http://www.scientificamerican.com/article.cfm?id=bacteria-outbreak-in-northern-europe

Bacteria Outbreak in Northern Europe Due to Ocean Warming

Manmade climate change is the main driver behind the unexpected emergence of a group of bacteria in northern Europe which can cause gastroenteritis, new research by a group of international experts shows.

By Nina Chestney Editing by Tim Pearce

LONDON (Reuters) - Manmade climate change is the main driver behind the unexpected emergence of a group of bacteria in northern Europe which can cause gastroenteritis, new research by a group of international experts shows. The paper, published in the journal Nature Climate Change on Sunday, provided some of the first firm evidence that the warming patterns of the Baltic Sea have coincided with the emergence of Vibrio infections in northern Europe.

Vibrios is a group of bacteria which usually grow in warm and tropical marine environments. The bacteria can cause various infections in humans, ranging from cholera to gastroenteritis-like symptoms from eating raw or undercooked shellfish or from exposure to seawater.

A team of scientists from institutions in Britain, Finland, Spain and the United States examined sea surface temperature records and satellite data, as well as statistics on Vibrio cases in the Baltic. They found the number and distribution of cases in the Baltic Sea area was strongly linked to peaks in sea surface temperatures. Each year the temperature rose one degree, the number of vibrio cases rose almost 200 percent.

"The big apparent increases that we've seen in cases during heat wave years (..) tend to indicate that climate change is indeed driving infections," Craig Baker-Austin at the UK-based Centre for Environment, Fisheries and Aquaculture Science, one of the authors of the study, told Reuters.

Ocean Warming

Climate studies show that rising greenhouse gas emissions made global average surface temperatures increase by about 0.17 degrees Celsius a decade from 1980 to 2010. The Vibrio study focused on the Baltic Sea in particular because it warmed at an unprecedented rate of 0.063 to 0.078 degrees Celsius a year from 1982 to 2010, or 6.3 to 7.8 degrees a century. "(It) represents, to our knowledge, the fastest warming marine ecosystem examined so far anywhere on Earth," the paper said.

Many marine bacteria thrive in warm, low-saline sea water. In addition to warming, climate change has caused more frequent and heavier rainfall, which has reduced the salt content of estuaries and coastal wetlands.

As ocean temperatures continue to rise and coastal regions in northern regions become less saline, Vibrio bacteria strains will appear in new areas, the scientists said.

Vibrio outbreaks have also appeared in temperate and cold regions in Chile, Peru, Israel, the northwest U.S. Pacific and northwest Spain, and these can be linked to warming patterns, the scientists said.

"Very few studies have looked at the risk of these infections at high latitudes," Baker-Austin said.

"Certainly the chances of getting a vibrio infection are considered to be relatively low, and more research is focused on areas where these diseases are endemic or at least more common," he added.

Previous Vibrio outbreaks in colder regions have often been put down to a sporadic event or special conditions rather than a response to long-term climate change. This is because the effects of global warming can be more pronounced at higher latitudes and in areas which lack detailed historical climate data, the study said.

Baker-Austin said there was a growing realization that climate and the emergence of some infectious diseases were closely linked but there are some "huge data gaps in that area which need addressing."

http://www.eurekalert.org/pub_releases/2012-07/osu-ssw072312.php

Study shows why some types of multitasking are more dangerous than others

In a new study that has implications for distracted drivers, researchers found that people are better at juggling some types of multitasking than they are at others.

COLUMBUS, Ohio - Trying to do two visual tasks at once hurt performance in both tasks significantly more than combining a visual and an audio task, the research found. Alarmingly, though, people who tried to do two visual tasks at the same time rated their performance as better than did those who combined a visual and an audio task - even though their actual performance was worse.

"Many people have this overconfidence in how well they can multitask, and our study shows that this particularly is the case when they combine two visual tasks," said Zheng Wang, lead author of the study and assistant professor of communication at Ohio State University.

"People's perception about how well they're doing doesn't match up with how they actually perform."

Eye-tracking technology used in the study showed that people's gaze moved around much more when they had two visual tasks compared to a visual and an audio task, and they spent much less time fixated on any one task.

That suggests distracted visual attention, Wang said. People in the study who had two visual tasks had to complete a pattern-matching puzzle on a computer screen while giving walking directions to another person using instant messaging (IM) software. Those who combined a visual and an audio task tried to complete the same pattern-matching task on the screen while giving voice directions using audio chat.

The two multitasking scenarios used in this study can be compared to those drivers may face, Wang said. People who try to text while they are driving are combining two mostly visual tasks, she said. People who talk on a phone while driving are combining a visual and an audio task. "They're both dangerous, but as both our behavioral performance data and eyetracking data suggest, texting is more dangerous to do while driving than talking on a phone, which is not a surprise," Wang said. "But what is surprising is that our results also suggest that people may perceive that texting is not more dangerous - they may think they can do a good job at two visual tasks at one time." The study appears in a recent issue of the journal Computers in Human Behavior.

The study involved 32 college students who sat at computer screens. All of the students completed a matching task in which they saw two grids on the screen, each with nine cells containing random letters or numbers. They had to determine, as quickly as possible, whether the two grids were a "match" or "mismatch" by clicking a button on the screen. They were told to complete as many trials as possible within two minutes.

After testing the participants on the matching task with no distractions, the researchers had the students repeat the matching task while giving walking directions to a fellow college student, "Jennifer," who they were told needed to get to an important job interview. Participants had to help "Jennifer" get to her interview within six minutes. In fact, "Jennifer" was a trained confederate experimenter. She has been trained to interact with participants in a realistic but scripted way to ensure the direction task was kept as similar as possible across all participants.

Half of the participants used instant messaging software (Google Chat)to type directions while the other half used voice chat (Google Talk with headphones and an attached microphone)to help "Jennifer" reach her destination.

Results showed that multitasking, of any kind, seriously hurt performance. Participants who gave audio directions showed a 30 percent drop in visual pattern-matching performance. But those who used instant messaging did even worse - they had a 50 percent drop in pattern-matching performance. In addition, those who gave audio directions completed more steps in the directions task than did those who used IM.

But when participants were asked to rate how well they did on their tasks, those who used IM gave themselves higher ratings than did those who used audio chat. "It may be that those using IM felt more in control because they could respond when they wanted without being hurried by a voice in their ears," Wang said.

"Also, processing several streams of information in the visual channel may give people the illusion of efficiency. They may perceive visual tasks as relatively effortless, which may explain the tendency to combine tasks like driving and texting."

Eye-tracking results from the study showed that people paid much less attention to the matching task when they were multitasking, Wang said. As expected, the results were worse for those who used IM than for those who used voice chat.

Overall, the percentage of eye fixations on the matching-task grids declined from 76 percent when that was the participants' only task to 33 percent during multitasking. Fixations on the grid task decreased by 53 percent for those using IM and a comparatively better 35 percent for those who used voice chat.

"When people are using IM, their visual attention is split much more than when they use voice chat," she said.

These results suggest we need to teach media and multitasking literacy to young people before they start driving, Wang said. "Our results suggest many people may believe they can effectively text and drive at the same time, and we need to make sure young people know that is not true."

In addition, the findings show that technology companies need to be aware of how people respond to multitasking when they are designing products. For example, these results suggest GPS voice guidance should be preferred over image guidance because people are more effective when they combine visual with aural tasks compared to two visual tasks.

"We need to design media environments that emphasize processing efficiency and activity safety. We can take advantage of the fact that we do better when we can use visual and audio components rather than two visual components," Wang said.

The work was supported by a grant from the National Science Foundation.

Co-authors of the study were Prabu David of Washington State University, Jatin Srivastava of Ohio University and Stacie Powers, Christine Brady, Jonathan D'Angelo and Jennifer Moreland, all of Ohio State.

http://www.eurekalert.org/pub_releases/2012-07/ehs-rdq072312.php

Researchers develop ginseng-fortified milk to improve cognitive function

Possible market for new functional food reported in the Journal of Dairy Science

Amsterdam, The Netherlands– American ginseng is reported to have neurocognitive effects, and research has shown benefits in aging, central nervous system disorders, and neurodegenerative diseases. The challenges of incorporating ginseng into food are twofold: it has a bitter taste, and food processing can eliminate its healthful benefits. Reporting in the August issue of the Journal of Dairy Science®, a group of scientists has formulated low-lactose functional milk that maintained beneficial levels of American ginseng after processing. An exploratory study found the product was readily accepted by a niche group of consumers.

"Our goal was to develop low-lactose milk that could be consumed by the elderly to improve cognitive function," reports lead investigator S. Fiszman, PhD, of the Instituto de Agroquimica y Tecnologia de Alimentos (IATA), Consejo Superior de Investigaciones Cientificas (CSIC), Patema (Valencia), Spain. "Consumers who were interested in the health benefits of ginseng rated our product quite highly."

Because older people frequently have trouble digesting milk products, the researchers developed a low-lactose formula. American ginseng was added, and then the milk was sterilized by ultra-high temperature processing (UHT), which prolongs shelf life. Analysis found that sufficient levels of ginseng remained in the milk after treatment to improve cognitive function as reported in the literature.

To reduce the bitter taste of American ginseng, the investigators developed samples with vanilla extract and sucralose, a zero-calorie artificial sweetener. In a preliminary study, 10 tasters with a good ability to discriminate between flavors compared low lactose UHT milk without any additives (the control) to low lactose milk with ginseng extract, vanilla aroma, and sucralose added before UHT treatment. They developed a list of 10 attributes that described the sample: color, sweet odor, milk flavor, vanilla flavor, metallic/root flavor, sweetness, bitterness, aftertaste, astringency, and viscosity. They then rated the intensity of each attribute for five samples; the control; the control with ginseng extract, vanilla aroma, and sucralose added; the control with ginseng extract added; the control with vanilla and ginseng extract; and the low lactose milk with ginseng extract; vanilla aroma; and sucralose added before UHT treatment.

In a second study, 100 participants were asked, on a scale of one to five, how willing they would be to consume a "highly digestible semi-skimmed milk," and a "highly digestible semi-skimmed milk enriched with ginseng extract that would improve cognitive function." Then, they tasted and rated, on a scale of one to nine, the overall acceptability of the control milk and the low lactose milk with ginseng extract, vanilla aroma, and sucralose added before UHT treatment.

Both the presence of ginseng and the thermal treatment affected some sensory properties of the milk. The addition of ginseng significantly increased the perceived light brown color in the flavored and unflavored samples, and was highest in the reduced-lactose milk with ingredients added before the UHT treatment. The sweet odor was more intense in flavored samples, but decreased slightly in the samples of milk with ingredients added before UHT treatment. Bitterness was clearly perceived in the samples containing ginseng additives, but was lower in flavored samples, indicating that the vanilla aroma and sucralose masked, to some extent, the bitter taste caused by ginseng extract.

Consumer responses varied greatly, depending on interest in the product. 78% indicated that they would be likely to consume the highly digestible milk, and after tasting the product, 87% of them indicated they would buy the sample. 47% indicated they were not interested in milk enriched with ginseng, and after tasting, they gave it a low acceptability rating. However, for the 32% of consumers who did express an interest in the product, 75% declared they would buy it.

"Drinking 150 to 300 mL of this ginseng-enriched milk would provide the amount indicated to be effective for improving cognitive functions. Combined with the low levels of lactose, this makes the drink an appropriate functional beverage for the elderly," says Dr. Fiszman. "Among consumers more likely to consume ginseng products, the newly developed milk was well accepted. The addition of more congruent flavors such as chocolate, citrus, or coffee, could be more effective in masking non-milk-related sensory attributes, Other alternatives could be investigated."

Commenting on the studies, Susan Duncan, PhD, professor, Department of Food Science & Technology, Virginia Tech, noted, "With the combination of intrinsic health benefits in milk and these additional ingredients, milk becomes an easy way to deliver valuable functional ingredients and the functional benefits of milk components. Diversifying the product line for milk and dairy products has a number of benefits, including market and consumer visibility and perception."

http://www.eurekalert.org/pub_releases/2012-07/bc-tsm072312.php

Trial signals major milestone in hunt for new TB drugs

Lancet paper finds novel drug regimen could be more effective than existing treatments; TB Alliance's trial to test drugs in combination saves years in research time

WASHINGTON, DC/LONDON – A novel approach to discover the first new tuberculosis (TB) combination drug regimen cleared a major hurdle when Phase II clinical trial results found it could kill more than 99 percent of patients' TB bacteria within two weeks and could be more effective than existing treatments, according to a study published today in the Lancet. These results add to a growing body of evidence that the new regimen could reduce treatment by more than a year for some patients.

The findings from researchers and the non-profit TB Alliance raise hope for a treatment breakthrough amid the growing and dangerous epidemic of drug-resistant forms of TB that, in some cases, are becoming untreatable. The results, presented today at the 2012 International AIDS Conference, also reveal progress in the pursuit of an antiretroviral-compatible TB treatment, which is critical to treating the millions of people with TB/HIV co-infection. Today, TB remains the largest killer of people with AIDS, but very often, TB and HIV treatments cannot be given together because of drug-drug interactions and side effects.

The clinical trial tested a combination of one completely novel drug candidate, a new TB drug candidate already approved to treat other infectious diseases, and one existing TB drug. These results, along with pre-clinical data, suggest that this novel combination could treat both drug-susceptible and some forms of drug-resistant TB in only four months. Currently, people with multi-drug resistant TB (MDR-TB) require 18 to 24 months of treatment. Even those with ordinary TB need six months of taking drugs every day.

"These findings confirm the promise of novel TB regimens to be shorter, simpler, safer, and, compared with today's MDR-TB drugs, much less expensive," said Mel Spigelman, MD, CEO and President of TB Alliance. "The next trial to advance this regimen is already underway. We now have real momentum toward bringing to market treatments that will ultimately help save millions of lives."

TB Alliance's push to test new drugs in combination has been done to produce a regimen that not only would be faster and easier for patients, but also would tackle two other challenges as a major step in stopping the spread of drug-resistant TB—the complexity and high cost of treatment. This promising regimen eliminates the use of injectables and projects to reduce the cost of MDR-TB therapy by as much as 90 percent.

TB is one of the world's most ancient and deadly infectious diseases, dating back thousands of years and found in remains of Egyptian mummies. When HIV/AIDS exploded in the 1980s and 1990s, especially in sub-Saharan Africa, that epidemic triggered a historic jump in the number of TB deaths. An estimated 1.4 million people die from TB, and roughly 9 million people develop the disease, each year. One-third of all people on earth—nearly 2.5 billion people—have a latent form of TB.

The study, NC-001, or New Combination 1, was a two-week trial successfully completed at two centers in South Africa. It involved the new combination therapy called PaMZ, consisting of the novel TB drug candidate, PA-824; moxifloxacin, an established antibiotic not yet approved for use in first-line TB therapy and being developed in partnership with Bayer Healthcare AG; and pyrazinamide, an existing TB drug. NC-001 was funded by the Bill & Melinda Gates Foundation, the United States Agency for International Development, UK aid, and Irish Aid.

"Treating drug-sensitive and drug-resistant TB with the same regimen can simplify the delivery of TB treatment worldwide," said Andreas Diacon, MD, the trial's principal investigator and lead author of the Lancet study. "The results of this study give healthcare providers on the front lines of the TB epidemic hope for better, faster tools needed to stop this disease."

A second trial called New Combination 2 (NC-002) was launched earlier this year to test the PaMZ combination over two months in patients, further advancing it through clinical development. NC-002 is currently enrolling patients and will be conducted at eight sites in South Africa, Tanzania and Brazil, and will build global capacity for TB trials.

In addition to these results, pharmaceutical companies are seeking regulatory approval for individual TB drug candidates—advances made possible by the existence of the most promising research pipeline for TB drugs in history. TB experts say any new drugs for tuberculosis would be an extraordinary development, but that new TB drug combinations are potential game-changers due to their expected impact.

The NC-001 trial also validated the approach to development of novel regimens. Mario Raviglione, MD, Director of the Stop TB Department at the World Health Organization, said testing multiple new TB drug candidates simultaneously has already proven to be a major advance.

"Because of testing drugs in combination, we have already saved several years in the research process to find new, effective regimens to treat TB," Raviglione said. "The results look strongly promising from this early trial. If further testing holds up these results and the regimen is affordable in poor countries, it is huge progress. We could shorten drug regimens substantially for everyone, regardless of whether the form of TB is sensitive or multi-drug resistant. That would be a dramatic step forward."

http://www.eurekalert.org/pub_releases/2012-07/aga-apa072312.php

Aspirin protects against Barrett's esophagus

Aspirin use appears to reduce the risk of Barrett's esophagus, the largest known risk factor for esophageal cancer

Aspirin use appears to reduce the risk of Barrett's esophagus (BE), the largest known risk factor for esophageal cancer, according to a new study in Clinical Gastroenterology and Hepatology, the official clinical practice journal of the American Gastroenterological Association.

"The protective effect of aspirin use appears robust because the analyses suggests a dose-response relationship in which high-dose aspirin was significantly associated with decreased Barrett's esophagus risk," said Chin Hur, MD, MPH, of the Massachusetts General Hospital Institute for Technology Assessment and lead author of this study. "It would not be advisable at this time for patients to start taking aspirin, particularly at higher doses, if preventing Barrett's esophagus is the only goal. However, if additional data confirms our findings and an individual at high risk for development of Barrett's esophagus and esophageal cancer also could derive additional benefits, most notably cardiovascular, aspirin could be a consideration."

Dr. Hur and his team of researchers analyzed characteristics of 434 BE patients for factors that might be used in screening and management. In addition to finding that those taking aspirin were 44 percent less likely to have BE, they also found that men were more than three times more likely to develop BE than women.

The incidence of esophageal cancer has been increasing at an alarming rate during the past few decades; current attempts at targeted screening for this type of cancer focus on identifying BE. Nonsteroidal anti-inflammatory drugs (NSAIDs), particularly aspirin, have been associated with reduced esophageal cancer incidence.

Although there have been many studies analyzing NSAID and aspirin chemoprevention for esophageal cancer or BE progression to this cancer, few have explored NSAIDs for BE prevention.

Read AGA's medical position statement on the management of BE.

http://nyti.ms/SZIAz6

Really? In a Heat Wave, an Electric Fan Can Cool You Off

THE FACTS The heat waves that have scorched parts of the country this summer may become all too familiar — climate scientists say they are likely to occur with increasing frequency.

By ANAHAD O'CONNOR

When air-conditioning is not an option for relief, an electric fan may seem like the best alternative. But some experts have questioned whether electric fans might actually hamper efforts to cool down.

In a new study, a team of researchers based primarily in Britain sought to review evidence on the effectiveness of electric fans during heat waves that have occurred all over the world.

