calculating them using a computer and the equations of quantum mechanics".

But Steinberg thinks his work could have prectical applications. He believes it could help to improve logic gates for quantum computers, by allowing the gates to repeat an operation deemed to have failed previously. "Under the normal interpretation of quantum mechanics we can't pose the question of what happened at an earlier time," he says. "We need something like weak measurement to even pose this question."

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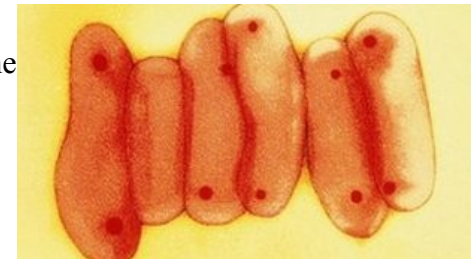
http://www.bbc.co.uk/news/uk-england-london-13639892

TB vaccination for all London newborns proposed

All newborn children in London could be vaccinated to reduce the spread of tuberculosis (TB), under proposals that are out for consultation.

Cases of TB have risen 50% in the capital, according to London Health Programmes (LHP), which has produced the draft plan. LHP hopes its range of proposals, which also includes targeted testing, will help to cut the rate of the respiratory illness by 50% over the next 10 years. The consultation runs until 13 July.



London has the poorest rate of cases of TB in Britain at 40 per 100,000 people, and it is also one of the worst in Western Europe. The LHP draft plans say all newborn children should be vaccinated within six weeks of birth.

London has the worst rate of cases of TB in Britain

'Serious issue'

The BCG jab was discontinued for school children in 2005, after it was deemed unnecessary.

Other proposals include improved early identification of people with infectious TB, targeted testing and treatment of latent TB infection and an awareness and education programme.

A Department of Health spokesman said: "We recognise that tuberculosis is a serious issue in London, particularly in more deprived boroughs and among the migrant community.

"We welcome the consultation on the draft TB Plan for London.

Early detection

"However, consideration of future vaccination needs is just one of a range of areas the plan identifies for further control of TB."

Dr John Moore-Gillon, Vice President at the British Lung Foundation and TB specialist, said: "People can unknowingly have TB bacteria present in their bodies without being ill, and early detection through screening programmes is also important.

"Crucially, both the public and health care professionals need to be aware that TB is back, and growing fast."

http://medicalxpress.com/news/2011-06-strain-mrsa.html

New strain of MRSA discovered

Scientists have identified a new strain of methicillin-resistant Staphylococcus aureus (MRSA) which occurs both in human and dairy cow populations.

The study, led by Dr Mark Holmes at the University of Cambridge, identified the new strain in milk from dairy cows while researching mastitis (a bacterial infection which occurs in the cows' udders).

The new strain's genetic makeup differs greatly from previous strains, which means that the 'gold standard' molecular tests currently used to identify MRSA - a polymerase chain reaction technique (PCR) and slide agglutination testing - do not detect this new strain. The research findings are published today in the journal The Lancet Infectious Diseases.

Dr Laura García-Álvarez, first author of the paper, who discovered the new strain while a PhD student at the University of Cambridge's Veterinary School, said: "To find the same new strain in both humans and cows is certainly worrying. However, pasteurization of milk will prevent any risk of infection via the food chain. Workers on dairy farms may be at higher risk of carrying MRSA, but we do not yet know if this translates into a higher risk of infection. In the wider UK community, less than 1% of individuals carry MRSA – typically in their noses – without becoming ill."

The scientists discovered the antibiotic resistant strain while researching S. aureus, a bacterium known to cause bovine mastitis. Despite the strain being able to grow in the presence of antibiotics, when they attempted to use the standard molecular tests available – which work by identifying the presence of the gene responsible for methicillin resistance (the mecA gene) – the tests came back negative for MRSA.

When Dr Matt Holden and a research team at the Wellcome Trust Sanger Institute sequenced the entire genome (decoding all of the genes in the bacteria's DNA) they realised that the new strain possessed unconventional DNA for MRSA. They found that the new strain does have a mecA gene but with only 60% similarity to the original mecA gene. Unfortunately, this results in molecular tests (which identify MRSA by the presence of the mecA gene) giving a false negative for this strain of MRSA.

Subsequent research revealed that the new strain was also present in humans. During the study, the new strain was found in samples from Scotland, England and Denmark (some from screening tests and others from people with MRSA disease). It has since been identified in Ireland and Germany. Additionally, by testing archived S. aureus samples, the researchers have also identified a recent upward trend in the prevalence of the antibiotic resistant bacteria.

Dr Mark Holmes said: "The majority of MRSA testing in British hospitals is performed by seeing if the bacteria will grow in the presence of antibiotics, typically oxacillin and cefoxitin, rather than methicillin – which is now no longer manufactured. This type of testing detects both the new MRSA and conventional MRSA.

"However, it is important that any of the MRSA testing that is based on detection of the mecA gene – i.e. PCR based testing, or slide agglutination testing – be upgraded to ensure that the tests detect the new mecA gene found in the new MRSA. We have already been working with public health colleagues in the UK and Denmark to ensure that testing in these countries now detects the new MRSA."

The new research also raises questions about whether cows could be a reservoir for the new strains of MRSA.