Despite what many people think, most fans do not directly cool the ambient air. When placed in an open window, they pull in cooler air from outside. But there is a point at which their effectiveness may diminish.

The authors of the new report pointed out that when temperatures climb past 95 degrees, having a fan pointed at you can actually contribute to heat gain, not reduce it. At those temperatures, being directly in the path of hot air blown from a fan can raise the risk of dehydration and heat exhaustion.

The researchers said that while they could not support or recommend against the use of electric fans in sweltering conditions, it was important to consider their potential harms and benefits.

That is especially the case for vulnerable populations like the elderly, “who are less able to cool down through sweating or increasing the flow of blood to their skin,” the authors wrote.

THE BOTTOM LINE Above a certain temperature, using an electric fan may not cool you off.

http://bit.ly/Msodae

New Biomarkers Honed to Help Search for Life on Earthlike Exoplanets

Despite the cancellation of the Terrestrial Planet Finder telescope, astrobiologists are modeling possible chemical biomarkers that could be used to detect indicators of life on newfound worlds

By Ron Cowen | Monday, July 23, 2012

Expectations are running high that some time next year astronomers using NASA's Kepler spacecraft will announce the discovery that planet hunters have been waiting for: the first Earth-size exoplanet found in a region around a sunlike star where life could flourish. That exoplanet will almost certainly lie too far from

Earth to be scrutinized, but it will nonetheless throw into high gear a search for the fingerprints of life—the chemical compounds that could indicate whether an exoplanet in the habitable zone, the life-friendly region where liquid water can survive, actually harbors life.

But even as researchers are gaining a deeper understanding of the bio-signatures that may be present in exoplanetary atmospheres, scientists face a roadblock. A proposed NASA mission called the Terrestrial Planet Finder (TPF), designed to search for these compounds among planets orbiting nearby stars—those that lie about one hundredth the distance of the orbs Kepler can find—lost its funding in 2007 amid rising costs for the James Webb Space Telescope, Hubble's successor.

The TPF would block the blinding glare from nearby, sunlike stars in order to take portraits of the planets that orbit them. In one scheme, a single large telescope outfitted with a mask, or coronagraph, would blot out starlight and image planets as they appear in reflected visible light. In another strategy, several telescopes flying in information would act in concert to zero out infrared light from a parent star and record the heat radiated by the star's planets at infrared wavelengths.

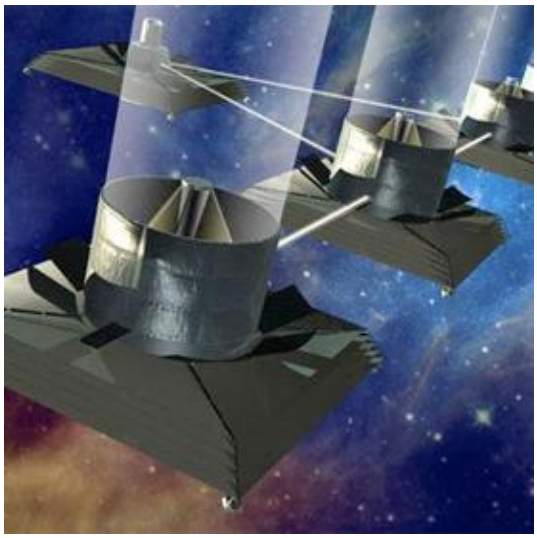


Image: NASA Science Missions

Light collected by the TPF and separated into its component wavelengths, or spectra, could reveal the presence of bio-signatures. Water vapor, oxygen and methane in the atmosphere of an exoplanet would offer evidence of a life-friendly environment as well as biological processes akin to photosynthesis and respiration on Earth, notes Geoff Marcy of the University of California, Berkeley. "The galaxy may be lousy with microbial life, but currently we have no clue," he adds. "It is a tragedy of modern science that the Terrestrial Planet Finder cannot be supported, either in the U.S. or Europe, due to budget pressures."

Bio-markup

Astronomers still hope to revive some version of TPF, but it would take a decade for the mission to get back on track, Marcy estimates. In the meantime studies by exoplanet researchers including Sara Seager of the Massachusetts Institute of Technology and Victoria Meadows of the University of Washington in Seattle are honing—and expanding—the list of compounds that may serve as biomarkers for exoplanets orbiting stars of different sizes and ages. With the chances of looking for chemical markers of life beyond the solar system initially few and far between, "we want to make sure we have the best possible understanding of bio-signatures," Meadows says. "We don't want to be fooled."

Much of the new work focuses on planets orbiting M dwarf stars, which are about one-half to one-tenth the sun's mass and account for about 75 percent of all the stars in the galaxy. Because M dwarfs are much cooler than the sun, their habitable zones are only about one tenth as far from them as Earth lies from the sun.

That proximity makes it impossible for the TPF to image those planets. However, the James Webb Space Telescope, now scheduled for launch in 2018, has a chance of examining the atmospheres of a handful of these bodies. So might a new generation of extremely large ground-based telescopes, with mirrors of 30 meters or more, that have recently been proposed.

Some of the exoplanets these telescopes will attempt to study have a rare alignment. Like the more distant exoplanets identified by Kepler, they regularly pass in front of, or transit, their parent stars as seen by the detectors. During a transit, starlight filters through an exoplanet's atmosphere, with each chemical constituent leaving its own imprint on the light. The signal is extremely faint but planets in the habitable zone of M stars make frequent transits, enabling astronomers to accumulate individual observations to make a stronger detection. "The habitable zone of M stars are the first places that we can look for bio-signatures," Seager says.

Simulations of Earthlike planets by Meadows and her colleagues over the past several years have revealed that M dwarfs may better preserve some of the fragile biomarkers that are easily destroyed by the radiation of more massive stars. Consider the simultaneous presence of high abundances of methane and ozone, which researchers first proposed in 1965 as a strong indicator of life. Only biological activity is capable of continually maintaining high levels of the two compounds, which readily react with each other and deplete the original supply.

M dwarfs produce much less near-ultraviolet radiation—which breaks ozone molecules into atomic oxygen and OH and hastens the destruction of methane—than sunlike stars do. As a result, methane would last about 20

times longer (about 200 years) and would have a predicted concentration 200 times greater on an Earthlike planet in the habitable zone around an M dwarf than the same planet in the habitable zone around the sun, Meadows and her collaborators calculate. Similarly, two other earthly bio-signatures - methyl chloride and nitrous oxide - may be more prevalent and easier to detect on terrestrial planets circling M dwarfs, Meadows says.

M stars, K dwarfs and beyond

No survey has yet identified an Earth-size planet in the habitable zone around an M star, and a space mission is needed to conduct a thorough search, says Lisa Kaltenegger of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass., and the Max Planck Institute for Astronomy in Heidelberg, Germany. One proposed mission, the Transiting Exoplanet Survey Satellite, would scan the entire sky for Earth-size and larger exoplanets around M stars as well as slightly more massive stars called K dwarfs. Last year the project, led by George Ricker of M.I.T., received a $1-million grant from NASA for further study.

Thinking beyond M stars—Seager and Meadows have also expanded the list of possible bio-signatures. In the January *Astrobiology*, Seager, Matthew Schrenk of East Carolina University in Greenville, N.C., and William Bains of Cambridge, England–based consultant firm Rufus Scientific note that most studies that examine possible bio-signature gases limit their scope to ozone or oxygen, methane and nitrous oxide. These compounds are not only the main signs of life on Earth but are the direct product of chemical reactions that generate the energy and structural components of life on the planet. Microorganisms on Earth, however, produce a much broader range of gases that Seager and her colleagues label secondary by-products and which are generated for unknown reasons and may be specific to particular species. One terrestrial example is dimethyl sulfide, produced by marine phytoplankton.

Although these secondary by-products only occur in small concentrations on Earth, they could be a dominant bio-signature on other types of habitable exoplanets. The ideas are still preliminary, but Seager and her collaborators suggest that high concentrations of unusual or complex molecules in the atmosphere of an exoplanet could be a new type of bio-signature.

In the June 2011 *Astrobiology*, Meadows and her collaborators also broaden the scope of possible bio-signatures. Motivated by evidence that single-cell bacteria thrived on the early Earth well before oxygen dominated the planet's atmosphere, the team simulated the search for signs of life on oxygen-poor exoplanets. Their work revealed that sulfur gases were produced by organisms in such environments, but that these gases did not build up in the atmospheres of exoplanets. Instead, the sulfur compounds were destroyed in a series of reactions that ultimately produced ethane. High ethane concentrations therefore should be added to the roster of compounds that indicate biological activity, Meadows says. In fact, it could be the dominant signature of life on exoplanets that lack oxygen.

Overall, Seager says, "I'm excited, because I feel like we're really on the verge of understanding the biosignatures on exoplanets. "We're gathering all the tools we need to make predictions and guide design of the instruments that will actually do the job of finding signs of life."

http://www.eurekalert.org/pub_releases/2012-07/tuhs-hac072412.php

How a common fungus knows when to attack

The opportunistic fungal pathogen Candida albicans inconspicuously lives in our bodies until it senses that we are weak, when it quickly adapts to go on the offensive.

BOSTON - The fungus, known for causing yeast and other minor infections, also causes a sometimes-fatal infection known as candidemia in immunocompromised patients. An in vivo study, published in mBio, demonstrates how C. albicans can distinguish between a healthy and an unhealthy host and alter its physiology to attack.

"The ability of the fungus to sense the immune status of its host may be key to its ability to colonize harmlessly in some people but become a deadly pathogen in others," said Jessica V. Pierce, BA, PhD student in the molecular microbiology program at the Sackler School of Graduate Biomedical Sciences at Tufts.

"Effective detection and treatment of disease in immunocompromised patients could potentially work by targeting the levels of a protein, Efg1p, that we found influenced the growth of Candida albicans inside the host," she continued.

The researchers knew from previous research that Efg1p influences the expression of genes that regulate how harmful a fungal cell can become. Surprisingly, the investigators found that lower Efg1p levels allow the fungal cells to grow to high levels inside a host. Higher levels of the protein result in less growth.

To examine how the immune status could affect the growth of C. albicans within a host, the researchers fed both healthy and immunocompromised mice equal amounts of two fungal strains containing two different levels of the Efg1p protein.
Fecal pellets from the mice were tested to determine which strain of fungi thrived. In a healthy host, the fungal cells with higher levels of the protein predominated.
In immunocompromised mice, the fungal cells with lower levels of the protein flourished. The researchers noted that lack of interactions with immune cells in the intestinal tract most likely caused the necessary environmental conditions favoring fungal cells that express lower levels of the protein, resulting in fungal overgrowth and setting the stage for systemic infection.
"By having a mixed population with some high Efg1p cells and some low Efg1p cells, the fungus can adjust its physiology to remain benign or become harmful when it colonizes hosts with varying immune statuses. These findings are important because they provide the first steps toward developing more effective methods for detecting and treating serious and stubborn infections caused by Candida albicans, such as candidemia," said Carol A. Kumamoto, PhD, professor of molecular biology and microbiology at Tufts University School of Medicine and member of the molecular microbiology and genetics program faculties at the Sackler School of Graduate Biomedical Sciences.
The immune system and "good bacteria" within the body act to regulate the size of C. albicans fungal populations in healthy individuals. When the immune system is compromised, the fungus can spread throughout the body. Candidemia, i.e. blood-borne Candida, is the fourth most common blood infection among hospitalized patients in the United States and is found in immunocompromised patients such as babies, those with catheters, and the critically ill.
mBio is an online-only, open access journal published in association with the American Society for Microbiology.
This research was supported in part by grants #AI076156, #AI08179, and #AI07422 from the National Institute of Allergy and Infectious Diseases, part of the National Institutes of Health.
Pierce JV, Kumamoto CA. mBio. "Variation in Candida albicans EFG1 Expression Enables Host-Dependent Changes in Colonizing Fungal Populations." July 24, 2012. DOI:10.1128/mBio.00117-12.

http://www.eurekalert.org/pub_releases/2012-07/bmj-srs072312.php

Study reveals substantial misdiagnosis of malaria in parts of Asia

The public health implications are significant, warn researchers

Research: *Overdiagnosis and mistreatment of malaria among febrile patients at primary healthcare level in Afghanistan: observational study*
Substantial overdiagnosis and mistreatment of malaria is evident in south and central Asia, warns a study published on bmj.com today. With more than two billion people at risk of malaria in this part of Asia – larger than that of Africa - this is a major public health problem which needs to be confronted, say the authors.
Malaria remains one of the most important infectious diseases of poverty. Recent global malaria treatment guidelines recommend that patients are treated with anti-malaria drugs only when a diagnostic test positively identifies malaria parasites in the patient's blood.
In Africa, however, many patients are treated for malaria even when the parasite test is negative, resulting in other severe infections being missed and drugs being wasted. Yet the extent of this problem in south and central Asia is relatively unknown. So, a team of researchers set out to assess the accuracy of malaria diagnosis and treatment for over 2,300 patients with suspected malaria at 22 clinics in northern and eastern Afganistan.
Some clinics used microscopic diagnosis, while others relied on clinical signs and symptoms to diagnose malaria. Blood sample slides were collected for every patient as a reference slide which was read by two independent experts who recorded whether the slide was positive or negative for malaria. This reference result was compared to the result of the diagnosis at the clinic and the treatment given to each patient.
In clinics using clinical diagnosis where malaria is rare, 99% of patients with negative slides received a malaria drug and just over one in 10 (11%) received an antibiotic.
This compares with clinics using newly introduced microscopy, where 37% of negative patients received a malaria drug and 60% received an antibiotic. In clinics with established microscopy, 51% of negative patients received a malaria drug and 27% received an antibiotic.
Almost all cases were due to vivax malaria, a relatively less serious form of malaria. However, only one in six cases of the rarer but potentially fatal falciparum malaria were detected and appropriately treated.
Compared with clinical diagnosis, microscopy improves the targeting of malaria drugs, but only by half, and it increases the prescription of antibiotics, say the authors. They argue that misdiagnosis and treatment is caused in equal part by inaccurate microscopy and by the clinicians' tendency to treat with malaria drugs even when a

test result is negative, resulting in a 40-50% loss of accuracy in treatment. The results are comparable to findings from Africa, confirming that inaccurate diagnosis and treatment of malaria is a worldwide problem. However, they stress that, efforts to improve diagnostic coverage and accuracy "will be undermined without concurrent interventions to change understanding, behaviour, and practice among clinicians."

http://www.eurekalert.org/pub_releases/2012-07/uoc--yrs072412.php

Yoga reduces stress; now it's known why

UCLA study helps caregivers of people with dementia

Six months ago, researchers at UCLA published a study that showed using a specific type of yoga to engage in a brief, simple daily meditation reduced the stress levels of people who care for those stricken by Alzheimer's and dementia. Now they know why.

As previously reported, practicing a certain form of chanting yogic meditation for just 12 minutes daily for eight weeks led to a reduction in the biological mechanisms responsible for an increase in the immune system's inflammation response. Inflammation, if constantly activated, can contribute to a multitude of chronic health problems.

Reporting in the current online edition of the journal Psychoneuroendocrinology, Dr. Helen Lavretsky, senior author and a professor of psychiatry at the UCLA Semel Institute for Neuroscience and Human Behavior, and colleagues found in their work with 45 family dementia caregivers that 68 of their genes responded differently after Kirtan Kriya Meditation (KKM), resulting in reduced inflammation.

Caregivers are the unsung heroes for their yeoman's work in taking care of loved ones that have been stricken with Alzheimer's and other forms of dementia, said Lavretsky, who also directs UCLA's Late-Life Depression, Stress and Wellness Research Program. But caring for a frail or demented family member can be a significant life stressor. Older adult caregivers report higher levels of stress and depression and lower levels of satisfaction, vigor and life in general. Moreover, caregivers show higher levels of the biological markers of inflammation. Family members in particular are often considered to be at risk of stress-related disease and general health decline.

As the U.S. population continues to age over the next two decades, Lavretsky noted, the prevalence of dementia and the number of family caregivers who provide support to these loved ones will increase dramatically. Currently, at least five million Americans provide care for someone with dementia.

"We know that chronic stress places caregivers at a higher risk for developing depression," she said "On average, the incidence and prevalence of clinical depression in family dementia caregivers approaches 50 percent. Caregivers are also twice as likely to report high levels of emotional distress." What's more, many caregivers tend to be older themselves, leading to what Lavretsky calls an "impaired resilience" to stress and an increased rate of cardiovascular disease and mortality.

Research has suggested for some time that psychosocial interventions like meditation reduce the adverse effects of caregiver stress on physical and mental health. However, the pathways by which such psychosocial interventions impact biological processes are poorly understood.

In the study, the participants were randomized into two groups. The meditation group was taught the 12-minute yogic practice that included Kirtan Kriya, which was performed every day at the same time for eight weeks. The other group was asked to relax in a quiet place with their eyes closed while listening to instrumental music on a relaxation CD, also for 12 minutes daily for eight weeks. Blood samples were taken at the beginning of the study and again at the end of the eight weeks.

"The goal of the study was to determine if meditation might alter the activity of inflammatory and antiviral proteins that shape immune cell gene expression," said Lavretsky. "Our analysis showed a reduced activity of those proteins linked directly to increased inflammation.

"This is encouraging news. Caregivers often don't have the time, energy, or contacts that could bring them a little relief from the stress of taking care of a loved one with dementia, so practicing a brief form of yogic meditation, which is easy to learn, is a useful too."

Lavretsky is a member of UCLA's recently launched Alzheimer's and Dementia Care Program, which provides comprehensive, coordinated care as well as resources and support to patients and their caregivers. Lavretsky has incorporated yoga practice into the caregiver program.

Funding for the study was provided by the Alzheimer's Research and Prevention Foundation in Tucson, Ariz. Other authors of the study included David S. Black, Steve Cole, Michael R. Irwin, Elizabeth Breen, Natalie M. St. Cyr, Nora Nazarian, all of UCLA, and Dharma S. Khalsa, medical director for the Alzheimer's Research and Prevention Foundation in Tucson. The authors report no conflict of interest.

http://www.eurekalert.org/pub_releases/2012-07/s-cbo072412.php

Carnivores: Beware of ticks

Recent research uncovers tick bite as the cause for a delayed allergic reaction to red meat

If you are a steak lover, enjoy your meat while you can. An article by Susan Wolver, MD, and Diane Sun, MD, from Virginia Commonwealth University in the US, and colleagues, explains why if you have been bitten by a tick, you may develop an allergy to red meat. Their article1 elucidates this connection and discusses the journey of the discovery. Their work appears online in the Journal of General Internal Medicine[2], published by Springer.

Delayed anaphylaxis - a severe, life-threatening allergic reaction - to meat is a new syndrome identified initially in the southeastern United States. Patients may wake up in the middle of the night, with hives or anaphylaxis usually three to six hours after having eaten red meat for dinner. Until recently, the link between red meat ingestion and anaphylaxis had remained elusive.

Wolver, Sun and colleagues' analysis of three patient case studies sheds light on this reaction. It is thought to be caused by antibodies to a carbohydrate (alpha-gal) that are produced in a patient's blood in response to a tick bite, specifically the Lone Star tick. This carbohydrate substance is also present in meat. When an individual who has been bitten by a tick eats the meat, his or her immune system activates the release of histamine* in response to the presence of alpha-gal, which can cause hives and anaphylaxis.

Significantly, meat-induced anaphylaxis is the first food-induced severe allergic reaction due to a carbohydrate rather than a protein. It is also the first time anaphylaxis has been noted to be delayed rather than occurring immediately after exposure.

The authors conclude: "Where ticks are endemic, for example in the southeastern United States, clinicians should be aware of this new syndrome when presented with a case of anaphylaxis. Current guidance is to counsel patients to avoid all mammalian meat - beef, pork, lamb and venison."

a compound found in mammalian tissues that causes dilatation of capillaries, contraction of smooth muscle, and stimulation of gastric acid secretion, that is released during allergic reactions.

1. Wolver SE et al (2012). A peculiar case of anaphylaxis: no more steak? The journey to discovery of a newly recognized allergy to galactose--1,3-galactose found in mammalian meat. Journal of General Internal Medicine; DOI 10.1007/s11606-012-2144-z

http://www.eurekalert.org/pub_releases/2012-07/tuhs-nrd072312.php

New research determines how a single brain trauma may lead to Alzheimer's disease

A study in mice found that a single event of a moderate-to-severe traumatic brain injury can disrupt proteins that regulate an enzyme associated with Alzheimer's.

BOSTON - A study, performed in mice and utilizing post-mortem samples of brains from patients with Alzheimer's disease, found that a single event of a moderate-to-severe traumatic brain injury (TBI) can disrupt proteins that regulate an enzyme associated with Alzheimer's. The paper, published in The Journal of Neuroscience, identifies the complex mechanisms that result in a rapid and robust post-injury elevation of the enzyme, BACE1, in the brain. These results may lead to the development of a drug treatment that targets this mechanism to slow the progression of Alzheimer's disease.

"A moderate-to-severe TBI, or head trauma, is one of the strongest environmental risk factors for Alzheimer's disease. A serious TBI can lead to a dysfunction in the regulation of the enzyme BACE1. Elevations of this enzyme cause elevated levels of amyloid-beta, the key component of brain plaques associated with senility and Alzheimer's disease," said first author Kendall Walker, PhD, postdoctoral associate in the department of neuroscience at Tufts University School of Medicine (TUSM).

Building on her previous work, neuroscientist Giuseppina Tesco, MD, PhD, of Tufts University School of Medicine (TUSM), led a research team that first used an in vivo model to determine how a single episode of TBI could alter the brain. In the acute phase (first two days) following injury, levels of two intracellular trafficking proteins (GGA1 and GGA3) were reduced, and an elevation of BACE1 enzyme level was observed. Next, in an analysis of post-mortem brain samples from patients with Alzheimer's disease, the researchers found that GGA1 and GGA3 levels were reduced while BACE1 levels were elevated in the brains of Alzheimer's disease patients compared to the brains of people without Alzheimer's disease, suggesting a possible inverse association.

In an additional experiment using a mouse strain genetically modified to express the reduced level of GGA3 that was observed in the brains of Alzheimer's disease patients, the team found that one week following traumatic brain injury, BACE1 and amyloid-beta levels remained elevated even when GGA1 levels had returned to normal. The research suggests that reduced levels of GGA3 were solely responsible for the increase

in BACE1 levels and therefore the sustained amyloid-beta production observed in the sub-acute phase, or seven days, after injury.
"When the proteins are at normal levels, they work as a clean-up crew for the brain by regulating the removal of BACE1 enzymes and facilitating their transport to lysosomes within brain cells, an area of the cell that breaks down and removes excess cellular material. BACE1 enzyme levels may be stabilized when levels of the two proteins are low, likely caused by an interruption in the natural disposal process of the enzyme," said Tesco, assistant professor of neuroscience at Tufts School of Medicine and member of the neuroscience program faculty at the Sackler School of Graduate Biomedical Sciences at Tufts.
"We found that GGA1 and GGA3 act synergistically to regulate BACE1 post-injury. The identification of this interaction may provide a drug target to therapeutically regulate the BACE1 enzyme and reduce the deposition of amyloid-beta in Alzheimer's patients," she continued. "Our next steps are to confirm these findings in post-mortem brain samples from patients with moderate-to-severe traumatic brain injuries."
Moderate-to-severe TBIs are caused most often by traumas, such as severe falls or motor vehicle accidents, that result in a loss of consciousness. Not all traumas to the head result in a TBI. According to the Centers for Disease Control and Prevention, each year 1.7 million people sustain a TBI. Concussions, the mildest form of a TBI, account for about 75% of all TBIs. Studies have linked repeated head trauma to brain disease and some previous studies have linked single events of brain trauma to brain disease, such as Alzheimer's. Alzheimer's disease currently affects as many as 5.1 million Americans and is the most common cause of dementia in adults age 65 and over.
Additional authors on the study are Eugene Kang, MPH, research assistant in the department of neuroscience at TUSM; Michael Whalen, MD, PhD, Neuroscience Center and department of pediatrics at Massachusetts General Hospital and associate professor at Harvard Medical School; and Yong Shen, MD, PhD, of the Center for Advanced Therapeutic Strategies for Brain Disorders at Roskamp Institute.
This study was supported by grants from the National Institute on Aging (#AG033016 and #AG025952), part of the National Institutes of Health; and a grant from the Cure Alzheimer's Fund.
Walker KR, Kang EL, Whalen MJ, Shen Y, Tesco G. The Journal of Neuroscience. "Depletion of GGA1 and GGA3 mediates post-injury elevation of BACE1." Published online July 25, 2012, DOI: 0.1523/JNEUROSCI.5491-11.2012

http://www.eurekalert.org/pub_releases/2012-07/nu-ndc072312.php

New drug could treat Alzheimer's, multiple sclerosis and brain injury

1-size-fits-all drug targets harmful brain inflammation in many diseases

CHICAGO - A new class of drug developed at Northwestern University Feinberg School of Medicine shows early promise of being a one-size-fits-all therapy for Alzheimer's disease, Parkinson's disease, multiple sclerosis and traumatic brain injury by reducing inflammation in the brain.
Northwestern has recently been issued patents to cover this new drug class and has licensed the commercial development to a biotech company that has recently completed the first human Phase 1 clinical trial for the drug.
The drugs in this class target a particular type of brain inflammation, which is a common denominator in these neurological diseases and in traumatic brain injury and stroke. This brain inflammation, also called neuroinflammation, is increasingly believed to play a major role in the progressive damage characteristic of these chronic diseases and brain injuries.
By addressing brain inflammation, the new class of drugs -- represented by MW151 and MW189 - offers an entirely different therapeutic approach to Alzheimer's than current ones being tested to prevent the development of beta amyloid plaques in the brain. The plaques are an indicator of the disease but not a proven cause.
A new preclinical study published today in the Journal of Neuroscience, reports that when one of the new Northwestern drugs is given to a mouse genetically engineered to develop Alzheimer's, it prevents the development of the full-blown disease. The study, from Northwestern's Feinberg School and the University of Kentucky, identifies the optimal therapeutic time window for administering the drug, which is taken orally and easily crosses the blood-brain barrier.
"This could become part of a collection of drugs you could use to prevent the development of Alzheimer's," said D. Martin Watterson, a professor of molecular pharmacology and biological chemistry at the Feinberg School, whose lab developed the drug. He is a coauthor of the study.
In previous animal studies, the same drug reduced the neurological damage caused by closed-head traumatic brain injury and inhibited the development of a multiple sclerosis-like disease. In these diseases as well as in Alzheimer's, the studies show the therapy time window is critical. MW151 and MW189 work by preventing the damaging overproduction of brain proteins called proinflammatory cytokines. Scientists now believe overproduction of these proteins contributes to the development of many degenerative neurological diseases as well as to the neurological damage caused by traumatic brain injury and stroke.

When too many of the cytokines are produced, the synapses of the brain begin to misfire. Eventually the entire organization of the brain falls into disarray, like a computer failing. The neurons lose their connections with each other and can eventually die. The resulting damage in the cortex and hippocampus can compromise memory and decision-making. "In Alzheimer's disease, many people now view the progression from mild cognitive impairment to full-blown Alzheimer's as an indication of malfunctioning synapses, the pathways that allow neurons to talk to each other," said Watterson, the John G. Searle Professor of Molecular Biology and Biochemistry. "And high levels of proinflammatory cytokines can contribute to synaptic malfunction."

Because this harmful inflammatory mechanism also appears to be a major player in other neurodegenerative disorders in addition to Alzheimer's, the class of drugs represented by MW151 might hold bright potential as co-therapies for Parkinson's disease, frontotemporal dementia, amyotrophic lateral sclerosis, M.S. and the longer term complications of brain injury, Watterson said. "We need more studies of therapeutic time windows in models of these other diseases so we can better plan future clinical trials," Watterson noted.

In the new study by Northwestern's Watterson and Linda Van Eldik, director of the University of Kentucky Sanders-Brown Center on Aging, a mouse model of Alzheimer's received MW151 three times a week starting at six months of age, right at the time the proinflammatory cytokines began to rise. This would be the comparable stage when a human patient would begin to experience mild cognitive impairment.

When the mice brains were later evaluated at 11 months (at a time when disease pathology is usually present), cytokine levels in the mice receiving the drug were restored to normal levels and their synapses were functioning normally. The inflammatory cytokine levels of the mice not receiving the drug, however, were still at abnormally high levels, and the mice had misfiring synapses. "The drug protected against the damage associated with learning and memory impairment," Van Eldik noted. "Giving this drug before Alzheimer's memory changes are at a late stage may be a promising future approach to therapy."

Drug Inhibits Multiple Sclerosis Development

In M.S., overproduction of the proinflammatory cytokines damage the central nervous system and the brain. The proteins directly or indirectly destroy the insulation or coverings of the nerve cells that transmit signals down the spinal cord. When the insulation is stripped, messages aren't properly conducted down the spinal cord. When mice that were induced to develop an M.S.-like disease received MW151 orally, they did not develop disease as severe.

"We inhibited the development of the disease," said William Karpus, the Marie A. Fleming Research Professor of Pathology at the Feinberg School. "Now we need to learn if the drug can prevent relapses of M.S." That study is ongoing in mice and the results will determine whether a patient trial will be planned.

The only current oral drug treatment for M.S. acts at the level of the lymph nodes, Karpus said. Because the brain is the site of the inflammation and damage, a drug that works in the brain is an ideal therapy.

Drug Protects Brain After Traumatic Brain Injury

After a traumatic brain injury, the glia cells in the brain become hyperactive and release a continuous cascade of proinflammatory cytokines that -- in the long term -- can result in cognitive impairment and epilepsy. As a result of this hyperactivity, researchers believe the brain is more susceptible to serious damage following a second neurological injury.

In a study with mice, Mark Wainright, M.D., professor of pediatric neurology at Northwestern's Feinberg School and a physician at the Ann & Robert H. Lurie Children's Hospital of Chicago, showed that when MW151 is given during an early therapeutic window three to six hours after the injury, it blocks glial activation and prevents the flood of proinflammatory cytokines after a traumatic brain injury. "If you took a drug like this early on after traumatic brain injury or a even a stroke, you could possibly prevent the long-term complications of that injury including the risk of seizures, cognitive impairment and, perhaps, mental health issues," Wainwright said.

Stroke also causes inflammation in the brain that may also be linked to long-term complications including epilepsy and cognitive deficits. As in traumatic brain injury, this inflammatory response is part of the recovery mechanisms used by the brain, so the use of brief and focused treatments like MW151 could prevent the harmful effects of inflammation while allowing the protective effects to occur unimpeded.

In another study, Wainwright showed MW151, when given after a traumatic brain injury, prevented the increased risk of epileptic seizures.

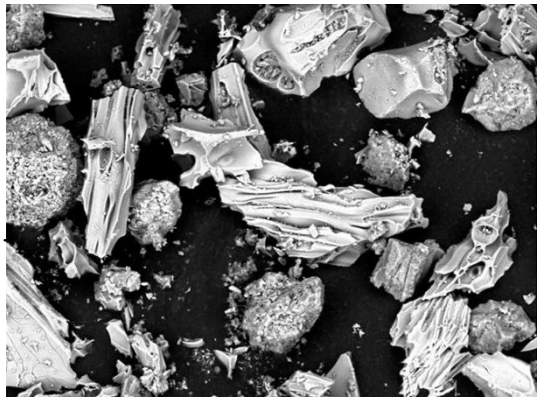
The study was supported by funds from the American Health Assistance Foundation, an Alzheimer's Association Zenith award, a gift from the Kleberg Foundation and grants P01 AG005119 and R01 AG027297 from the National Institute on Aging of the National Institutes of Health and R01 NS056051 from the National Institute of Neurological Disorders and Stroke from the National Institutes of Health and S10 RR026489 from the National Institutes of Health.

http://www.wired.com/wiredscience/2012/07/neanderthal-extinction-human-caused/

Humans Blamed for Neanderthal Extinction

A new study of microscopic particles of volcanic glass concludes that the eruption happened after Neandertals were mostly gone, putting the blame for their extinction on competition with modern humans

By Michael Balter, ScienceNOW



About 40,000 years ago, a huge volcanic eruption west of what is now Naples, Italy, showered ash over much of central and Eastern Europe. Some researchers have suggested that this super-eruption, combined with a sharp cold spell that hit the Northern Hemisphere at the same time, created a "volcanic winter" that did in the Neandertals. But a new study of microscopic particles of volcanic glass left behind by the explosion concludes that the eruption happened after the Neandertals were already mostly gone, putting the blame for their extinction on competition with modern humans.

Tiny glass fragments from a 40,000-year-old volcanic eruption suggest Neandertals were wiped out by competition with modern humans and not by climate change. **Suzanne MacLachlan/BOSCORF/National Oceanography Centre, U.K.**

Why the Neandertals disappeared is one of archaeology's longest-running debates. Over the years, opinions have shifted back and forth between climate change, competition with modern humans, and combinations of the two. Earlier this year, the climate change contingent got a boost when a European team determined that the Italian eruption, known as the Campanian Ignimbrite (CI), was two to three times larger than previous estimates. The researchers calculated that ash and chemical aerosols released into the atmosphere by the eruption cooled the Northern Hemisphere by as much as 2°C for up to 3 years.

Modern humans entered Europe from Africa and possibly the Middle East around the time of the eruption and Neandertals' demise, give or take several thousand years. The timing is critical. If Neandertals began disappearing before the eruption, it could not be responsible for their extinction; if their demise began at the same time or shortly afterward, the correlation with climate might still hold.

With these issues in mind, a team of more than 40 researchers from across Europe, led by geographer John Lowe of Royal Holloway, University of London in Egham, U.K., used a new technique for detecting volcanic ash across a much larger area than previously possible. The new method relies on deposits of cryptotephra, tiny particles of volcanic glass that are invisible to the naked eye. Unlike visible ash deposits, which are found over a more limited range, the much lighter cryptotephra can penetrate and be recovered from far-flung archaeological sites as well as marine, lake, and marsh environments. Moreover, by analyzing the chemical composition of the microscopic particles, researchers can trace them back to specific volcanic eruptions, in this case the CI.

The team collected samples containing CI cryptotephra from four central European caves where stone tools and other artifacts typical of Neandertals and modern humans have been found. They also gathered the particles from a modern human site in Libya and from marshland and marine sites in Greece and the Aegean Sea. The results, the team argues in a paper published online this week in the Proceedings of the National Academy of Sciences, are incompatible with the hypothesis that the CI was responsible for Neandertal extinction, at least in central Europe. The CI cryptotephra lie above, and so postdate, the transition from Neandertal to modern human stone tool types at all four central European sites, indicating that modern humans had replaced Neandertals before the catastrophic events of 40,000 years ago.

Moreover, analysis of tree pollen and other climatic indicators from the marsh and marine sediments confirmed that the CI was contemporaneous with a sharp cold spell called a Heinrich event, which is also often cited as a contributor to Neandertal extinction. So the data suggest that the eruption and the cold snap happened after the Neandertals had already vanished from central Europe.

"Climate was probably not directly responsible for Neandertal extinction, and catastrophic events most certainly were not," says co-author William Davies, an archaeologist at the University of Southampton, Avenue Campus, in the United Kingdom. That leaves competition with modern humans as the most likely culprit, the team contends.

Nevertheless, the authors concede that their results are only directly applicable to central and probably Eastern Europe, and not to Western Europe, where some researchers have claimed that Neandertals hung on until at least 35,000 years ago in Portugal and Spain. Because the team has not been able to find cryptotephra that far west, "we cannot rule out the survival of Neandertals post-CI and post Heinrich … in refugia like the Iberian

Peninsula," says co-author Chris Stringer of the Natural History Museum in London. "But it must have been a very limited survival at best, as they headed to physical extinction."
The team's techniques offer new clues to the eruption, says Clive Finlayson, director of the heritage division at the Gibraltar Museum and head of the excavations at Gibraltar's caves, at the southern tip of Spain, where Neandertals may have survived until as late as 30,000 years ago. But Finlayson, an advocate of climate change as the key factor in Neandertal extinction, says the researchers have not proven their case. "We can only conclude from this that the eruption and subsequent climatic changes had no effect on Neandertals that were already extinct. To pretend that these results speak to other factors that may have generated the Neandertal extinction, which was a protracted process, is utter nonsense."
This story provided by ScienceNOW, the daily online news service of the journal Science.

http://www.sciencedaily.com/releases/2012/07/120724104258.htm

Bats, a Reservoir of Resurgent Viruses

Measles, mumps, pneumonia, influenza and encephalitis in man, Carré's disease in dogs, Ovine Rinderpest ... all of these diseases are caused by viruses from the same family: Paramyxoviridae.

ScienceDaily - Measles, mumps, pneumonia, influenza and encephalitis in man, Carré's disease in dogs, Ovine Rinderpest (PPR)… all of these diseases are caused by viruses from the same family: Paramyxoviridae. A vast international study(1), carried out in collaboration with IRD researchers and published in Nature Communications has led to the discovery of more than 60 new species of these dangerous infectious agents, almost double the number previously recorded. This family of highly diverse pathogens affects all animals, from canines to fowl, cattle and humans. As a result, it is not always easy to determine which host is responsible for these viruses. Thanks to testing carried across the globe, the research team has recently discovered their source: bats.