Dr Holmes added: "Although there is circumstantial evidence that dairy cows are providing a reservoir of infection, it is still not known for certain if cows are infecting people, or people are infecting cows. This is one of the many things we will be looking into next. "Although our research suggests that the new MRSA accounts for a small proportion of MRSA – probably less than 100 isolations per year in the UK, it does appear that the numbers are rising. The next step will be to explore how prevalent the new strain actually is and to track where it is coming from. If we are ever going to address the problem with MRSA, we need to determine its origins."

Scientists at the Health Protection Agency (HPA) co-authored this paper, providing the analysis of the human samples of the new strain. Dr Angela Kearns, head of the HPA's Staphylococcus Reference Laboratory said: "There are numerous strains of MRSA circulating in the UK and the rest of Europe. Even though this new strain is not picked up by the current molecular tests, they do still remain effective for the detection of over 99 per cent of MRSAs. This new strain can be picked up by another type of test, which has shown to be effective in trials in the UK and elsewhere in Europe.

"This is a very interesting find and the HPA is currently involved in further research to screen a wider population of MRSA samples to ascertain how prevalent it is. It's important to remember MRSA is still treatable with a range of antibiotics and the risk of becoming infected with this new strain is very low."

With funding from the Medical Research Council, the researchers will next be undertaking prevalence surveys in people and in dairy cattle in the UK to determine how much new MRSA is present in these populations. They will also be performing an epidemiological study on farms to identify any factors that may be associated with infection by the new MRSA, to look for further new MRSA strains, and to explore the potential risks of the new strain to farm workers. ***Source**: University of Cambridge*

http://www.newscientist.com/blogs/shortsharpscience/2011/06/tevatrons-mystery-signal-grows.html

Tevatron's mystery signal grows stronger with more data

Amanda Gefter, contributor

If physicists weren't jumping up and down with excitement in April at the announcement that an unknown particle had been glimpsed at Fermilab, they are now.

The news of a possible particle sighting in the debris of proton-antiproton collisions at the Illinois accelerator had been met with a mix of curiosity and scepticism. It was based on an analysis of eight years of data collected by Fermilab's CDF experiment that looked at collisions that produced a W boson, carrier of the weak nuclear force, along with two jets of quarks.

A suspicious bump in the data showed an unexpected rise in the number of these events clustered around 145 GeV – suggesting that they are being produced by an unidentified particle of the same mass. It was immediately clear that whatever the particle was, it was not predicted by the standard model of physics, the leading theory for how particles and forces interact. To add to the mystery, it was clearly not a Higgs boson, the long-sought particle that gives other particles their mass.

Still, physicists maintained their composure, noting that the results weren't convincing enough to warrant any impromptu dancing or high-pitched screams. At a robustness of "three sigma", there was a 1 in 1000 chance that it was just a statistical fluke, making the finding good enough to be considered "evidence" but still far from the five-sigma gold standard for a true discovery.

Now the CDF team has analysed nearly twice the amount of data the first result was based on, and the result has not gone away. In fact, as CDF physicist Giovanni Punzi told a conference this week in Blois, France, the signal has only gotten stronger. It is reportedly at 4.8 sigma, tantalisingly close to five-sigma certainty.

Now that there's a mere 1 in a million chance that the result is a fluke, it seems there are only two options: either it's the result of some systematic or detector effect that no one has thought of yet, or it's real. The CDF team is hard at work trying to figure out which. "We're still going through all the data, and we've got two other teams repeating the analysis in a different way, so we're not going to publish a five-sigma result until all of our i's and t's are dotted and crossed," says CDF spokesperson Rob Roser.

An independent check will also come from Fermilab's DZero experiment, which has enough of its own data to corroborate or cast doubt on the particle's existence. So far, the DZero team is keeping quiet, but it is expected to publish its results in the next few weeks.

The Large Hadron Collider in Switzerland should also be able to test CDF's result. There's talk that the LHC hasn't seen any such bump – but Roser says that doesn't mean much one way or the other, as the LHC hasn't collected as much data as Fermilab. "They haven't really achieved the sensitivity to see this yet," he explains.

So if the alleged particle is real, what is it? That's the million dollar question, and theorists are already placing their bets. Some say it's a particle called the Z-prime, a hypothetical carrier of a new force similar to the electroweak force, though it would have to be an unusual version of a Z-prime to have slipped by unnoticed at CERN's LEP collider. Others say it might be a sign of supersymmetry – a popular theory that solves some perplexing problems in physics and postulates that every particle has a shadowy partner. The Fermilab bump could therefore be pairs of "squarks" or "selectrons" – supersymmetric partners of quarks and electrons. Still others believe that it is a technipion – a particle that appears in a theory known as technicolour, which posits a new force that is similar to the strong nuclear force but operates at much higher energies.

The CDF team is looking at these and other theoretical models to see which best fits and will be publishing a paper in the next few months with their result. Roser says a leading contender has emerged, but he's keeping his lips sealed about its identity. Whatever happens, a five-sigma result is enough to allow physicists to finally let out a little excitement. As we usher in the era of physics beyond the standard model, I am sure that office doors in physics departments around the world are being closed and behind each one, someone is doing a little dance.

http://www.scientificamerican.com/article.cfm?id=moving-mirrors-make-light-from-nothing

Moving Mirrors Make Light from Nothing

Researchers claim to have produced sought-after quantum effect.