All indices agree

Virologists have collected over 10,000 animal samples, including more than 90 Chiroptera(2) species from Africa, Latin America, Asia and Europe. As a result of blood and organ analysis, researchers have observed a large genetic diversity of paramyxoviruses in these small mammals. This suggests that these infectious agents have had enough time to evolve in bats over the course of history. They have thus been present for a very long time in this order of animals. In addition, scientists have found them in all known species of bat worldwide. This planetary spread signifies that it is the result of movement from continent to continent from a common ancestor and that these flying hosts have been carriers for millennia. Lastly, biologists have found nearly all genera from the paramyxovirus in bats, which has not been the case with any other animal. Such viral representation confirms that they are at the origin of all infection across the animal kingdom. To provide the final proof, researchers investigated the probability that each order -- bats, rodents, birds, humans, canines or bovines -- could be the source of contamination. Using paramyxovirus phylogeny -- the family tree, so to speak -, the probability of transfer is highest from bats to other animals.

The threat is still hovering

Researchers have also made a worrying discovery. Chiroptera might also be a reservoir of certain paramyxoviruses that were thought to be specific to humans. Scientists have found evidence among these small animals of paramyxoviruses that are genetically very similar to those observed in man and which could cause infection in humans once again. Childhood diseases such as measles or mumps, which the WHO considers as having been practically eradicated, in developed countries at least, could re-emerge. Any eradication hypothesis(3) requires all animal reservoirs to be eliminated.

Continents on the brink

Another worrying finding from the study is that certain highly dangerous viruses have been discovered in regions of the world where they were thought to be absent. This is the case for the Hendra and Nipah viruses, two emerging pathogens which have recently been the cause of fatal encephalitis(4) epidemics in Asia and Australia. No other cases have been detected in the world until now. And yet, researchers have found the viruses in the organs of African bats. In Gabon and Ghana, where the study has focused, two infectious agents seem to be highly present, which raises fears for possible emergence on the African continent.
Bats are already recognised as carrying diseases such as Ebola and rabies, notorious for devastating outbreaks, although these are rare and geographically contained. We are now learning that they are reservoirs of a multitude of infections that affect humans and animals worldwide. All epidemiological study on paramyxoviruses should now take into account the ecological data available for these airborne animals.
(1) This research has been carried out in collaboration with the universities of Bonn, Hanover, Marburg, Cologne and Ulm, the Noctalis centre, the Bernhard Nocht Institute for Tropical Medicine, the Charité Medical School and the

Institute for Novel and Emerging Infectious Diseases in Germany, CIRMF in Gabon, the Czech Republic Academy of Sciences, Strandja national park in Bulgaria, Kumasi University in Ghana, Lubumbashi Univesity in DRC, Bahia University in Brazil and Stellenbosch University in South Africa, Chumakov Institute of Poliomyelitis and Viral Encephalitides in Russia, the Smithsonian Tropical Research Institute in Panama, KCCR in Ghana, the Institut Pasteur in Bangui, Central African Republic, the Netherlands Center for Infectious Disease Control, the Muséum National d'Histoire Naturelle and the CNRS.
Jan Felix Drexler, Victor Max Corman, Marcel Alexander Müller, Gael Darren Maganga, Peter Vallo, Tabea Binger, Florian Gloza-Rausch, Andrea Rasche, Stoian Yordanov, Antje Seebens, Samuel Oppong, Yaw Adu Sarkodie, Célestin Pongombo, Alexander N. Lukashev, Jonas Schmidt-Chanasit, Andreas Stöcker, Aroldo José Borges Carneiro, Stephanie Erbar, Andrea Maisner, Florian Fronhoffs, Reinhard Buettner, Elisabeth K.V. Kalko, Thomas Kruppa, Carlos Roberto Franke, René Kallies, Emmanuel R.N. Yandoko, Georg Herrler, Chantal Reusken, Alexandre Hassanin, Detlev H. Krüger, Sonja Matthee, Rainer G. Ulrich, Eric M. Leroy, Christian Drosten. Bats host major mammalian paramyxoviruses. Nature Communications, 2012; 3: 796 DOI: 10.1038/ncomms1796

http://www.wired.com/wiredscience/2012/07/drought-food-prices-unrest/

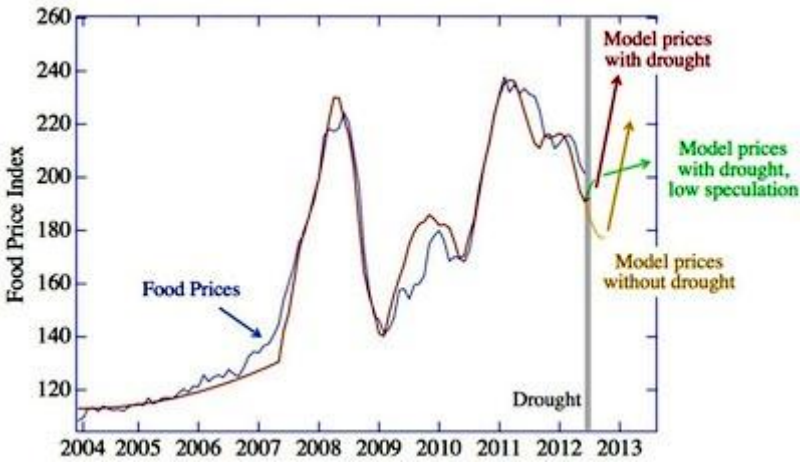
U.S. Drought Could Cause Global Unrest

Twice in the last five years, rising food prices triggered global waves of social unrest.

By Brandon Keim

With drought baking U.S. crops, another round of soaring, society-straining price spikes may happen in coming months. According to researchers from the New England Complex Systems Institute, commodity speculation - investors betting on food prices - will amplify the drought's market signals, creating a new food bubble and the crises that follow. "The drought is clearly going to kick prices up. It already has. What happens when you have speculators is that it goes through the roof," said NECSI president Yaneer Bar-Yam. "We've created an unstable system. Globally, we are very vulnerable."

The ongoing drought, the United States' worst since the Dust Bowl, is expected to last until October and will decimate U.S. harvests. America is the world's largest exporter of corn, wheat and soy beans; global prices for those commodities have already surged to record levels.



FAO Food Price Index (blue line) and NECSI's model of food market behavior (red line). Grey line is July 2012; lines beyond that point show NECSI's predictions of food price behavior without the drought (yellow), with the drought and low speculation (green) or current speculation (red). **Image: NECSI**

While the United States is relatively insulated from food price increases, people in developing countries, who spend far more of their budgets on food and rely on agricultural imports, are extremely vulnerable. For them, high prices are a catastrophe.

Since 2004, global food prices have slowly but steadily increased, with drastic and socially destabilizing spikes in 2007 and again in 2010. Economists argued over the causes, with blame cast on poor regional harvests, supply shortages caused by converting food crops to biofuels, and — most controversially — speculation.

Until the late 1990s, food markets in the United States were mostly limited to people with direct interests in food prices, such as farmers and crop buyers. Deregulation allowed hedge funds and investment banks to start betting, changing market dynamics and making them prone to sudden, massive fluctuations.

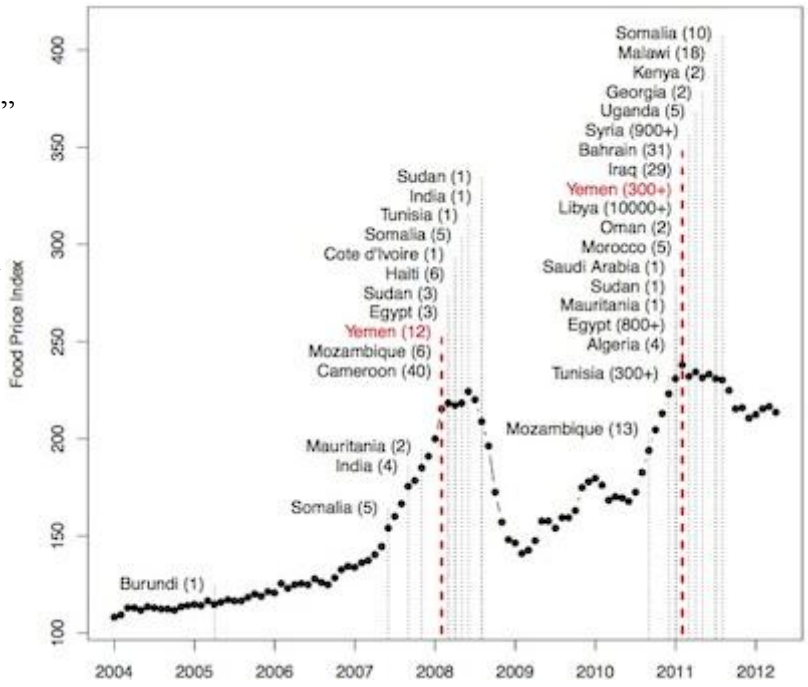
In earlier research, Bar-Yam's group developed mathematical models of global food market behavior that found biofuels responsible for a slow upwards rise in prices, and speculation for the spikes. That model anticipated a new food bubble in early 2013, but couldn't have foreseen the drought.

In the new analysis, released July 23 on NECSI's website, Bar-Yam's group added drought-triggered price increases to the model. With those figures included, the already grim forecast becomes even darker. "The drought may trigger the third massive price spike to occur earlier than otherwise expected, beginning immediately," wrote the NECSI team.

'We've created an unstable system. Globally, we are very vulnerable.'

According to Bar-Yam, excessive speculation acts as an amplifier, exaggerating whatever signal the market receives. Left alone, a highly speculative market would naturally experience boom-and-bust cycles, but this summer's drought-precipitated surge in food prices will accelerate the next bubble's formation.

Models are, to be sure, always tricky, but this one does seem to have predictive power.
"The work they are doing on food prices is pathbreaking," said agricultural economist Peter Timmer of the Center for Global Development, who is familiar with NECSI's modeling. "I don't think their empirical model 'proves' that biofuels and speculation are the main causes of volatile food prices, but their model is the only one that's empirically tracked those prices accurately over the last eight years."
What happens after another bubble is a pressing question, said Bar-Yam. In both 2007 and 2010, massive unrest almost immediately followed food price surges, tracking market behavior with uncanny synchronization. Some Middle East experts say that rising prices even triggered the Arab Spring, providing a spark that ignited long-simmering tensions and resentments.
While the exact role played by food is difficult to isolate, a new NECSI analysis of the 2008 Yemeni uprising supports the spark hypothesis. In a paper released July 24, NECSI found that the geographical character of violence changed immediately after the price spikes, shifting from ethnically localized to widespread.



FAO food price index between 2004 and 2012, with incidents of social unrest plotted against prices. Image: NECSI

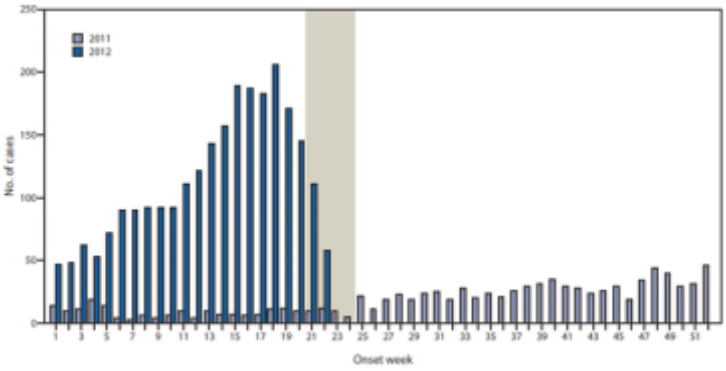
"I think the analysis has merit," said political geographer Charles Schmitz of Towson University. "The food prices did disturb things. The legitimacy of the government was undermined."
While some might see the Arab Spring's catalysis as a positive side effect, food shortages and panicked riots are hardly the most desirable path to social change. To keep prices under control, experts have recommended limiting financial speculation in commodity markets and using biofuel crops for food instead.
"In the short run, USDA needs to figure out a way to remove the mandate on ethanol use from corn," said Timmer. "If we could free up 20 to 30 percent of the U.S. crop, reduced as it is, it would bring corn prices down very quickly."
New speculation limits are scheduled to be enacted by year's end, but drought means that may be too late, said Bar-Yam. In the meantime, the USDA has rebuffed all requests to reduce corn biofuel allotments.
"These are new tools for understanding social change," said Bar-Yam of NECSI's modeling. "The thing we're worried about is that they're pointing to global catastrophe in a short period of time."

http://www.wired.com/wiredscience/2012/07/whooping-cough-runs-amok-in-washington/

Whooping Cough Runs Amok in Washington — A Very Scary Graph

By David Dobbs

As I've been pushing my own legislators here in Vermont to close the big fat public health pothole called the 'philosophical exemption,' I often ask them to pay attention to the pertussis outbreak in Washington State. So I hope they'll take note of Phil Plait's update over at Bad Astronomy:



This is one of the scariest graphs I've seen in a long time. This plot, from the CDC, shows probable and confirmed cases of pertussis – whooping cough – in the state of Washington from 2011 through June 2012. Last year's numbers are the short, light-blue-grey rectangles, and this year's are the dark blue. The plot is by week, so you can see the 2011 numbers slowly growing across the year; then this year's numbers suddenly taking a huge leap upward. They are reporting the new rate as 13 times larger than last year. Note that 83% of these cases have been confirmed as being pertussis, while 17% are probable. The drop in recent weeks is due to a lag in complete reporting of cases.

Got that? There are 13 times as many people – more than 2500 in total so far – getting pertussis right now as there were last year at this time in Washington.

Some of this increase may be attributable to the pertussis bacterium growing a resistance to the vaccine and booster. However, it's curious that Washington state has seen such a large jump; the incidence of pertussis overall in that state is nine times higher than the national average.

The really scary part is the possibility that this year's graph (the tall bars) will rise through the season in the same way last year's graph (the shorter gray bars) did as the year progressed. It's vital to note that this is a 13-fold jump from last year. What does this tell us? When our vaccination levels drop enough to allow outbreaks, we won't necessarily get the slow-motion, gentle warning we'd ideally want. Epidemics don't work that way; they're not polite, and in many cases, certain factors can line up to create a tipping point beyond which the numbers balloon. The graph above shows how fast things can get ugly.

You should read the whole thing at Bad Astronomy — a must-read generally. But in case you don't go, DO heed Plait's take-home:

Pertussis is a terrible, terrible disease. It puts infants at grave risk of dying, and eight infants so far this year have been killed by pertussis in the US. Even if it doesn't kill them, it's a horrible thing to put them through.

Vaccines save lives. Talk to your board-certified doctor and find out if you need one, or a booster.I did, and my whole family is up-to-date with their vaccinations. I refuse to be a part of spreading a disease that can kill anyone, let alone babies, and I refuse to be silent about it.

http://www.bbc.co.uk/news/health-19013016

Whooping cough outbreak spreads to very young babies

Babies are offered a whooping cough vaccine at two, three and four months of age

By James Gallagher Health and science reporter, BBC News

The outbreak of whooping cough in England and Wales has spread to very young babies who are most at risk of severe complications and death, the Health Protection Agency has warned. There were another 675 cases in June bringing the total to 2,466 for 2012 so far. At this stage last year there had only been 311 cases. Increased levels of whooping cough have also been reported in Northern Ireland and Scotland.

The main symptoms are severe coughing fits which are accompanied by a "whoop" sound as children gasp for breath. Surges in the number of whooping-cough cases are seen every three to four years. This latest outbreak began at the end of 2011. Before routine vaccination in 1957, whooping cough outbreaks in the UK were on a huge scale. It could affect up to 150,000 people and kill 300 in one year.

'Very concerned'

There have been 186 cases reported in infants under three months this year compared to 72 in the same period last year. Five babies have died from the infection.

Dr Mary Ramsay, the head of immunisation at the Health Protection Agency, said she was "very concerned" with the increase in cases.

She said: "Whooping cough can be a very serious illness, especially in the very young. In older people it can be unpleasant but does not usually lead to serious complications.

Whooping cough
It is also known as pertussis and is caused by a species of bacteria, Bordetella pertussis
It mostly affects infants, who are at highest risk of complications and even death
The earliest signs are similar to a common cold, which then develop into a cough and can even result in pneumonia
Babies may turn blue while coughing due to a lack of oxygen
The cough tends to come in short bursts followed by desperate gasps for air (the whooping noise)

"Anyone showing signs and symptoms, which include severe coughing fits accompanied by the characteristic 'whoop' sound in young children, but as a prolonged cough in older children and adults, should visit their GP."

In the UK, the whooping cough vaccine is given to babies after two, three and four months. A booster dose is given just before primary school. Babies are not fully protected until the third jab. It is in the following years that protection is at its peak then it gradually fades. It means you can get whooping cough as an adult even if you had the infection or the jabs as a child.

The Department of Health's Joint Committee of Vaccination and Immunisation is considering ways to tackle the outbreak, such as giving teenagers or pregnant women a booster jab. Vaccinations for medics working with young babies have already been recommended to protect them and prevent them from spreading the infection.

Figures for the end of March showed 27 confirmed cases in Northern Ireland, compared to 13 in the whole of 2011. At the end of March there had been 150 cases reported in Scotland compared to 22 in the first three months of 2011.

Prof Adam Finn, from University of Bristol, said: "The current vaccination programme has reduced whooping cough in children, but also pushed it back into older age groups. "Immunity due to vaccine does not last as long as immunity due to infection so as the number of people who have had whooping cough in the past falls, population immunity falls and rates go up. "This is happening everywhere, not just in the UK."

http://www.eurekalert.org/pub_releases/2012-07/uoa-ita072512.php

Identifying the arrogant boss

New test can help reduce the threat to organizations

Akron, Ohio – Arrogant bosses can drain the bottom line because they are typically poor performers who cover up their insecurities by disparaging subordinates, leading to organizational dysfunction and employee turnover. A new measure of arrogance, developed by researchers at The University of Akron and Michigan State University, can help organizations identify arrogant managers before they have a costly and damaging impact. The Workplace Arrogance Scale (WARS) will be presented at the American Psychological Association convention in Orlando on August 2 by industrial and organizational psychologist and professor Stanley Silverman, dean of UA's Summit College and University College.

Arrogance is characterized by a pattern of behavior that demeans others in an attempt to prove competence and superiority. Silverman says this behavior is correlated with lower intelligence scores and lower self-esteem when compared to managers who are not arrogant.

"Does your boss demonstrate different behaviors with subordinates and supervisors?" Silverman asks. He says a "yes" answer could mean trouble. Silverman warns that "yes" replies to these other questions raise red flags and signal arrogance.