By Geoff Brumfiel of Nature magazine

A team of physicists is claiming to have coaxed sparks from the vacuum of empty space. If verified, the finding would be one of the most unusual experimental proofs of quantum mechanics in recent years and "a significant milestone", says John Pendry, a theoretical physicist at Imperial College London who was not involved in the study. The researchers, based at the Chalmers University of Technology in Gothenburg, Sweden, will present their findings early next week at a workshop in Padua, Italy. They have already posted a paper on the popular pre-print server arXiv.org, but have declined to talk to reporters because the work has not yet been peer-reviewed. High-profile journals, including Nature, discourage researchers from talking to the press until their findings are ready for publication.

Nevertheless, scientists not directly connected with the group say that the result is impressive. "It is a major development," says Federico Capasso, an experimental physicist at Harvard University in Cambridge, Massachusetts, who has worked on similar quantum effects.

At the heart of the experiment is one of the weirdest, and most important, tenets of quantum mechanics: the principle that empty space is anything but. Quantum theory predicts that a vacuum is actually a writhing foam of particles flitting in and out of existence.

The existence of these particles is so fleeting that they are often described as virtual, yet they can have tangible effects. For example, if two mirrors are placed extremely close together, the kinds of virtual light particles, or photons, that can exist between them can be limited. The limit means that more virtual photons exist outside the mirrors than between them, creating a force that pushes the plates together. This 'Casimir force' is strong enough at short distances for scientists to physically measure it.

From virtual to real

For decades, theorists have predicted that a similar effect can be produced in a single mirror that is moving very quickly. According to theory, a mirror can absorb energy from virtual photons onto its surface and then re-emit that energy as real photons. The effect only works when the mirror is moving through a vacuum at nearly the speed of light -- which is almost impossible for everyday mechanical devices.

Per Delsing, a physicist at the Chalmers University of Technology, and his colleagues circumvented this problem using a piece of quantum electronics known as a superconducting quantum interference device (SQUID), which is extraordinarily sensitive to magnetic fields.

The team fashioned a superconducting circuit in which the SQUID effectively acted as a mirror. Passing a magnetic field through the SQUID moved the mirror slightly, and switching the direction of magnetic field several billion times per second caused it to 'wiggle' at around 5% the speed of light, a speed great enough to see the effect. The result was a shower of microwave photons shaken loose from the vacuum, the team claims. The group's analysis shows that the frequency of the photons was roughly half the frequency at which they wiggled the mirror -- as was predicted by quantum theory.

Capasso calls the experiment "very clever". He doubts that the effect has any practical use because it doesn't generate large numbers of photons, but he considers it a nice demonstration of quantum mechanics. He still hopes to see a moving piece of metal generate detectable light from the vacuum, and believes that micromechanical systems may eventually be able to reach such speeds.

Pendry says that the result, if it stands up, is bound to generate excitement. "Work in this area stirs considerable passion in the breasts of physicists."

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http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=06022011

The National Academies Press Makes All PDF Books Free to Download;

More Than 4,000 Titles Now Available Free to All Readers

WASHINGTON -- As of today all PDF versions of books published by the National Academies Press will be downloadable to anyone free of charge. This includes a current catalog of more than 4,000 books plus future reports produced by the Press. The mission of the National Academies Press (NAP) -- publisher for the National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council -- is to disseminate the institutions' content as widely as possible while maintaining financial sustainability. To that end, NAP began offering free content online in 1994. Before today's announcement, all PDFs were free to download in developing countries, and 65 percent of them were available for free to any user.

"Our business model has evolved so that it is now financially viable to put this content out to the entire world for free," said Barbara Kline Pope, executive director for the National Academies Press. "This is a wonderful opportunity to make a positive impact by more effectively sharing our knowledge and analyses."

Based on the performance of NAP's current free PDFs, projections suggest that this change will enhance dissemination of PDF reports from about 700,000 downloads per year to more than 3 million by 2013.

Printed books will continue to be available for purchase through the NAP website and traditional channels. The free PDFs are available exclusively from the NAP's website, http://www.nap.edu/, and remain subject to copyright laws. PDF versions exist for the vast majority of NAP books. Exceptions include some books that were published before the advent of PDFs; books from the Joseph Henry Press imprint; and in cases where contractually prohibited, such as reference books in the Nutrient Requirements of Domestic Animals series.

http://www.eurekalert.org/pub_releases/2011-06/mc-fcw060111.php

Fighting cancer with cancer: Mayo Clinic finds promising use for thyroid cancer gene

ROCHESTER, Minn. -- ***A mutant gene long thought to accelerate tumor growth in thyroid cancer patients actually inhibits the spread of malignant cells, showing promise for novel cancer therapies, a Mayo Clinic study has found.***

The findings will be presented by Mayo Clinic researcher Honey Reddi, Ph.D., at the Endocrine Society meeting in Boston.

Dr. Reddi's discovery could have widespread implications in cancer research and endocrinology. It could help oncologists sharpen the diagnosis of specific types of thyroid cancers, while leading pharmaceutical researchers toward therapeutics derived from a protein once thought to feed tumor growth.

"It's not an oncogene like everyone thought it was," Dr. Reddi says, referring to a gene with the potential to cause cancer. "We all knew what happened in the cell culture, but we said, 'That's not good enough,' so we asked, 'What would it do in mice?'"

Thyroid cancer is the sixth most common cancer in the world, and 15 to 20 percent of all thyroid cancer cases are follicular, a type that is more aggressive. Dr. Reddi's findings could aid this diagnosis and treatment for thousands of patients.

Distinguishing benign from malignant follicular thyroid cancer poses a unique challenge to oncologists. An accurate diagnosis of malignant follicular cancer cannot be made until after cancerous material is removed. That has led to countless unnecessary surgeries in patients with benign thyroid tumors. Patients who now present with non-papillary cancerous growths on thyroid cells must undergo surgery to remove the tumor — even if the cancer is benign.

Dr. Reddi's research found that the PAX8/PPARγ fusion protein, developed from a mutated fusion gene found in many follicular thyroid carcinomas, functions as a tumor suppressor by upregulating (encourages natural production of) microRNA-122 and PTEN, both naturally occurring anti-tumor agents.

PAX8/PPARγ results from the translocation of genetic material between human chromosomes 2 and 3. Previous in vitro studies of the PAX8/PPARγ protein found rapid acceleration of cell growth, which led researchers to the false interpretation that PAX8/PPARγ functioned as an oncogene, a type of mutated gene that encourages tumor propagation, Dr. Reddi says.

Mayo Clinic's in vivo animal studies show that PAX8/PPARγ upregulates the well-known anti-cancer protein PTEN, as well as microRNA-122, and likely facilitates other cancer-fighting molecules.

PAX8/PPARγ does not boost tumor progression when exposed to cancerous cells, Dr. Reddi says. Rather, its facilitation of other native anti-cancer molecules appears to outweigh the tumor propagation. Tumors grew about four times slower in mice exposed to the PAX8/PPARγ gene than those who were deprived of the protein's cancer-fighting qualities.

Among the team's goals in future research is the identification of other microRNA-like markers, which could identify a benign disease and obviate the need for immediate and unnecessary surgery.

Based on her discussions with clinicians at Mayo Clinic, Dr. Reddi says, "There are many complications from thyroid surgery, and having early detection markers could save thousands of unnecessary surgeries every year. We're just getting started and look towards a rapid translation from bench to bedside."

Others on the study team include Bryan McIver, M.B., Ch.B., Ph.D.; Norman Eberhardt, Ph.D.; Pranathi Madde; Dragana Milosevic; Alicia Algeciras-Schimnich, Ph.D.; and Stefan Grebe, M.D.; all of Mayo Clinic. Translation of this research to a clinical setting is being done in collaboration with Dr. Grebe. The study was funded by Mayo Clinic, the Fraternal Order of Eagles, and the National Institutes of Health. The Emslander Career Development Award supported Dr. McIver.

http://www.physorg.com/news/2011-06-estrogen-blocker-breast-cancer.html

Estrogen blocker cuts breast cancer risk 65%: study

An anti-estrogen drug has shown a "promising" 65-percent reduction of breast cancer risk among post-menopausal women, according to the findings of a study released Saturday.

The research could lead to a breakthrough for women who are at increased risk of developing breast cancer, which strikes some 1.3 million women worldwide each year and leads to the death of 500,000 women annually, said lead study author Paul Goss of Harvard Medical School.

"The potential public health impact of these findings is important," Goss said in a statement coinciding with the release of the study at the annual meeting of the American Society of Clinical Oncology, the world's largest oncology conference, gathering in Chicago.

A random phase III trial led by Canadian trial group NCIC CTG showed that risk of breast cancer in menopausal women dropped by 65 percent compared to a placebo when patients used exemestane, an oral drug that decreases the body's production of estrogen, the hormone that has been implicated in causing the disease.

"Results from the MAP.3 (mammary prevention - 3) trial indicate that exemestane is a promising new way to prevent breast cancer in menopausal women most commonly affected with breast cancer," said Goss.

"Our study not only showed an impressive reduction in breast cancers, but also an excellent side effect profile, although my cautionary note is that average follow-up to date has been only three years."

The study says aromastate inhibitors (AIs) like exemestane -- sold under the brand name Aromasin -- are distinct from other anti-estrogen therapies such as tamoxifen and raloxifene, which have been approved by the US Food and Drug Administration as preventative therapies for women at high breast cancer risk.

Exemestane too has been approved by the FDA, for use in early breast cancer patients.

Serious side effects have been recorded with drugs like tamoxifen, including rare but serious uterine cancer and potentially fatal blood clots, and Goss's study says AIs counteract estrogen "without the serious toxicities seen with tamoxifen," the statement said.

The clinical study was conducted from 2004 to 2010 and enrolled 4,560 women from the United States, Canada, Spain and France, who had at least one major risk factor such as being age 60 or older, or having prior breast cancer tumors, including breast cancer with mastectomy. Half the participants received Aromasin, produced by US pharmaceutical giant Pfizer, and half were given a placebo.