Does your boss put his/her personal agenda ahead of the organization's agenda?

Does the boss discredit others' ideas during meetings and often make them look bad?

Does your boss reject constructive feedback?

Does the boss exaggerate his/her superiority and make others feel inferior?

Silverman and his colleagues Russell Johnson, assistant professor of management at the Eli Broad College of Business at Michigan State University, and Nicole McConnell and Alison Carr, both Ph.D. students in The University of Akron's Industrial and Organizational Psychology Program, published details of the Workplace Arrogance Scale in the July 2012 issue of The Industrial-Organizational Psychologist.

Left unchecked, arrogant leaders can be a destructive force within an organization, notes Silverman. With power over their employees' work assignments, promotion opportunities and performance reviews, arrogant bosses put subordinates in a helpless position. They do not mentor junior colleagues nor do they motivate a team to benefit the organization as a whole, contributing to a negative social workplace atmosphere.

Silverman says that arrogance is less a personality trait than a series of behaviors, which can be addressed through coaching if the arrogant boss is willing to change. He recommends that organizations incorporate an assessment of arrogance into the employee review and performance management process.

Silverman emphasizes that cultivating humility among leaders and promoting a learning-oriented work climate go far in reducing arrogance and increasing productive leadership and employee social interaction.

http://www.sciencedaily.com/releases/2012/07/120725120646.htm

How Life Turned Left: Meteorite Fragments Help Explain Why Living Things Only Use Molecules With Specific Orientations

Researchers analyzing meteorite fragments that fell on a frozen lake in Canada have developed an explanation for the origin of life's handedness

ScienceDaily - Researchers analyzing meteorite fragments that fell on a frozen lake in Canada have developed an explanation for the origin of life's handedness -- why living things only use molecules with specific orientations. The work also gave the strongest evidence to date that liquid water inside an asteroid leads to a strong preference of left-handed over right-handed forms of some common protein amino acids in meteorites. The result makes the search for extraterrestrial life more challenging.

"Our analysis of the amino acids in meteorite fragments from Tagish Lake gave us one possible explanation for why all known life uses only left-handed versions of amino acids to build proteins," said Dr. Daniel Glavin of NASA's Goddard Space Flight Center in Greenbelt, Md. Glavin is lead author of a paper on this research to be published in the journal Meteoritics and Planetary Science.

In January, 2000, a large meteoroid exploded in the atmosphere over northern British Columbia, Canada, and rained fragments across the frozen surface of Tagish Lake. Because many people witnessed the fireball, pieces were collected within days and kept preserved in their frozen state. This ensured that there was very little contamination from terrestrial life. "The Tagish Lake meteorite continues to reveal more secrets about the early

Solar System the more we investigate it," said Dr. Christopher Herd of the University of Alberta, Edmonton, Canada, a co-author on the paper who provided samples of the Tagish Lake meteorite for the team to analyze. "This latest study gives us a glimpse into the role that water percolating through asteroids must have played in making the left-handed amino acids that are so characteristic of all life on Earth."

Proteins are the workhorse molecules of life, used in everything from structures like hair to enzymes, the catalysts that speed up or regulate chemical reactions. Just as the 26 letters of the alphabet are arranged in limitless combinations to make words, life uses 20 different amino acids in a huge variety of arrangements to build millions of different proteins. Amino acid molecules can be built in two ways that are mirror images of each other, like your hands. Although life based on right-handed amino acids would presumably work fine, they can't be mixed. "Synthetic proteins created using a mix of left- and right-handed amino acids just don't work," says Dr. Jason Dworkin of NASA Goddard, co-author of the study and head of the Goddard Astrobiology Analytical Laboratory, where the analysis was performed.

Since life can't function with a mix of left- and right-handed amino acids, researchers want to know how life -- at least, life on Earth -- got set up with the left-handed ones. "The handedness observed in biological molecules -- left-handed amino acids and right-handed sugars -- is a property important for molecular recognition processes and is thought to be a prerequisite for life," said Dworkin. All ordinary methods of synthetically creating amino acids result in equal mixtures of left- and right-handed amino acids. Therefore, how the nearly exclusive production of one hand of such molecules arose from what were presumably equal mixtures of left and right molecules in a prebiotic world has been an area of intensive research.

The team ground up samples of the Tagish Lake meteorites, mixed them into a hot-water solution, then separated and identified the molecules in them using a liquid chromatograph mass spectrometer. "We discovered that the samples had about four times as many left-handed versions of aspartic acid as the opposite hand," says Glavin. Aspartic acid is an amino acid used in every enzyme in the human body. It is also used to make the sugar substitute Aspartame. "Interestingly, the same meteorite sample showed only a slight left-hand excess (no more than eight percent) for alanine, another amino acid used by life."

"At first, this made no sense, because if these amino acids came from contamination by terrestrial life, both amino acids should have large left-handed excesses, because both are common in biology," says Glavin. "However, a large left-hand excess in one and not the other tells us that they were not created by life but instead were made inside the Tagish Lake asteroid." The team confirmed that the amino acids were probably created in space using isotope analysis.

Isotopes are versions of an element with different masses; for example, carbon 13 is a heavier, and less common, variety of carbon. Since the chemistry of life prefers lighter isotopes, amino acids enriched in the heavier carbon 13 were likely created in space.

"We found that the aspartic acid and alanine in our Tagish Lake samples were highly enriched in carbon 13, indicating they were probably created by non-biological processes in the parent asteroid," said Dr. Jamie Elsila of NASA Goddard, a co-author on the paper who performed the isotopic analysis. This is the first time that carbon isotope measurements have been reported for these amino acids in Tagish Lake. The carbon 13 enrichment, combined with the large left-hand excess in aspartic acid but not in alanine, provides very strong evidence that some left-handed proteinogenic amino acids -- ones used by life to make proteins -- can be produced in excess in asteroids, according to the team.

Some have argued that left-handed amino acid excesses in meteorites were formed by exposure to polarized radiation in the solar nebula -- the cloud of gas and dust from which asteroids, and eventually the Solar System, were formed. However, in this case, the left-hand aspartic acid excesses are so large that they cannot be explained by polarized radiation alone. The team believes that another process is required.

Additionally, the large left-hand excess in aspartic acid but not in alanine gave the team a critical clue as to how these amino acids could have been made inside the asteroid, and therefore how a large left-hand excess could arise before life originated on Earth.

"One thing that jumped out at me was that alanine and aspartic acid can crystallize differently when you have mixtures of both left-handed and right-handed molecules," said Dr. Aaron Burton, a NASA Postdoctoral Program Fellow at NASA Goddard and a co-author on the study. "This led us to find several studies where researchers have exploited the crystallization behavior of molecules like aspartic acid to get left-handed or right-handed excesses. Because alanine forms different kinds of crystals, these same processes would produce equal amounts of left- and right-handed alanine. We need to do some more experiments, but this explanation has the potential to explain what we see in the Tagish Lake meteorite and other meteorites."

The team believes a small initial left-hand excess could get amplified by crystallization and dissolution from a saturated solution with liquid water. Some amino acids, like aspartic acid, have a shape that lets them fit together in a pure crystal -- one composed of just left-handed or right-handed molecules. For these amino acids, a small initial left- or right-hand excess could become greatly amplified at the expense of the opposite-handed crystals, similar to the way a large snowball gathers more snow and gets bigger more rapidly when rolled downhill than a small one. Other amino acids, like alanine, have a shape that prefers to join together with their mirror image to make a crystal, so these crystals are composed of equal numbers of left- and right-handed molecules. As these "hybrid" crystals grow, any small initial excess would tend to be washed out for these amino acids. A requirement for both of these processes is a way to convert left-handed to right-handed molecules, and vice-versa, while they are dissolved in the solution.

This process only amplifies a small excess that already exists. Perhaps a tiny initial left-hand excess was created by conditions in the solar nebula. For example, polarized ultraviolet light or other types of radiation from nearby stars might favor the creation of left-handed amino acids or the destruction of right-handed ones, according to the team. This initial left-hand excess could then get amplified in asteroids by processes like crystallization. Impacts from asteroids and meteorites could deliver this material to Earth, and left-handed amino acids might have been incorporated into emerging life due to their greater abundance, according to the team. Also, similar enrichments of left-handed amino acids by crystallization could have occurred on Earth in ancient sediments that had water flowing through them, such as the bottoms of rivers, lakes, or seas, according to the team.

The result complicates the search for extraterrestrial life -- like microbial life hypothesized to dwell beneath the surface of Mars, for example. "Since it appears a non-biological process can create a left-hand excess in some kinds of amino acids, we can't use such an excess alone as proof of biological activity," says Glavin.

The research was funded by the NASA Astrobiology Institute, the Goddard Center for Astrobiology, the NASA Cosmochemistry Program, and the Natural Sciences and Engineering Research Council of Canada.

Glavin DP, Elsila JE, Burton AS, Dworkin JP, Hilts RW and Herd CDK. Unusual non-terrestrial L-proteinogenic amino acid excesses in the Tagish Lake meteorite. Meteoritics & Planetary Science, 2012 (in press)

http://www.sciencedaily.com/releases/2012/07/120725132210.htm

Chemical Makes Blind Mice See; Compound Holds Promise for Treating Humans

Scientists have discovered a chemical that temporarily restores some vision to blind mice

ScienceDaily - A team of University of California, Berkeley, scientists in collaboration with researchers at the University of Munich and University of Washington, in Seattle, has discovered a chemical that temporarily restores some vision to blind mice, and is working on an improved compound that may someday allow people with degenerative blindness to see again.

Mice with a genetic disease that causes blindness regained some sight after injection with a chemical "photoswitch." The eye of the untreated mouse on the left shows no response to light, while the pupil of the mouse on the right, which was injected with the chemical, contracts in light. **(Credit: Image courtesy of University of California - Berkeley)**

The approach could eventually help those with retinitis pigmentosa, a genetic disease that is the most common inherited form of blindness, as well as age-related macular degeneration, the most common cause of acquired blindness in the developed world. In both diseases, the light sensitive cells in the retina -- the rods and cones -- die, leaving the eye without functional photoreceptors.

The chemical, called AAQ, acts by making the remaining, normally "blind" cells in the retina sensitive to light, said lead researcher Richard Kramer, UC Berkeley professor of molecular and cell biology. AAQ is a photoswitch that binds to protein ion channels on the surface of retinal cells. When switched on by light, AAQ alters the flow of ions through the channels and activates these neurons much the way rods and cones are activated by light.

"This is similar to the way local anesthetics work: they embed themselves in ion channels and stick around for a long time, so that you stay numb for a long time," Kramer said. "Our molecule is different in that it's light sensitive, so you can turn it on and off and turn on or off neural activity."

Because the chemical eventually wears off, it may offer a safer alternative to other experimental approaches for restoring sight, such as gene or stem cell therapies, which permanently change the retina. It is also less invasive than implanting light-sensitive electronic chips in the eye.

"The advantage of this approach is that it is a simple chemical, which means that you can change the dosage, you can use it in combination with other therapies, or you can discontinue the therapy if you don't like the

results. As improved chemicals become available, you could offer them to patients. You can't do that when you surgically implant a chip or after you genetically modify somebody," Kramer said.
"This is a major advance in the field of vision restoration," said co-author Dr. Russell Van Gelder, an ophthalmologist and chair of the Department of Ophthalmology at the University of Washington, Seattle.
Kramer, Van Gelder, chemist Dirk Trauner and their colleagues at UC Berkeley, the University of Washington, Seattle, and the University of Munich will publish their findings on July 26, in the journal Neuron.
The blind mice in the experiment had genetic mutations that made their rods and cones die within months of birth and inactivated other photopigments in the eye. After injecting very small amounts of AAQ into the eyes of the blind mice, Kramer and his colleagues confirmed that they had restored light sensitivity because the mice's pupils contracted in bright light, and the mice showed light avoidance, a typical rodent behavior impossible without the animals being able to see some light. Kramer is hoping to conduct more sophisticated vision tests in rodents injected with the next generation of the compound.
"The photoswitch approach offers real hope to patients with retinal degeneration," Van Gelder said. "We still need to show that these compounds are safe and will work in people the way they work in mice, but these results demonstrate that this class of compound restores light sensitivity to retinas blind from genetic disease."
From optogenetics to implanted chips
The current technologies being evaluated for restoring sight to people whose rods and cones have died include injection of stem cells to regenerate the rods and cones; "optogenetics," that is, gene therapy to insert a photoreceptor gene into blind neurons to make them sensitive to light; and installation of electronic prosthetic devices, such as a small light-sensitive retinal chip with electrodes that stimulate blind neurons. Several dozen people already have retinal implants and have had rudimentary, low vision restored, Kramer said.
Eight years ago, Kramer, Trauner, a former UC Berkeley chemist now at the University of Munich, and their colleagues developed an optogenetic technique to chemically alter potassium ion channels in blind neurons so that a photoswitch could latch on. Potassium channels normally open to turn a cell off, but with the attached photoswitch, they were opened when hit by ultraviolet light and closed when hit by green light, thereby activating and deactivating the neurons.
Subsequently, Trauner synthesized AAQ (acrylamide-azobenzene-quaternary ammonium), a photoswitch that attaches to potassium channels without the need to genetically modify the channel. Tests of this compound are reported in the current Neuron paper.
New versions of AAQ now being tested are better, Kramer said. They activate neurons for days rather than hours using blue-green light of moderate intensity, and these photoswitches naturally deactivate in darkness, so that a second color of light is not needed to switch them off.
"This is what we are really excited about," he said.
Coauthors with Kramer, Van Gelder and Trauner are UC Berkeley current or former post-docs or graduate students Aleksandra Polosukhina, Jeffrey Litt, Ivan Tochitsky, Ivan De Kouchkovsky, Tracy Huang and Katharine Borges; and post-doctoral fellow Joseph Nemargut and ophthalmology resident Yivgeny Sychev at the University of Washington.
The work was supported by the National Eye Institute of the National Institutes of Health (EY018957 & EY003176) and Research to Prevent Blindness.
Aleksandra Polosukhina, Jeffrey Litt, Ivan Tochitsky, Joseph Nemargut, Yivgeny Sychev, Ivan De Kouchkovsky, Tracy Huang, Katharine Borges, Dirk Trauner, Russell N. Van Gelder, Richard H. Kramer. Photochemical Restoration of Visual Responses in Blind Mice. Neuron, 2012; 75 (2): 271 DOI: 10.1016/j.neuron.2012.05.022

http://nyti.ms/PcTHjr

New Paint Wipes Out Infestation in a Village

The paint has not yet been fully evaluated by the World Health Organization, but experimental efforts have produced promising results

By JEAN FRIEDMAN-RUDOVSKY

CAMIRI, Bolivia - It happened just like that. One day Barbara Saavedra's modest adobe home, deep in southeastern Bolivia, turned white - and miraculously, for the first time ever, bug-free. "The vinchuca were just gone," said Ms. Saavedra, 39, a member of Bolivia's indigenous Guarani people.
The Chaco, the dry-forest region surrounding Ms. Saavedra's village, is the epicenter of a worldwide Chagas epidemic affecting up to 10 million people, including one million in the United States. Ms. Saavedra's family, and most of her neighbors, often slept outside to escape the bug's nightly blood feedings.
Deliverance came in an unlikely form: On that August day, her home was slathered with a high-tech paint that kills disease-carrying pests like the kissing bug. Over the past decade, approximately 7,000 houses in the Chaco

region have been covered with the paint, known as Inesfly. By most estimates, the vinchuca vanish within a week, and no houses have suffered repeat infestations, although some, like Ms. Saavedra's, have been repainted as a precaution. The bug-killing paint has reduced infestation rates in her area from as high as 90 percent to nearly zero.

"It's astounding," said Dr. João Carlos Pinto Dias, a leading expert in Chagas disease at the Oswaldo Cruz Institute in Brazil. His studies found Inesfly effective for two years in real-life conditions. Standard insecticide application lasts only six months under the most ideal conditions and can dissipate within a week in harsh environments like the Chaco.

Developed by a small Spanish company called Inesba, the paint has not yet been fully evaluated by the World Health Organization; until it is, public health officials in many countries will not incorporate it into disease-control programs. But experimental efforts against a range of pests in South America, Mexico and Africa have produced promising results.

"The paint is changing the way we understand vector-transmitted disease and its prevention," said Javier Lucientes Curdi, a parasitologist at the University of Zaragoza in Spain, who has been evaluating the paint's ability to reduce transmission of dengue and sleeping sickness in Africa.

Inesfly comprises "microcapsules" of pesticides within a water-based paint. The active ingredients are released slowly over time, extending the paint's effectiveness for years. The microcapsules also hold insect growth regulators, which kill insect eggs and their young. (Insecticides do not kill bugs in their early life stages.)

The microcapsules also act as the paint's safety mechanism. Because the pesticides and insect growth regulators are released from the paint gradually, in tiny amounts, it is much less toxic than the fumigation on which many countries rely for pest control. There have been no reports or evidence of environmental or health complications related to Inesfly.

In Africa, researchers are testing the paint against Anopheles gambiae, the mosquito that transmits the parasite causing malaria. Mosquitoes pose even greater challenges than a bug like the vinchuca because they don't make their homes in walls, are virtually omnipresent and reproduce with greater speed.

But studies in the lab and in the field have shown that use of the paint can reduce mosquito populations over long periods of time much more effectively than traditional pesticide application methods. In experiments conducted in the village of Ladji, Benin, W.H.O. researchers found that Inesfly, applied to cement huts, had a kill rate of 100 percent for three months against mosquito populations. The paint remained 90 percent to 93 percent effective after nine months. The researchers plan now to paint another village to see whether fewer mosquitoes translates into fewer malaria infections.

"The product is without a doubt a great hope for Africa," said Dr. Santiago Mas-Coma, president of the European Federation of Parasitologists, who is coordinating the trials. "Just thinking about what could be painted — homes, restaurants, theaters, airports — gives us a glimpse of its possible impact."

Government officials in Mexico have used Inesfly to eliminate a variety of dangerous household pests in central Mexico. In one 2007 study, for example, the paint eradicated scorpions and kissing bugs in about 100 homes in the village of Los Epazotes near the city of Tejupilco over a six-month period.

In another study, from mid-2009 to mid-2010, in the community of Venustiano Carranza in the Tabasco region, infestations of dengue-transmitting Aedes aegypti mosquitoes were reduced to just 1 percent of homes from 20 percent after application of the paint. For 60 years, fumigation had failed to eliminate these pests, said Jorge Méndez Galván, former head of vector-transmitted disease for the Mexican government and now a researcher for the Federico Gómez Children's Hospital of Mexico, who conducted the studies.

In regions where he's conducted his studies, he added, residents come to recognize painted homes as healthier spaces than houses that have not been painted.