After a period of three years, the Aromasin group had about one third as many invasive cancers as those in the placebo group -- a result corresponding to what researchers expected at the beginning of the trial, Goss said.

In addition, for those with breast cancer, "there also appeared to be fewer of the more aggressive tumors on exemestane," he added.

The most common side effects reported by Aromasin users include fatigue, hot flashes, insomnia and joint pain. Results of the study are being published in the New England Journal of Medicine.

http://www.bbc.co.uk/news/science-environment-13609153

Moons like Earth's could be more common than we thought

By Jason Palmer Science and technology reporter, BBC News

About one in 10 rocky planets around stars like our Sun may host a moon proportionally as large as Earth's, researchers say.

Our Moon is disproportionately large - more than a quarter of Earth's diameter - a situation once thought to be rare. Using computer simulations of planet formation, researchers have now shown that the grand impacts that resulted in our Moon may in fact be common. The result may also help identify other planets that are hospitable to life. A report outlining the results will be published in Icarus.

Last year, researchers from the University of Zurich's Institute of Theoretical Physics in Switzerland and Ryuja Morishima of the Laboratory for Atmospheric and Space Physics at the University of Colorado in the US undertook a series of simulations to look at the way planets form from gas and smaller chunks of rock called planetesimals.

Our own moon is widely thought to have formed early in the Earth's history when a Mars-sized planet slammed into the Earth, resulting in a disc of molten material encircling the Earth which in time coalesced into the Moon as we know it.

The team used the results from their initial study as the input to a further "N-body simulation" to find out the likelihood that large-scale impact events could form large satellites in the same way. Their results showed that there is about a one in 12 chance of generating a system comprising a planet more than half the Earth's mass and a moon with more than half that of our Moon (taking into account the errors in the simulation, the full range of probabilities was between one in 45 and one in four).

Stabilising influence

Sebastian Elser of the University of Zurich said the new estimates for the likelihood of Moon-sized satellites could inform the hunt for extrasolar planets. Such large moons can confuse the measurements that spot the planets, and knowing that large satellites may be common could make the measurements easier.

Also, our Moon has served to stabilise the tilt of the Earth's axis - or its obliquity - which could otherwise have varied drastically over relatively short time scales. That in turn would wreak drastic changes to the way heat from the Sun is distributed around the planet.

It thus can be said that the Moon's presence made a more stable environment in which life could evolve, Mr Elser said. "Checking for the possibility of an obliquity-stabilising moon is a good thing if you're trying to find out how many habitable worlds are out there in the galaxy," he told BBC News. "But it's surely not the only one and not the most important."

Eiichiro Kokubo is a planet formation expert who has published widely on the mechanics behind the development of both the planets in our Solar System and the Moon.

He called the result an "interesting estimate" but cautioned that there are several as-yet unknown parameters "which greatly affect lunar formation and evolution and thus the probability of hosting a large moon". He told BBC News that, for example, it is still impossible to put numbers to the effects of a planet's initial spin before impact, or how the disc of material is formed and evolves after it. "I think we should take the paper as a trial calculation based on what we know about formation of terrestrial planets and moons today," he said.

http://medicalxpress.com/news/2011-06-asthma-drug-metabolism.html

New generation asthma drug could improve metabolism

Formoterol, a new generation asthma medication, shows great promise for improving fat and protein metabolism, say Australian researchers, who have tested this effect in a small sample of men.

The research team comprises members of Professor Ken Ho's lab from Sydney's Garvan Institute of Medical Research as well as Professor Ric Day, a clinical pharmacologist from St. Vincent's Hospital.

Study leader, endocrinologist Dr Paul Lee, focused his PhD research on how various hormones affect metabolism. Of central importance is a class of hormones called catecholamines, which regulate heart rate, metabolism and breathing. Formoterol is a synthetic catecholamine, the metabolic effects of which have not previously been studied in people. Therapy doses given to animals, however, have shown that it stimulates metabolism without affecting the heart.

"We have known for a long time that catecholamine influences the way the body handles nutrients, in particular fat and protein," said Lee. "The generation of drugs before formoterol was exploited in the livestock industry around 20 years ago – to reduce the fat and increase the protein content of meat. Unfortunately, these older drugs also caused a faster heart rate."

"Formoterol is a new generation of this class of medication. It is highly selective for the kind of catecholamine receptors found in the lungs, and not those in the heart." "The new drug is also more selective for a similar receptor found in muscle and fat. In theory at least, it should have beneficial metabolic effects – like the older class of medication – without affecting the heart."

Lee sourced the drug in its oral form, found the dose needed to give a metabolic effect, and gave it to 8 healthy men over a week. "Energy metabolism increased by more than 10%, fat burning increased by more than 25%, while protein burning fell by 15%," he said. "So although whole body metabolism increased, these men burned fat while reducing the burning of protein. That's a good thing because in the long run these effects may lead to a loss in fat mass and an increase in muscle.

"In this study, all 8 subjects tolerated the medication well – without any significant increase in heart rate."

The next step will be to test the drug over a longer period in a larger sample of people to determine if the beneficial effects translate into improvement in body composition, health and function.

Provided by Research Australia

http://www.bbc.co.uk/news/world-europe-13662431

E.coli outbreak: German beansprouts 'probable' cause

Locally grown beansprouts are suspected to be the source of an E.coli outbreak that has left at least 21 people dead, German officials say.

A spokesman for the Lower Saxony agriculture ministry, Gert Hahne, said it had not been conclusively proven that the sprouts were to blame.

But he told the Associated Press news agency that "all indications speak to them being" the cause.

Hundreds of people across Europe have been made ill in the outbreak.

Most of those affected have been in Germany, with cases concentrated in the northern city of Hamburg.

The health ministry in Berlin said it was still waiting for results from tests on the beansprouts, German news agency DPA reported.

The head of the Robert Koch Institute (RKI), Germany's national disease centre, was also reported as saying that the cause of the outbreak could not yet be definitively confirmed.

Mr Hahne told AP that many restaurants in which people ate before becoming ill had recently taken delivery of the sprouts, grown in Lower Saxony.

The state is to send an alert advising people to stop eating the sprouts, he said.

The BBC's Steve Evans reports from Berlin that the announcement may cause embarrassment to German authorities, who had earlier pointed to Spanish farms as the source of the outbreak.

Scientists say the new E.coli strain's genes have been decoded, and that it is a new hybrid form toxic to humans.

http://www.eurekalert.org/pub_releases/2011-06/dbnl-asa053111.php

ALPHA stores antimatter atoms for over a quarter of an hour -- and still counting

Berkeley Lab physicists join with their international colleagues in reaching a new frontier in antimatter science

The ALPHA Collaboration, an international team of scientists working at CERN in Geneva, Switzerland, has created and stored a total of 309 antihydrogen atoms, some for up to 1,000 seconds (almost 17 minutes), with an indication of much longer storage time as well.

ALPHA announced in November, 2010, that they had succeeded in storing antimatter atoms for the first time ever, having captured 38 atoms of antihydrogen and storing each for a sixth of a second. In the weeks following, ALPHA continued to collect anti-atoms and hold them for longer and longer times.

Scientists at the U.S. Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) and the University of California at Berkeley, including Joel Fajans and Jonathan Wurtele of Berkeley Lab's Accelerator and Fusion Research Division (AFRD), both UC Berkeley physics professors, are members of the ALPHA Collaboration.

Says Fajans, "Perhaps the most important aspect of this result is that after just one second these antihydrogen atoms had surely already decayed to ground state. These were likely the first ground state anti-atoms ever made." Since almost all precision measurements require atoms in the ground state, ALPHA's achievement opens a path to new experiments with antimatter.

A principal component of ALPHA's atom trap is a superconducting octupole magnet proposed and prototyped in Berkeley Lab's AFRD. It takes ALPHA about 15 minutes to make and capture atoms of antihydrogen in their magnetic trap.

"So far, the only way we know whether we've caught an anti-atom is to turn off the magnet," says Fajans. "When the anti-atom hits the wall of the trap it annihilates, which tells us that we got one. In the beginning we were turning off our trap as soon as possible after each attempt to make anti-atoms, so as not to miss any."

Says Wurtele, "At first we needed to demonstrate that we could trap antihydrogen. Once we proved that, we started optimizing the system and made rapid progress, a real qualitative change."

Initially ALPHA caught only about one anti-atom in every 10 tries, but Fajans notes that at its best the ALPHA apparatus trapped one anti-atom with nearly every attempt.

Although the physical set-ups are different, ALPHA's ability to hold anti-atoms in a magnetic trap for 1,000 seconds, and presumably longer, compares well to the length of time ordinary atoms can be magnetically confined.

"A thousand seconds is more than enough time to perform measurements on a confined anti-atom," says Fajans. "For instance, it's enough time for the anti-atoms to interact with laser beams or microwaves." He jokes that, at CERN, "it's even enough time to go for coffee."

The ALPHA Collaboration not only made and stored the long-lived antihydrogen atoms, it was able to measure their energy distribution.

"It may not sound exciting, but it's the first experiment done on trapped antihydrogen atoms," Wurtele says. "This summer we're planning more experiments, with microwaves. Hopefully we will measure microwave-induced changes of the atomic state of the anti-atoms." With these and other experiments the ALPHA Collaboration aims to determine the properties of antihydrogen and measure matter-antimatter asymmetry with precision.

A program of upgrades is being planned that will allow experiments not possible with the current ALPHA apparatus. At present the experimenters don't have laser access to the trap. Lasers are essential for performing spectroscopy and for "cooling" the antihydrogen atoms (reducing their energy and slowing them down) to perform other experiments.

Fajans says, "We hope to have laser access by 2012. We're clearly ready to move to the next level."

Additional information

"Confinement of antihydrogen for 1000 seconds," by the ALPHA Collaboration: G. B. Andresen, M. D. Ashkezari, M. Baquero-Ruiz, W. Bertsche, E. Butler, C. L. Cesar, A. Deller, S. Eriksson, J. Fajans, T. Friesen, M. C. Fujiwara, D. R. Gill, A. Gutierrez, J. S. Hangst, W. N. Hardy, R. S. Hayano, M. E. Hayden, A. J. Humphries, R. Hydomako, S. Jonsell, S. Kemp, L. Kurchaninov, N. Madsen, S. Menary, P. Nolan, K. Olchanski, A. Olin, P. Pusa, C. Ø. Rasmussen, F. Robicheaux, E. Sarid, D. M. Silveira, C. So, J. W. Storey, R. I. Thompson, D. P. van der Werf, J. S. Wurtele, Y. Yamazaki, appears in Nature Physics and is available online at http://www.nature.com/nphys/index.html.