The paint may help protect livestock, as well. Dr. Lucientes, of the University of Zaragoza, has been coordinating research in Spain to test the paint's potential against animal pathogens. He said that initial findings suggest that painting barns, stalls, pens or fencing help prevent the spread of salmonella or animal trypanosomiasis.

Still, insecticidal paint is not a panacea. It can't be used cover thatched walls, and many homes in malaria-stricken areas are made of thatch. Where pests have already become resistant to pesticides, the paint is ineffective. And even where the paint is effective, houses must be repainted — particularly if mosquitoes are the target.

Whatever its drawbacks, Inesfly may soon be available in the United States. The company is working toward approval by the Environmental Protection Agency and hopes to market the paint here as a tool to control household pests like cockroaches or ants.

Back in Bolivia, Ms. Saavedra acknowledges that until the painters arrived at her adobe home, she didn't even know the vinchuca caused Chagas disease. She's never been tested for the infection; without the money for expensive, long-term treatment, she sees no point in knowing. But Ms. Saavedra smiles as she looks at her youngest son, born after the first house-painting. "I know he's safe," she said.

http://www.sciencedaily.com/releases/2012/07/120725200256.htm

Adult Stem Cells from Liposuction Used to Create Blood Vessels in the Lab

Adult stem cells extracted during liposuction can be used to grow healthy new blood vessels for use in heart surgery

ScienceDaily - Adult stem cells extracted during liposuction can be used to grow healthy new small-diameter blood vessels for use in heart bypass surgery and other procedures, according to new research presented at the American Heart Association's Basic Cardiovascular Sciences 2012 Scientific Sessions.

Millions of cardiovascular disease patients are in need of small-diameter vessel grafts for procedures requiring blood to be routed around blocked arteries. These liposuction-derived vessels, grown in a lab, could help solve major problems associated with grafting blood vessels from elsewhere in the body or from using artificial blood vessels that are not living tissue, said Matthias Nollert, Ph.D., the lead author of the study and associate professor at the University of Oklahoma School of Chemical, Biological and Materials Engineering, in Norman, Okla.

"Current small-diameter vessel grafts carry an inherent risk of clotting, being rejected or otherwise failing to function normally," Nollert said. "Our engineered blood vessels have good mechanical properties and we believe they will contract normally when exposed to hormones. They also appear to prevent the accumulation of blood platelets -- a component in blood that causes arteries to narrow."

In this study, adult stem cells derived from fat are turned into smooth muscle cells in the laboratory, and then "seeded" onto a very thin collagen membrane. As the stem cells multiplied, the researchers rolled them into tubes matching the diameter of small blood vessels. In three to four weeks, they grew into usable blood vessels. Creating blood vessels with this technique has the potential for "off-the-shelf" replacement vessels that can be used in graft procedures, Nollert said.

The researchers hope to have a working prototype to test in animals within six months.

Co-authors are Jaclyn A. Brennan, M.S., and Julien H. Arrizabalaga, B.S. Funding for this study was provided by the American Heart Association.

http://www.eurekalert.org/pub_releases/2012-07/bawh-bmt072612.php

Bone marrow transplant eliminates signs of HIV infection

2 Brigham and Women's Hospital patients have no detectable traces of HIV following transplantation

Boston, MA – Two men with longstanding HIV infections no longer have detectable HIV in their blood cells following bone marrow transplants. The virus was easily detected in blood lymphocytes of both men prior to their transplants but became undetectable by eight months post-transplant. The men, who were treated at Brigham and Women's Hospital (BWH), have remained on anti-retroviral therapy. Their cases will be presented on July 26, 2012 at the International AIDS Conference by Timothy Henrich, MD and Daniel Kuritzkes, MD, physician-researchers in the Division of Infectious Diseases at BWH. "This gives us some important information", said Dr. Kuritzkes. "It suggests that under the cover of anti-retroviral therapy, the cells that repopulated the patient's immune system appear to be protected from becoming re-infected with HIV."

One patient's bone marrow transplant was two years ago, the other was four years ago. Both were performed at the Dana-Farber/Brigham and Women's Cancer Center. Over time, as the patients' cells were replaced by donor cells, traces of HIV were lost. Currently, both patients have no detectable HIV DNA or RNA in their blood. The level of HIV antibody, a measure of exposure to HIV, also declined in both men.

"We expected HIV to vanish from the patients' plasma, but it is surprising that we can't find any traces of HIV in their cells", said Dr. Henrich. "The next step is to determine if there are any traces of HIV in their tissue."

The research team is currently designing studies that would enable them to look for HIV in the tissues. Researchers also plan to study additional HIV-positive patients who have undergone a bone marrow transplant.

Researchers point out that there are two key differences between the Brigham patients and the "Berlin patient", a man who was functionally cured of HIV after a stem cell transplant. In the Berlin patient's case, his donor was specifically chosen because the donor had a genetic mutation that resisted HIV.

The Brigham patients' bone marrow transplants were done without any thought to selecting an HIV-resistant donor. Second, the Berlin patient ceased anti-retroviral therapy after his transplant, while the Brigham patients have remained on anti-retroviral therapy.

http://www.eurekalert.org/pub_releases/2012-07/hsop-mwp072612.php

Men with prostate cancer more likely to die from other causes

Study suggests prostate cancer management should emphasize healthy lifestyle changes

Boston, MA – Men diagnosed with prostate cancer are less likely to die from the disease than from largely preventable conditions such as heart disease, according to a new study from Harvard School of Public Health (HSPH). It is the largest study to date that looks at causes of death among men with prostate cancer, and suggests that encouraging healthy lifestyle changes should play an important role in prostate cancer management.

"Our results are relevant for several million men living with prostate cancer in the United States," said first author Mara Epstein, a postdoctoral researcher at HSPH. "We hope this study will encourage physicians to use a prostate cancer diagnosis as a teachable moment to encourage a healthier lifestyle, which could improve the overall health of men with prostate cancer, increasing both the duration and quality of their life."

The study was published July 25, 2012 in the Advance Access online Journal of the National Cancer Institute.

Prostate cancer is the most frequently diagnosed form of cancer, affecting one in six men during their lifetime. While incidence of prostate cancer has greatly increased in the United States, Sweden, and other Western countries in recent decades, the likelihood that a newly diagnosed man in these countries will die from the disease has declined. The researchers attribute this to the widespread use of the prostate-specific antigen (PSA) test, which has resulted in a higher proportion of men diagnosed with lower-risk forms of the disease.

The researchers examined causes of death among prostate cancer cases recorded in the U.S. Surveillance, Epidemiology, and End Results Program (over 490,000 men from 1973 to 2008) and the nationwide Swedish Cancer and Cause of Death registries (over 210,000 men from 1961 to 2008).

The results showed that during the study period, prostate cancer accounted for 52% of all reported deaths in Sweden and 30% of reported deaths in the United States among men with prostate cancer; however, only 35% of Swedish men and 16% of U.S. men diagnosed with prostate cancer died from this disease. In both populations, the risk of prostate cancer-specific death declined, while the risk of death from heart disease and non-prostate cancer remained constant. The five-year cumulative incidence of death from prostate cancer was 29% in Sweden and 11% in the United States.

Death rates from prostate cancer varied by age and calendar year of diagnosis, with the highest number of deaths from the disease among men diagnosed at older ages and those diagnosed in the earlier years of the surveys (especially in the years before the introduction of PSA screening).

"Our study shows that lifestyle changes such as losing weight, increasing physical activity, and quitting smoking, may indeed have a greater impact on patients' survival than the treatment they receive for their prostate cancer," said senior author Hans-Olov Adami, professor of epidemiology at HSPH.

The study was supported by Karolinska Institutet Distinguished Professor Award, a National Institutes of Health research training grant (R25 CA098566), and a postdoctoral grant from Svenska Sällskapet för Medicinsk Forskning.

"Temporal Trends in Cause of Death among Swedish and US Men With Prostate Cancer," Mara M. Epstein, Gustaf Edgren, Jennifer R. Rider, Lorelei A. Mucci, and Hans-Olov Adami, Journal of the National Cancer Institute, Advance Access online July 25, 2012.

http://www.eurekalert.org/pub_releases/2012-07/uota-rtm072612.php

Repetitious, time-intensive magical rituals considered more effective, study shows

People are likely to find logic in supernatural rituals that require a high degree of time and effort

AUSTIN, Texas - Even in this modern age of science, people are likely to find logic in supernatural rituals that require a high degree of time and effort, according to new research from The University of Texas at Austin.

The study, published in the June issue of Cognition, is the first psychological analysis of how people of various cultures evaluate the efficacy of ritual beliefs. The findings provide new insight into cognitive reasoning processes — and how people intuitively make sense out of the unknown.

"One of the most remarkable characteristics of human cognition is the capacity to use supernatural reasoning to explain the world around us," said Cristine Legare, an assistant professor in the Department of Psychology at The University of Texas at Austin. "We argue that the characteristics of ritual are the product of an evolved cognitive system."

Cause-and-effect thinking is critical to human survival, Legare said. So it's natural for people to find logic in supernatural rituals that emphasize repetition and procedural steps. If doing something once has some effect, then repeating it must have a greater effect. For example, if a mechanic says he inspected something five times, the frequency of his actions leads the customer to overestimate the effectiveness of his work.

To find out how people rate the effectiveness of magical rituals, Legare and graduate student André Souza conducted a study in Brazil, a country suffused with rituals called simpatias. Used for solving problems as varied as quitting smoking, curing asthma and warding off bad luck, simpatias are formulaic rituals that involve various steps and repetition.

The psychologists presented 162 Brazilian respondents several versions of these rituals. Each was modified with different characteristics, such as repetition of procedures, number of steps, number of items used, and the presence of religious icons.

As part of the study, Legare asked the respondents to rate the effectiveness of each ritual. According to the findings, three elements of the simpatias had the biggest influence: number of steps, repetition of procedures and a specified time.

To see how magical rituals are perceived across cultures, the researchers conducted the same study with 68 U.S. respondents of various religious and socioeconomic backgrounds. As the researchers expected, the majority of respondents didn't believe in simpatias. Yet similar to the Brazilians, they were more inclined to believe in rituals involving numerous repetitions and steps. For example, they gave a higher rating for this sadness-curing ritual, which involves numerous steps and repetitions.

In a metal container, put the leaves of a white rose. After that, set fire to the leaves. Get the remaining ash from the leaves and put it in a small plastic bag. Take the small plastic bag and leave it at a crossroad. Repeat the procedure for seven days in a row.

Though simpatias are primarily practiced in Brazil, magical rituals and other superstitions are widely accepted in the United States. Findings from the study provide further insight into how people find logic in the supernatural, regardless of concrete evidence.

http://www.eurekalert.org/pub_releases/2012-07/ehs-nsa072312.php

New study associates excess maternal iodine supplementation with congenital hypothyroidism

Congenital hypothyroidism is thyroid hormone deficiency at birth that, if left untreated, can lead to neurocognitive impairments in infants and children

Cincinnati, OH - Although the World Health Organization recommends 200-300 µg of iodine daily during pregnancy for normal fetal thyroid hormone production and neurocognitive development, the US Institute of Medicine considers 1,100 µg to be the safe upper limit for daily ingestion. A case series scheduled for publication in The Journal of Pediatrics describes three infants who developed congenital hypothyroidism as a result of excess maternal iodine supplementation.

Kara Connelly, MD, and colleagues from Oregon Health & Science University, Doernbecher Children's Hospital, Boston University School of Medicine, State of Oregon Public Health Laboratory, and Randall Children's Hospital at Legacy Emanuel describe three infants with congenital hypothyroidism whose mothers had taken 12.5 mg of iodine daily, 11 times more than the safe upper limit, while pregnant and/or breastfeeding. Iodine is transferred from the mother to the infant through the placenta or breast milk. The three infants had blood iodine levels 10 times higher than healthy control infants (measured from newborn screening filter paper). Excess iodine causes the thyroid to temporarily decrease function to protect against hyperthyroidism (Wolff-Chaikoff effect).

Adults and older children are able to "escape" from this effect after several days of excess iodine to avoid hypothyroidism. However, the immature thyroid glands of fetuses and newborns have not developed this protective effect and are more susceptible to iodine-induced hypothyroidism. Although infants recover normal thyroid function after acute iodine exposure (e.g., a few days of topical iodine application), continuous excessive iodine exposure to the fetal and neonatal thyroid gland may cause long-term harmful effects on thyroid function.

Sources of iodine include nutritional supplements, prenatal vitamins, and seaweed (kelp). According to Dr. Connelly, "The use of iodine-containing supplements in pregnancy and while breastfeeding is recommended in the United States. However, these cases demonstrate the potential hazard of exceeding the safe upper limit for daily ingestion."

Excess iodine ingestion from supplementation is often unrecognized because it is not routine practice to ask mothers of infants with congenital hypothyroidism about nutritional supplements taken during pregnancy. Pregnant or breastfeeding women should discuss the safe dosages of nutritional supplements with their doctors prior to including them in their daily regimen.

http://www.eurekalert.org/pub_releases/2012-07/uow-apo072612.php

A pinch of opportunity makes deep inequality more palatable

Just a tiny hint of opportunity has a disproportionately powerful effect - making unfairness more acceptable to disadvantaged people, new research has found.

A study by Eugenio Proto, an economist from the Centre for Competitive Advantage in the Global Economy (CAGE) at the University of Warwick and two other co-authors, looked at decision-making and how it was influenced by people's perceptions of fairness.

Researchers set up a game between two people where one person (the proposer) offers to split £10 between themselves and their partner, with the proposer able to decide the exact amount he or she is willing to offer. If that amount is not accepted by to the second person (the responder) then neither gets any money.

Known as an ultimatum game, this kind of set-up is frequently studied by economists – but for the first time the CAGE experiment introduced an element of inequality via an increasingly-biased rigged lottery to decide who becomes the proposer, the stronger of the two positions.

It makes sense that when people see clear-cut unfairness, they are less likely to accept it - and this was shown in the results. When the opportunity to become the proposer was 50 per cent – i.e completely fair – responders on average rejected an offer by the proposer of £2.15 or less. And when the chance of becoming the proposer was rigged at 0 per cent – i.e complete inequality – responders rejected offers of £2.96 or less.

But when just a one per cent chance of becoming a proposer was introduced - i.e the lottery was still vastly rigged biased in the proposer's favour - responders rejected offers of £2.53 or less.

In other words the difference between having absolutely no chance and having just a one per cent chance was valued at 43p (£2.96 - £2.53) – proportionally much larger than the 38p value (£2.53 - £2.15) given to the gap between 1 and 50 per cent.

Dr Eugenio Proto, Associate Professor of Economics at the University of Warwick, said he was surprised to discover this quirk in human decision-making. "When you look at it rationally, it makes no sense that people are placing such a disproportionate value on that first one per cent increase in opportunity. "But that slight increase in fairness seems to have some kind of symbolic meaning. "It appears people are happy to accept extreme inequality when they have this tiny carrot dangled in front of them.

"We've got to remember that our experiments are conducted in a lab at a university, not in the real world which is far more complex. "But these results could shed light on why people living in unequal societies aren't more vocal in rejecting unfairness. "It seems that even if people believe they have just the tiniest of chances to become the next Bill Gates, it's enough to keep them tolerant of obvious inequality."

Anirban Kar of the Delhi School of Economics, one of the other two co-authors, added: "It makes sense that when people see clear-cut unfairness in the system, they are more likely to reject an unequal outcome than if the same outcome was generated by a fair system. "Participation in the system, surprisingly enough, even a symbolic one (a modicum of voice) seems to have a significant impact".

The research paper Everyone Wants a Chance: Initial Positions and Fairness in Ultimatum Games was co-authored with Gianluca Grimalda of Universitat Jaume I, Castelló in Spain and Anirban Kar of the Delhi School of Economics, University of Delhi.

http://arstechnica.com/science/2012/07/measuring-the-boss-from-hell/

Measuring the boss from hell

The developers of a "Workplace Arrogance Scale" look at what it's told them.

by John Timmer - July 27 2012, 3:10am TST

Almost everyone has experienced a boss from hell at one point or another in their careers, but how many of us could quantify just how unpleasant the experience is? Thanks to some hard-working psychologists, that's now possible—at least for some forms of unpleasantry. A team has spent four years immersed in the study of workplace arrogance, and emerged with what they term the "Workplace Arrogance Scale," or WARS. In a recent review, they've looked back on what they've learned about arrogance, and the results are pretty ugly.

They illustrate the problem of arrogance with the person behind AIG's disastrous trading group, one Joe Cassano. According to the authors, "Cassano had penchants for yelling, cursing, bad-mouthing others, and belittling colleagues, as well as little tolerance for opposing viewpoints." Years after, with all the problems obvious to most observers, he's taken to blaming the failure on others.

This, the authors note, is typically arrogant behavior: disparaging others as a way to exaggerate your own self-importance, possibly as a way of covering over personal insecurities, all wrapped up in the inability to incorporate feedback from the people you disparage. Although there are elements of narcissism and hubris involved, the authors point out that both of these traits don't require interactions with others. (People can get

overconfident when they're making decisions on their own, and all a narcissist needs is a mirror). Arrogance, in contrast, is all about how a person presents themselves to others.

To get a handle on arrogance, Russ Johnson and Stan Silverman (along with various collaborators and students) spent four years developing and refining WARS. Workers and managers were asked to describe the behaviors they considered arrogant, and these were distilled down to a series of questions that other groups matched to arrogant behavior. Once the questions were refined, they were modified so that people could answer the questions about their own level of arrogance without it being obvious that they were rating a socially undesirable trait. The end result included 26 questions, with answers rated on a five-point scale.

To confirm its accuracy, self-reported scores were compared with ratings provided by co-workers; they matched up very well. The one place where ratings diverged was when the arrogant individual's superiors were asked to rate them. Managers consistently underrated the arrogance of their underlings, a trend that the authors ascribe to the fact that arrogant people know their place in corporate hierarchies, and only unload on people below them on the food chain.

With arrogance quantified, the researchers went back and looked at the personality traits and consequences of arrogant behavior. "As expected, high scores on the WARS are associated with high social dominance and trait anger, as well as with several narcissistic tendencies (e.g., entitlement, superiority)," they found. In addition, arrogance is associated with weaker cognitive ability and low self-esteem (and is probably a coping measure for these).

The authors found that arrogance not only created a poisonous atmosphere at the workplace, but it actively hindered the ability to get projects done: "These results highlight an interesting paradox: Employees who act superior in actuality have inferior performance." The authors suggest this creates a vicious cycle, where failures fuel a greater sense of personal inadequacy, and thus more arrogant behavior. The failures themselves are ascribed to an arrogant person's inability to seriously consider advice from other members of the team: "A weak learning orientation also causes people to identify others to blame when setbacks or failures are experienced, instead of revising performance strategies or uncovering why problems occurred."