Details of the ALPHA method of creating and trapping antihydrogen atoms may be found in "Antimatter Atoms Successfully Stored for the First Time," the 17 November 2010 Berkeley Lab news release, at http://newscenter.lbl.gov/news-releases/2010/11/17/antimatter-atoms/.

http://www.eurekalert.org/pub_releases/2011-06/ps-crt060311.php

Carbon release to atmosphere 10 times faster than in the past

The rate of release of carbon into the atmosphere today is nearly 10 times as fast as during the Paleocene-Eocene Thermal Maximum (PETM), 55.9 million years ago, the best analog we have for current global warming, according to an international team of geologists.

Rate matters and this current rapid change may not allow sufficient time for the biological environment to adjust. "We looked at the PETM because it is thought to be the best ancient analog for future climate change caused by fossil fuel burning," said Lee R. Kump, professor of geosciences, Penn State.

However, the researchers note in the current issue of Nature Geoscience, that the source of the carbon, the rate of emission and the total amount of carbon involved in this event during the PETM are poorly characterized.

Investigations of the PETM are usually done using core samples from areas that were deep sea bottom 55.9 million years ago. These cores contain layers of calcium carbonate from marine animals that can show whether the carbon in the carbonate came from organic or inorganic sources. Unfortunately, when large amounts of greenhouse gases --carbon dioxide or methane -- are in the atmosphere, the oceans become more acidic, and acid dissolves calcium carbonate.

"We were concerned with the fidelity of the deep sea records," said Kump. "How do we determine the rate of change of atmospheric carbon if the record is incomplete? The incomplete record makes the warming appear more abrupt."

Kump and his colleagues decided to look at information coming from areas that were shallow arctic ocean bottom during the PETM. During a Worldwide Universities Network expedition to train graduate students from Penn State, the University of Southampton, University of Leeds, University of Utrecht and University of Oslo in how projects develop, the researchers visited Spitsbergen, Norway. They uncovered a supply of rock cores curated by a forward-thinking young coal-mining company geologist, Malte Jochmann.

"Deep-sea cores usually have from 10 cm to a meter (about 4 inches to 3 feet) of core corresponding to the PETM," said Kump. "The Spitsbergen cores have 150 meters (492 feet) of sediment for the PETM."

The larger sediment section, made up of mud that came into the shallow ocean contains organic matter that can also supply the carbon isotope signature and provide the greenhouse gas profile of the atmosphere. With the larger core segment, it is easier to look at what happened through time and ocean acidification would not degrade the contents. "We think the Spitsbergen core is relatively complete and shows an interval of about 20,000 years for the injection of carbon dioxide during the PETM," said Kump.

Using the data collected from the cores, the researchers forced a computer model to in essence run backward. They set up the models to find the proper amounts of greenhouse gases and atmospheric temperature that would have resulted in the carbon isotope ratios observed in the cores.

The outcome was a warming of from 9 to 16 degrees Fahrenheit and an acidification event in the oceans.

"Rather than the 20,000 years of the PETM which is long enough for ecological systems to adapt, carbon is now being released into the atmosphere at a rate 10 times faster," said Kump. "It is possible that this is faster than ecosystems can adapt."

Other Penn State researchers on this project include Ying Cui, graduate student and Katherine H. Freeman, professor; geosciences, Christopher K. Junium and Aaron F. Diefendorf, former graduates students and Nathan M. Urban former postdoctoral fellow. Other researchers include Ian C. Harding, senior lecturer, and Adam J. Charles graduate student, National Oceanography Centre Southampton, University of Southampton, UK and Andy J. Ridgwell, professor of Earth system modeling, School of Geographical Sciences, University of Bristol, UK. The National Science Foundation, Worldwide Universities Network and Penn State supported this work.

http://www.eurekalert.org/pub_releases/2011-06/sri-nss060311.php

New solar system formation models indicate that Jupiter's foray robbed Mars of mass

Planetary scientists have long wondered why Mars is only about half the size and one-tenth the mass of Earth.

As next-door neighbors in the inner solar system, probably formed about the same time, why isn't Mars more like Earth and Venus in size and mass? A paper published in the journal Nature this week provides the first cohesive explanation and, by doing so, reveals an unexpected twist in the early lives of Jupiter and Saturn as well.

Dr. Kevin Walsh, a research scientist at Southwest Research Institute® (SwRI®), led an international team performing simulations of the early solar system, demonstrating how an infant Jupiter may have migrated to within 1.5 astronomical units (AU, the distance from the Sun to the Earth) of the Sun, stripping a lot of material from the region and essentially starving Mars of formation materials.

"If Jupiter had moved inwards from its birthplace down to 1.5 AU from the Sun, and then turned around when Saturn formed as other models suggest, eventually migrating outwards towards its current location, it would have truncated the distribution of solids in the inner solar system at about 1 AU and explained the small mass of Mars," says Walsh. "The problem was whether the inward and outward migration of Jupiter through the 2 to 4 AU region could be compatible with the existence of the asteroid belt today, in this same region. So, we started to do a huge number of simulations.