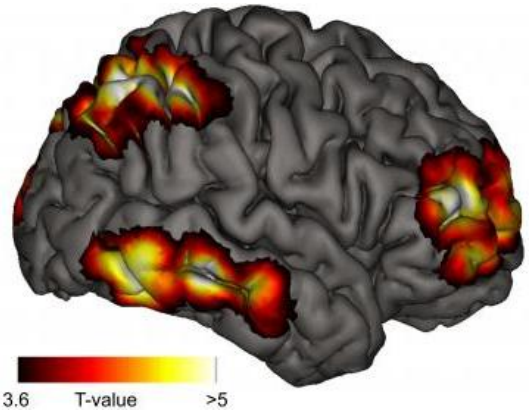
Typically, these sorts of vicious cycles can be hard to break, but that may not be the case with arrogance. "Fortunately arrogance is a cluster of changeable behaviors, driven by relatively malleable beliefs," the authors note. But doing so would necessarily involve identifying the problem and intervening, and the earlier the better. Of course, judging by the AIG example given earlier, there are probably some workplace environments where arrogance may not be considered a negative personality trait.

The Industrial-Organizational Psychologist, 2012. DOI not available, but ***the article is open access****.*

http://www.eurekalert.org/pub_releases/2012-07/m-tso072712.php

The seat of meta-consciousness in the brain

Studies of lucid dreamers visualize which centers of the brain become active when we become aware of ourselves



Which areas of the brain help us to perceive our world in a self-reflective manner is difficult to measure. During wakefulness, we are always conscious of ourselves. In sleep, however, we are not. But there are people, known as lucid dreamers, who can become aware of dreaming during sleep. Studies employing magnetic resonance tomography (MRT) have now been able to demonstrate that a specific cortical network consisting of the right dorsolateral prefrontal cortex, the frontopolar regions and the precuneus is activated when this lucid consciousness is attained. All of these regions are associated with self-reflective functions. This research into lucid dreaming gives the authors of the latest study insight into the neural basis of human consciousness.

This shows the brain regions activated more strongly during lucid dreaming than in a normal dream. **MPI of Psychiatry**

The human capacity of self-perception, self-reflection and consciousness development are among the unsolved mysteries of neuroscience. Despite modern imaging techniques, it is still impossible to fully visualise what goes on in the brain when people move to consciousness from an unconscious state. The problem lies in the fact that it is difficult to watch our brain during this transitional change. Although this process is the same, every time a person awakens from sleep, the basic activity of our brain is usually greatly reduced during deep sleep. This makes it impossible to clearly delineate the specific brain activity underlying the regained self-perception and

consciousness during the transition to wakefulness from the global changes in brain activity that takes place at the same time.

Scientists from the Max Planck Institutes of Psychiatry in Munich and for Human Cognitive and Brain Sciences in Leipzig and from Charité in Berlin have now studied people who are aware that they are dreaming while being in a dream state, and are also able to deliberately control their dreams. Those so-called lucid dreamers have access to their memories during lucid dreaming, can perform actions and are aware of themselves - although remaining unmistakably in a dream state and not waking up. As author Martin Dresler explains, "In a normal dream, we have a very basal consciousness, we experience perceptions and emotions but we are not aware that we are only dreaming. It's only in a lucid dream that the dreamer gets a meta-insight into his or her state."

By comparing the activity of the brain during one of these lucid periods with the activity measured immediately before in a normal dream, the scientists were able to identify the characteristic brain activities of lucid awareness.

"The general basic activity of the brain is similar in a normal dream and in a lucid dream," says Michael Czisch, head of a research group at the Max Planck Institute of Psychiatry. "In a lucid state, however, the activity in certain areas of the cerebral cortex increases markedly within seconds. The involved areas of the cerebral cortex are the right dorsolateral prefrontal cortex, to which commonly the function of self-assessment is attributed, and the frontopolar regions, which are responsible for evaluating our own thoughts and feelings. The precuneus is also especially active, a part of the brain that has long been linked with self-perception." The findings confirm earlier studies and have made the neural networks of a conscious mental state visible for the first time.

Martin Dresler, PhD; Renate Wehrle, PhD; Victor I. Spoormaker, PhD; Stefan P. Koch, PhD; Florian Holsboer, MD, PhD; Axel Steiger, MD; Hellmuth Obrig, MD; Philipp G. Sämann, MD; Michael Czisch, PhD (2012) ***Neural Correlates of Dream Lucidity Obtained from Contrasting Lucid versus Non-Lucid REM Sleep: A Combined EEG/fMRI Case Study SLEEP*** *2012;35(7):1017-1020*

http://www.eurekalert.org/pub_releases/2012-07/uoc--urd072712.php

UCLA researchers discover that fluoxetine - a.k.a., Prozac - is effective as an anti-viral

UCLA researchers have come across an unexpected potential use for fluoxetine – commonly known as Prozac – which shows promise as an antiviral agent.

The discovery could provide another tool in treating human enteroviruses that sicken and kill people in the U.S. and around the world.

Human enteroviruses are members of a genus containing more than 100 distinct RNA viruses responsible for various life threatening infections, such as poliomyelitis and encephalitis. While immunization has all but eliminated the poliovirus, the archetype for the genus, no antiviral drugs currently exist for the treatment of enterovirus infections, which are often severe and potentially fatal. In view of its favorable pharmacokinetics and safety profile of fluoxetine — which is in a class of compounds typically used in the treatment of depression, anxiety disorders and some personality disorders — the research team found that it warrants additional study as a potential antiviral agent for enterovirus infections.

Using molecular screening, the UCLA research team from the Department of Pediatrics, the California NanoSystems Institute and the Department of Molecular and Medical Pharmacology found that fluoxetine was a potent inhibitor of coxsackievirus replication. This is one of the viruses that include polio and echovirus that is found in the gastrointestinal tract. Exposure to the virus causes other opportunistic infections and diseases.

"The discovery of unexpected antiviral activity of fluoxetine is scientifically very significant and draws our attention to previously overlooked potential targets of fluoxetine and other psychogenic drugs," said Robert Damoiseaux, scientific director of the Molecular Screening Shared Resource at the California NanoSystems Institute. "Part of our follow-up work will be the discovery of these unconventional targets for fluoxetine and other drugs of the same class and how these targets intersect with the known targets of this drug class."

Paul Krogstad, professor of pediatrics and molecular and medical pharmacology, added that understanding the mechanisms of action of fluoxetine and norfloxetine against coxsackieviruses "will add to our understanding of enterovirus replication and lead to assessment of their potential clinical utility for the future treatment of serious enterovirus infections."

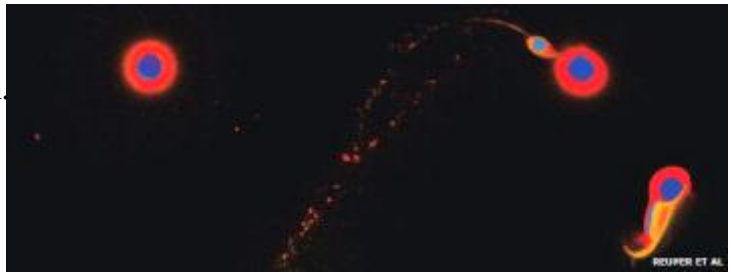
The research team found that fluoxetine did not interfere with either viral entry or translation of the viral genome. Instead, fluoxetine and norfluoxetine markedly reduced the production of viral RNA and protein.

The study was published on July 2 in the journal of Antimicrobial Agents and Chemotherapy. Study authors also include Jun Zuo, Kevin K. Quinn, Steve Kye, and Paige Cooper from the Department of Pediatrics. The study was supported by grants from the Today's and Tomorrow's Children's Fund and the UCLA Department of Pediatrics Nanopediatrics Program.

http://www.bbc.co.uk/news/science-environment-19011013

Moon formation: Was it a 'hit and run' accident?

Scientists have proposed a fresh idea in the long-running debate about how the Moon was formed.



Computer simulations suggest a large, fast-moving body impacted the Earth to create the Moon

What is certain is that some sort of impact from another body freed material from the young Earth and the resulting debris coalesced into today's Moon. But the exact details of the impactor's size and speed have remained debatable. In *a report online* to be published in Icarus, researchers suggest that the crash happened with a much larger, faster body than previously thought.

Such theories need to line up with what we know about the Moon, about the violent processes that set off the creation of moons, and what computer simulations show about the more sedate gravitational "gathering-up" that finishes the job.

In recent years, scientists' best guess for how the Moon formed has been that a relatively slowly moving, Mars-sized body called Theia crashed into the very young Earth. That would have heated both of them up and released a vast cloud of molten material, much of which cooled and clumped together to give rise to the Moon. That would suggest that the Moon is made up of material from both the early Earth and from Theia, which should be somewhat different from one another.

Impact factor

What complicates that story is a number of observations of "isotopic compositions" - the ratios of naturally-occurring variants of some atoms - taken from the Earth and from lunar samples.

While the Moon has an iron core like Earth, it does not have the same fraction of iron - and computer models supporting the Theia impact idea show just the same thing. However, the ratio of the Earth's and the Moon's oxygen isotopes is nearly identical, and not all scientists agree on how that may have come about.

Confounding the issue further, scientists reporting in Nature Geoscience in March said that a fresh analysis of lunar samples taken by the Apollo missions showed that the Moon and the Earth shared an uncannily similar isotope ratio of the metal titanium. That, they said, gave weight to the idea that the Moon was somehow cleaved from the Earth itself.

Now, Andreas Reufer, of the Center for Space and Habitability in Bern, Switzerland, and colleagues have run computer simulations that suggest another possibility: that a far larger and faster-moving body made an even more glancing blow with the young Earth. They said this body would have lost only a small amount of material and most of it would have continued on after the "hit-and-run". That results in a much hotter disc of debris from the collision, but matches up with what would be needed to make a Moon-sized body.

The authors suggest that since most of what became the Moon would have been liberated by the impact from the Earth, similarities between the isotope fractions should be more pronounced.

More analyses of different elements within lunar samples - and a great deal more computer simulations that result in a Moon like our own - will be needed to settle the debate.

http://www.sciencedaily.com/releases/2012/07/120727095538.htm

Molecule Found That Inhibits Recovery from Stroke

Researchers at UCLA have identified a novel molecule in the brain that, after stroke, blocks the formation of new connections between neurons.

ScienceDaily - As a result, it limits the brain's recovery. In a mouse model, the researchers showed that blocking this molecule -- called ephrin-A5--induces axonal sprouting, that is, the growth of new connections between the brain's neurons, or cells, and as a result promotes functional recovery. If duplicated in humans, the identification of this molecule could pave the way for a more rapid recovery from stroke and may allow a synergy with existing treatments, such as physical therapy. Dr. S. Thomas Carmichael, professor of neurology, and colleagues performed the study. The research appears online this week in the journal PNAS.

Stroke is the leading cause of adult disability because of the brain's limited capacity for repair. An important process in recovery after stroke may be in the formation of new connections, termed axonal sprouting. The adult brain inhibits axonal sprouting and the formation of these connections. In previous work the researchers found, paradoxically, that the brain sends mixed signals after a stroke -- activating molecules that both stimulate and inhibit axonal sprouting. In this present work, the researchers have identified the effect of one molecule that

inhibits axonal sprouting and determined the new connections in the brain that are necessary to form for recovery.
The researchers also developed a new tissue bioengineering approach for delivering drugs to the brain after stroke. This approach uses a biopolymer hydrogel, or a gel of naturally occurring brain proteins, to release neural repair molecules directly to the target region for recovery in stroke -- the tissue adjacent to the center of the stroke.
Last, the paper also shows that the more behavioral activity after stroke, such as the amount an impaired limb is used, the more new connections are directly stimulated to form in the injured brain. This direct link between movement patterns, like those that occur in neurorehabilitation, and the formation of new brain connections, provides a biological mechanism for the effects of some forms of physical therapy after stroke.
J. J. Overman, A. N. Clarkson, I. B. Wanner, W. T. Overman, I. Eckstein, J. L. Maguire, I. D. Dinov, A. W. Toga, S. T. Carmichael. PNAS Plus: A role for ephrin-A5 in axonal sprouting, recovery, and activity-dependent plasticity after stroke. Proceedings of the National Academy of Sciences, 2012; DOI: 10.1073/pnas.1204386109

http://www.sciencedaily.com/releases/2012/07/120727102434.htm

Accelerated Resolution Therapy Significantly Reduces PTSD Symptoms, Researchers Report

Researchers have shown that brief treatments with Accelerated Resolution Therapy substantially reduce symptoms associated with post-traumatic stress disorder

ScienceDaily - Researchers at the University of South Florida (USF) College of Nursing have shown that brief treatments with Accelerated Resolution Therapy (ART) substantially reduce symptoms associated with post-traumatic stress disorder (PTSD) including, depression, anxiety, sleep dysfunction and other physical and psychological symptoms. The findings of this first study of ART appear in an on-line article published June 18, 2012 in the Journal Behavioral Sciences.
ART is being studied as an alternative to traditional PTSD treatments that use drugs or lengthy psychotherapy sessions. The talk therapy uses back-and-forth eye movements as the patient fluctuates between talking about a traumatic scene, and using the eye movements to help process that information to integrate the memories from traumatic events. The two major components of ART include minimizing or eliminating physiological response associated traumatic memories, and re-envisioning painful or disturbing experiences with a novel technique known as Voluntary Image Replacement.
For the initial study, USF researchers recruited 80 adult veterans and civilians, ages 21 to 60, in the Tampa Bay area. Before receiving ART, patients were tested for symptoms of PTSD and depression, with the vast majority testing positive, 80 percent for PTSD and 90 percent for depression. After the patients received ART-based psychotherapy, the research team reported a dramatic reversal in symptoms. In as few as one to four sessions, those showing symptoms had decreased to only 17 percent for PTSD and 28 percent for depression. Improvements were also seen in trauma-related growth and self-compassion in just one to four treatments.
"From this initial assessment, ART appears to be a brief, safe, and effective treatment for symptoms of PTSD," the report concludes. "Early results are very promising," said principal investigator Kevin E. Kip, PhD, professor and executive director of the USF College of Nursing Research Center. "Most people who came in to be treated had very high scores for PTSD, and after treatment, the majority had very large reductions. The treatment also reduced other symptoms, like depression, as well as improved sleep."
According to the National Institutes of Health (NIH), PTSD has become an epidemic in the United States. Recent NIH statistics show more than 7.7 million American adults and as many as 31 percent of war veterans suffer from PTSD. They experience mild to extreme symptoms, often with greatly impaired quality of life and physical and psychological functioning.
ART is a particularly promising alternative to traditional PTSD treatments, because it uses no drugs, has no serious adverse effects, and can improve symptoms in -few therapy sessions. The compelling results achieved principally with civilians in the first study prompted the USF College of Nursing to seek and facilitate expansion of a second ongoing ART study funded by the U.S. Army. This expanded study encompasses active duty service members, veterans, and reservists across all branches of service at sites around the country.
"As part of RESTORE LIVES at USF, the innovative nursing research being conducted by Dr. Kip and his team demonstrates our commitment to the health and welfare of our nation's military, veterans and their families," said Dianne Morrison-Beedy, PhD, senior associate vice president of USF Health and dean of the College of Nursing. "We are energized that the Department of Defense has agreed to extend the scope of the current study funded by the U.S. Army. The results that the ART studies have shown so far are truly amazing, and offers new hope to those suffering from PTSD."

Earlier this month, the USF research team traveled to Las Vegas to conduct the first mobile ART study with military reservists. "We are happy about our collaboration with USF College of Nursing," said Navy Lt. Cmdr. Raul Rojas, commanding officer for the Naval Operations Support Center (NOSC). "We're honored to be the first West Coast study site for the USF College of Nursing's ART study. "We hope our relationship will help get the word out to those who can benefit from the study."

ART is one of the five sub-studies of the USF College of Nursing's Research to Rehabilitate/Restore the Lives of Veterans, Service Members and their Families (RESTORE LIVES) grant funded and administered by the U.S. Army Medical Research and Materiel Command and the Telemedicine & Advanced Technology Research Center (TATRC) at Fort Detrick, MD.

"All the pieces are coming together, with published results on ART, effectiveness leading to Department of Defense approval to extend the scope of the study, and our first national study site in Las Vegas. It looks like we are closer to getting a more efficient evidence-based treatment into place that will actually eliminate the traumatic response to memories and bring relief to the troops and their families," said co-principal investigator Carrie Elk, PhD, assistant professor and military liaison at the USF College of Nursing.

Kevin E. Kip, Carrie A. Elk, Kelly L. Sullivan, Rajendra Kadel, Cecile A. Lengacher, Christopher J. Long, Laney Rosenzweig, Amy Shuman, Diego F. Hernandez, Jennifer D. Street, Sue Ann Girling, David M. Diamond. Brief Treatment of Symptoms of Post-Traumatic Stress Disorder (PTSD) by Use of Accelerated Resolution Therapy (ART®). Behavioral Sciences, 2012; 2 (2): 115 DOI: 10.3390/bs2020115

http://nyti.ms/OwMNYd

Weather Extremes Leave Parts of U.S. Grid Buckling

The nation's infrastructure are being taxed to worrisome degrees by heat, drought and vicious storms

By MATTHEW L. WALD and JOHN SCHWARTZ

WASHINGTON - From highways in Texas to nuclear power plants in Illinois, the concrete, steel and sophisticated engineering that undergird the nation's infrastructure are being taxed to worrisome degrees by heat, drought and vicious storms.

On a single day this month here, a US Airways regional jet became stuck in asphalt that had softened in 100-degree temperatures, and a subway train derailed after the heat stretched the track so far that it kinked - inserting a sharp angle into a stretch that was supposed to be straight. In East Texas, heat and drought have had a startling effect on the clay-rich soils under highways, which "just shrink like crazy," leading to "horrendous cracking," said Tom Scullion, senior research engineer with the Texas Transportation Institute at Texas A&M University. In Northeastern and Midwestern states, he said, unusually high heat is causing highway sections to expand beyond their design limits, press against each other and "pop up," creating jarring and even hazardous speed bumps.

Excessive warmth and dryness are threatening other parts of the grid as well. In the Chicago area, a twin-unit nuclear plant had to get special permission to keep operating this month because the pond it uses for cooling water rose to 102 degrees; its license to operate allows it to go only to 100. According to the Midwest Independent System Operator, the grid operator for the region, a different power plant had had to shut because the body of water from which it draws its cooling water had dropped so low that the intake pipe became high and dry; another had to cut back generation because cooling water was too warm.