"The result was fantastic," says Walsh. "Our simulations not only showed that the migration of Jupiter was consistent with the existence of the asteroid belt, but also explained properties of the belt never understood before."

The asteroid belt is populated with two very different types of rubble, very dry bodies as well as water-rich orbs similar to comets. Walsh and collaborators showed that the passage of Jupiter depleted and then re-populated the asteroid belt region with inner-belt bodies originating between 1 and 3 AU as well as outer-belt bodies originating between and beyond the giant planets, producing the significant compositional differences existing today across the belt.

The collaborators call their simulation the "Grand Tack Scenario," from the abrupt change in the motion of Jupiter at 1.5 AU, like that of a sailboat tacking around a buoy. The migration of the gas giants is also supported by observations of many extra-solar planets found in widely varying ranges from their parent stars, implying migrations of planets elsewhere in universe.

The paper, "A Low Mass for Mars from Jupiter's Early Gas-Driven Migration," published in the June 5 issue of the journal Nature, was written by Walsh; Alessandro Morbidelli of the Université de Nice, France; Sean N. Raymond of Université de Bordeaux, France; David P. O'Brien of Planetary Science Institute in Tucson, Ariz.; and Avi M. Mandell of NASA's Goddard Space Flight Center. The research was funded by the Helmholtz Alliance, the French National Center for Scientific Research and NASA.

http://www.nytimes.com/2011/06/07/health/research/07screening.html

Screening: Saliva Test for Cytomegalovirus Proves Accurate

By RONI CARYN RABIN

A new test offers a rapid, inexpensive and highly accurate method for screening newborns for cytomegalovirus, which can cause permanent hearing loss, researchers said on Wednesday.

Though one in 150 babies are born infected with cytomegalovirus — known as CMV and part of the herpes virus family — current tests are not effective for widespread screening, the scientists said.

The new test does not require the culturing of blood samples; it employs saliva, easily obtained by swabbing the inside of a baby's mouth.

Of 17,662 newborns screened, all 85 infants identified as infected with CMV by a blood culture test also were identified by the new test, researchers reported in a paper published in The New England Journal of Medicine. Another 17,327 newborns were screened with a different saliva test. It was slightly less accurate, detecting CMV in 74 of 76 infants identified by culturing.

Infected babies must be monitored and tested frequently for hearing loss so that support services can be provided if necessary, said Dr. Suresh B. Boppana, a professor of pediatrics at University of Alabama at Birmingham and one of the paper's authors.

http://www.physorg.com/news/2011-06-australians-smart-bandage.html

Australians develop 'smart' bandage

Australian researchers have developed a "smart" bandage that changes colour as a wound worsens or improves, potentially leading to the better treatment of ailments such as leg ulcers.

Lead inventor Louise van der Werff, a materials scientist at the Commonwealth Scientific and Industrial Research Organisation, said the dressing would change from red to blue depending on the temperature of the wound.

"If the wound becomes infected then it typically gets warmer. It would get cooler if there were, for example, a compromised blood supply," she told AFP on Monday.

Van der Werff said wound changes were not always obvious and the fibre she helped devise, using liquid crystals which react to different temperatures, could show changes of less than half a degree Celsius.

"A temperature is sort of an obvious indication -- if they can see that through a colour change then hopefully it can help a lot," she said.

Van der Werff, who is completing her doctorate at Monash University in Melbourne, said plans were underway to incorporate the colour-changing fibre into a textile which could then be woven or knitted into a wound dressing. "Our main target is for chronic wound care -- the elderly, obese and people with diabetes who can get wounds like leg ulcers and pressure ulcers and things like that which can really last a long time without healing properly," she said.

http://www.sciencedaily.com/releases/2011/06/110603122849.htm

Autism May Have Had Advantages in Humans' Hunter-Gatherer Past, Researcher Believes

ScienceDaily - ***Though people with autism face many challenges because of their condition, they may have been capable hunter-gatherers in prehistoric times, according to a paper published in the journal Evolutionary Psychology in May***.

The autism spectrum may represent not disease, but an ancient way of life for a minority of ancestral humans, said Jared Reser, a brain science researcher and doctoral candidate in the USC Psychology Department.

Some of the genes that contribute to autism may have been selected and maintained because they created beneficial behaviors in a solitary environment, amounting to an autism advantage, Reser said.

The "autism advantage," a relatively new perspective, contends that sometimes autism has compensating benefits, including increased abilities for spatial intelligence, concentration and memory. Although individuals with autism have trouble with social cognition, their other cognitive abilities are sometimes largely intact.

The paper looks at how autism's strengths may have played a role in evolution. Individuals on the autism spectrum would have had the mental tools to be self-sufficient foragers in environments marked by diminished social contact, Reser said.

The penchant for obsessive, repetitive activities would have been focused by hunger and thirst towards the learning and refinement of hunting and gathering skills.

Today autistic children are fed by their parents so hunger does not guide their interests and activities. Because they can obtain food free of effort, their interests are redirected toward nonsocial activities, such as stacking blocks, flipping light switches or collecting bottle tops, Reser said.