The frequency of extreme weather is up over the past few years, and people who deal with infrastructure expect that to continue. Leading climate models suggest that weather-sensitive parts of the infrastructure will be seeing many more extreme episodes, along with shifts in weather patterns and rising maximum (and minimum) temperatures. "We've got the 'storm of the century' every year now," said Bill Gausman, a senior vice president and a 38-year veteran at the Potomac Electric Power Company, which took eight days to recover from the June 29 "derecho" storm that raced from the Midwest to the Eastern Seaboard and knocked out power for 4.3 million people in 10 states and the District of Columbia.

In general, nobody in charge of anything made of steel and concrete can plan based on past trends, said Vicki Arroyo, who heads the Georgetown Climate Center at Georgetown University Law Center in Washington, a clearinghouse on climate-change adaptation strategies.

Highways, Mr. Scullion noted, are designed for the local climate, taking into account things like temperature and rainfall. "When you get outside of those things, man, all bets are off." As weather patterns shift, he said, "we could have some very dramatic failures of highway systems."

Adaptation efforts are taking place nationwide. Some are as huge as the multibillion-dollar effort to increase the height of levees and flood walls in New Orleans because of projections of rising sea levels and stronger storms

to come; others as mundane as resizing drainage culverts in Vermont, where Hurricane Irene damaged about 2,000 culverts. “They just got blown out,” said Sue Minter, the Irene recovery officer for the state.
In Washington, the subway system, which opened in 1976, has revised its operating procedures. Authorities will now watch the rail temperature and order trains to slow down if it gets too hot. When railroads install tracks in cold weather, they heat the metal to a “neutral” temperature so it reaches a moderate length, and will withstand the shrinkage and growth typical for that climate. But if the heat historically seen in the South becomes normal farther north, the rails will be too long for that weather, and will have an increased tendency to kink. So railroad officials say they will begin to undertake much more frequent inspection.
Some utilities are re-examining long-held views on the economics of protecting against the weather. Pepco, the utility serving the area around Washington, has repeatedly studied the idea of burying more power lines, and the company and its regulators have always decided that the cost outweighed the benefit. But the company has had five storms in the last two and a half years for which recovery took at least five days, and after the derecho last month, the consensus has changed. Both the District of Columbia and Montgomery County, Md., have held hearings to discuss the option — though in the District alone, the cost would be $1.1 billion to $5.8 billion, depending on how many of the power lines were put underground.
Even without storms, heat waves are changing the pattern of electricity use, raising peak demand higher than ever. That implies the need for new investment in generating stations, transmission lines and local distribution lines that will be used at full capacity for only a few hundred hours a year. “We build the system for the 10 percent of the time we need it,” said Mark Gabriel, a senior vice president of Black & Veatch, an engineering firm. And that 10 percent is “getting more extreme.”
Even as the effects of weather extremes become more evident, precisely how to react is still largely an open question, said David Behar, the climate program director for the San Francisco Public Utilities Commission. “We’re living in an era of assessment, not yet in an area of adaptation,” he said.
He says that violent storms and forest fires can be expected to affect water quality and water use: runoff from major storms and falling ash could temporarily shut down reservoirs. Deciding how to address such issues is the work of groups like the Water Utility Climate Alliance, of which he is a member. “In some ways, the science is still catching up with the need of water managers for high-quality projection,” he said.
Some needs are already known. San Francisco will spend as much as $40 million to modify discharge pipes for treated wastewater to prevent bay water from flowing back into the system.
Even when state and local officials know what they want to do, they say they do not always get the cooperation they would like from the federal government. Many agencies have officially expressed a commitment to plan for climate change, but sometimes the results on the ground can be frustrating, said Ms. Minter of Vermont. For instance, she said, Vermont officials want to replace the old culverts with bigger ones. “We think it’s an opportunity to build back in a more robust way,” she said. But the Federal Emergency Management Agency wants to reuse the old culverts that washed out, or replace them with similar ones, she said.
Ms. Arroyo of Georgetown said the federal government must do more. “They are not acknowledging that the future will look different from the past,” she said, “and so we keep putting people and infrastructure in harm’s way.” *Matthew L. Wald reported from Washington, and John Schwartz from New York.*

http://www.eurekalert.org/pub_releases/2012-07/osu-c2d072712.php

Chronic 2000-04 drought, worst in 800 years, may be the 'new normal'

Scientists say those conditions will become the "new normal" for most of the coming century

CORVALLIS, Ore. – The chronic drought that hit western North America from 2000 to 2004 left dying forests and depleted river basins in its wake and was the strongest in 800 years, scientists have concluded, but they say those conditions will become the "new normal" for most of the coming century.
Such climatic extremes have increased as a result of global warming, a group of 10 researchers reported today in Nature Geoscience. And as bad as conditions were during the 2000-04 drought, they may eventually be seen as the good old days.
Climate models and precipitation projections indicate this period will actually be closer to the "wet end" of a drier hydroclimate during the last half of the 21st century, scientists said.
Aside from its impact on forests, crops, rivers and water tables, the drought also cut carbon sequestration by an average of 51 percent in a massive region of the western United States, Canada and Mexico, although some areas were hit much harder than others. As vegetation withered, this released more carbon dioxide into the atmosphere, with the effect of amplifying global warming.
"Climatic extremes such as this will cause more large-scale droughts and forest mortality, and the ability of vegetation to sequester carbon is going to decline," said Beverly Law, a co-author of the study, professor of

global change biology and terrestrial systems science at Oregon State University, and former science director of AmeriFlux, an ecosystem observation network.
"During this drought, carbon sequestration from this region was reduced by half," Law said. "That's a huge drop. And if global carbon emissions don't come down, the future will be even worse."
This research was supported by the National Science Foundation, NASA, U.S. Department of Energy, and other agencies. The lead author was Christopher Schwalm at Northern Arizona University. Other collaborators were from the University of Colorado, University of California at Berkeley, University of British Columbia, San Diego State University, and other institutions.
It's not clear whether or not the current drought in the Midwest, now being called one of the worst since the Dust Bowl, is related to these same forces, Law said. This study did not address that, and there are some climate mechanisms in western North America that affect that region more than other parts of the country.
But in the West, this multi-year drought was unlike anything seen in many centuries, based on tree ring data. The last two periods with drought events of similar severity were in the Middle Ages, from 977-981 and 1146-1151. The 2000-04 drought affected precipitation, soil moisture, river levels, crops, forests and grasslands.
Ordinarily, Law said, the land sink in North America is able to sequester the equivalent of about 30 percent of the carbon emitted into the atmosphere by the use of fossil fuels in the same region. However, based on projected changes in precipitation and drought severity, scientists said that this carbon sink, at least in western North America, could disappear by the end of the century.
"Areas that are already dry in the West are expected to get drier," Law said. "We expect more extremes. And it's these extreme periods that can really cause ecosystem damage, lead to climate-induced mortality of forests, and may cause some areas to convert from forest into shrublands or grassland."
During the 2000-04 drought, runoff in the upper Colorado River basin was cut in half. Crop productivity in much of the West fell 5 percent. The productivity of forests and grasslands declined, along with snowpacks. Evapotranspiration decreased the most in evergreen needleleaf forests, about 33 percent.
The effects are driven by human-caused increases in temperature, with associated lower soil moisture and decreased runoff in all major water basins of the western U.S., researchers said in the study.
Although regional precipitations patterns are difficult to forecast, researchers in this report said that climate models are underestimating the extent and severity of drought, compared to actual observations. They say the situation will continue to worsen, and that 80 of the 95 years from 2006 to 2100 will have precipitation levels as low as, or lower than, this "turn of the century" drought from 2000-04.
"Towards the latter half of the 21st century the precipitation regime associated with the turn of the century drought will represent an outlier of extreme wetness," the scientists wrote in this study.
These long-term trends are consistent with a 21st century "megadrought," they said.

http://www.sciencedaily.com/releases/2012/07/120729142319.htm

Record Efficiency for Next-Generation Solar Cells

Researchers have made a breakthrough in the development of colloidal quantum dot (CQD) films, leading to the most efficient CQD solar cell ever.

ScienceDaily - Researchers from the University of Toronto (U of T) and King Abdullah University of Science & Technology (KAUST) have made a breakthrough in the development of colloidal quantum dot (CQD) films, leading to the most efficient CQD solar cell ever. Their work is featured in a letter published in Nature Nanotechnology.
The researchers, led by U of T Engineering Professor Ted Sargent, created a solar cell out of inexpensive materials that was certified at a world-record 7.0% efficiency. "Previously, quantum dot solar cells have been limited by the large internal surface areas of the nanoparticles in the film, which made extracting electricity difficult," said Dr. Susanna Thon, a lead co-author of the paper. "Our breakthrough was to use a combination of organic and inorganic chemistry to completely cover all of the exposed surfaces."
Quantum dots are semiconductors only a few nanometres in size and can be used to harvest electricity from the entire solar spectrum -- including both visible and invisible wavelengths. Unlike current slow and expensive semiconductor growth techniques, CQD films can be created quickly and at low cost, similar to paint or ink. This research paves the way for solar cells that can be fabricated on flexible substrates in the same way newspapers are rapidly printed in mass quantities.
The U of T cell represents a 37% increase in efficiency over the previous certified record. In order to improve efficiency, the researchers needed a way to both reduce the number of "traps" for electrons associated with poor surface quality while simultaneously ensuring their films were very dense to absorb as much light as possible. The solution was a so-called "hybrid passivation" scheme.

"By introducing small chlorine atoms immediately after synthesizing the dots, we're able to patch the previously unreachable nooks and crannies that lead to electron traps," explained doctoral student and lead co-author Alex Ip. "We follow that by using short organic linkers to bind quantum dots in the film closer together."
Work led by Professor Aram Amassian of KAUST showed that the organic ligand exchange was necessary to achieve the densest film. "The KAUST group used state-of-the-art synchrotron methods with sub-nanometer resolution to discern the structure of the films and prove that the hybrid passivation method led to the densest films with the closest-packed nanoparticles," stated Professor Amassian.
The advance opens up many avenues for further research and improvement of device efficiencies, which could contribute to a bright future with reliable, low cost solar energy. According to Professor Sargent, "Our world urgently needs innovative, cost-effective ways to convert the sun's abundant energy into usable electricity. This work shows that the abundant materials interfaces inside colloidal quantum dots can be mastered in a robust manner, proving that low cost and steadily-improving efficiencies can be combined."
Alexander H. Ip, Susanna M. Thon, Sjoerd Hoogland, Oleksandr Voznyy, David Zhitomirsky, Ratan Debnath, Larissa Levina, Lisa R. Rollny, Graham H. Carey, Armin Fischer, Kyle W. Kemp, Illan J. Kramer, Zhijun Ning, André J. Labelle, Kang Wei Chou, Aram Amassian, Edward H. Sargent. Hybrid passivated colloidal quantum dot solids. Nature Nanotechnology, 2012; DOI: 10.1038/nnano.2012.127

http://www.sciencedaily.com/releases/2012/07/120729205034.htm

Kidney Cancer Vaccine Successful in Clinical Trials

Researchers have published the results of two clinical studies using the kidney-cancer vaccine IMA901

ScienceDaily - Researchers at the University of Tübingen and immatics biotechnologies GmbH -- a start-up by Tübingen scientists -- have published the results of two clinical studies using the kidney-cancer vaccine IMA901 in the latest edition of Nature Medicine.
IMA901 is used to treat patients with cancer of the kidneys. It is composed of ten synthetic tumor-associated peptides (TUMAPs), which activate the body's own killer T-cells against the tumor. Unlike chemotherapy, this process targets the body's immune responses and mobilizes them to attack the cancer. The studies show that this active immunization against cancer can be successful and extend the life of a patient for longer than even the latest chemotherapy techniques -- with far fewer side-effects.
Prof. Dr. Hans-Georg Rammensee, head of Immunology at the University of Tübingen and co-founder of immatics biotechnologies, says: "This work is a milestone in the development of cancer immune therapies. The principle applied here -- of active immunization against cancer antigens previously identified in cancer cells -- can be used against practically all types of cancer. University of Tübingen researchers have published similarly successful clinical studies in the case of bowel cancer, also in collaboration with immatics, and prostate cancer. Immatics is currently carrying out studies on treatments for glioblastoma [a common and malignant brain tumor] and further studies for treating liver cancer and ovarian carcinoma are in the pipeline."
Prof. Dr. Arnulf Stenzl, head of Urology at the University Hospitals, who supervised the clinical studies, explains: "All of the medications previously used have brought about a clear improvement in reducing tumor growth in cancer of the kidneys, but they did not lead to the desired extension of the patient's life and certainly did not cure the patient. So from the clinical point of view, the further development by immatics of active immunization in combination with a low dose of one-off chemotherapy is a significant step in the treatment of kidney cell carcinoma -- and possibly other malignant tumors as well."
One particular aspect of this kidney cancer study is its uniquely exhaustive analysis of the immune response against the cancer antigens -- done with the help of biomarkers. In particular, the characteristics of the white blood cells involved were precisely detailed during the course of the immunization. Complex logistics were required to get these cells frozen and transported to Tübingen from study centers all over Europe, while ensuring they were in a fit state to be analyzed.
The study shows that in kidney-cancer patients with documented T-cell reactions against two or more tumor-associated peptides, the immune reaction and clinical progress were clearly linked. That confirms the hypothesis that cancer treatments can be further developed by broadly activating the immune system against various target structures on the surface of the tumor. The article also describes the researchers' aims of identifying biomarkers which could help give a more accurate prediction of how long certain groups of patients may live after being treated with IMA901. An analysis of more than 300 potential biomarkers turned up a number of them which are currently being tested in a new phase-3 study by immatics for their ability to show an immune response and the extension of patient life after treatment with IMA901.

Steffen Walter, Toni Weinschenk, Arnulf Stenzl, Romuald Zdrojowy, Anna Pluzanska, Cezary Szczylik, Michael Staehler, Wolfram Brugger, Pierre-Yves Dietrich, Regina Mendrzyk, Norbert Hilf, Oliver Schoor, Jens Fritsche, Andrea Mahr, Dominik Maurer, Verona Vass, Claudia Trautwein, Peter Lewandrowski, Christian Flohr, Heike Pohla, Janusz J Stanczak, Vincenzo Bronte, Susanna Mandruzzato, Tilo Biedermann, Graham Pawelec, Evelyna Derhovanessian, Hisakazu Yamagishi, Tsuneharu Miki, Fumiya Hongo, Natsuki Takaha, Kosei Hirakawa, Hiroaki Tanaka, Stefan Stevanovic, Jürgen Frisch, Andrea Mayer-Mokler, Alexandra Kirner, Hans-Georg Rammensee, Carsten Reinhardt, Harpreet Singh-Jasuja. Multipeptide immune response to cancer vaccine IMA901 after single-dose cyclophosphamide associates with longer patient survival. Nature Medicine, 2012; DOI: 10.1038/nm.2883

http://www.eurekalert.org/pub_releases/2012-07/uorm-wsb072512.php

Would sliding back to pre-PSA era cancel progress in prostate cancer?

Eliminating the PSA test would be a big step backwards and likely result in rising numbers of men with metastatic cancer at the time of diagnosis

Eliminating the PSA test to screen for prostate cancer would be taking a big step backwards and would likely result in rising numbers of men with metastatic cancer at the time of diagnosis, predicted a University of Rochester Medical Center analysis published in the journal, Cancer. The URMC study suggests that the prostate-specific antigen (PSA) test and early detection may prevent up to 17,000 cases of metastatic prostate cancer a year. Data shows, in fact, that if age-specific pre-PSA era incidence rates were to occur in the present day, the number of men whose cancer had already spread at diagnosis would be three times greater.

"Our findings are very important in light of the recent controversy over PSA testing," said Edward M. Messing, M.D., study co-author, chair of Urology at URMC, and president of the Society of Urologic Oncology. "Yes, there are trade-offs associated with the PSA test and many factors influence the disease outcome. And yet our data are very clear: not doing the PSA test will result in many men presenting with far more advanced prostate cancer. And almost all men with metastasis at diagnosis will die from prostate cancer."

Prostate cancer usually occurs in older men, and is the second leading cause of cancer death in the male population. In 2012 an estimated 241,740 new cases will be diagnosed and 28,000 deaths will occur. Prognosis depends on whether the cancer has spread outside the prostate gland, and the degree to which the cancer cells are abnormal.

In 2011 the U.S. Preventative Services Task Force recommended against PSA screening in all men, prompting criticism from the medical community. The government panel reviewed scientific evidence and concluded that screening has little or no benefit, or that the harms of early detection outweigh the benefits. One major concern, for example, was that doctors are screening for, finding, and treating non-aggressive cancers that might have remained quiet, causing patients to needlessly suffer from serious treatment side effects such as incontinence or erectile dysfunction.

The U.S. Task Force recommendations against screening caused some confusion, and in response, a special panel of experts from the American Society of Clinical Oncology this month issued its own opinion. The ASCO panel decided that for men with a life expectancy of less than 10 years, general screening with the PSA test should be discouraged. For men with a longer life expectancy, though, it is recommended that physicians discuss with patients whether the PSA test is appropriate for them.

Messing's study looked back at the era prior to 1986, when no one was routinely screened for prostate cancer with a PSA test. To analyze the effect of screening on stage of disease at initial diagnosis, Messing and Emelian Scosyrev, Ph.D., assistant professor of Urology, reviewed data from 1983 to 2008 kept by the nation's largest cancer registry, Surveillance, Epidemiology and End-Results or SEER. They compared SEER data from the pre-PSA era (1983 to '85) to the current era of widespread PSA use (2006 to 2008), and adjusted for age, race, and geographic variations in the United States population.

Approximately 8,000 cases of prostate cancer with metastases at initial presentation occurred in the U.S. in 2008. Using a mathematical model to estimate the number of metastatic cases that would be expected to occur in 2008 in the absence of PSA screening, Scosyrev and Messing predicted the number would be 25,000.

The authors emphasized the study was observational and has some limitations. In particular it is impossible to know if the PSA test and early detection is solely responsible for the fewer cases of metastasis at diagnosis in 2008.

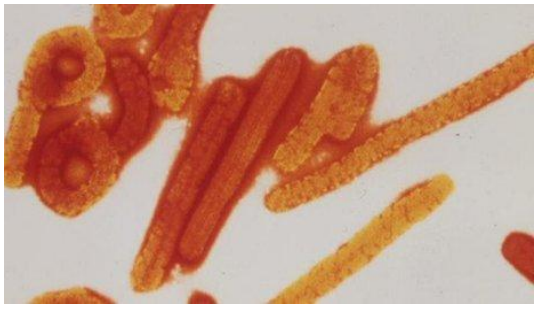
The potential lead-time of screening also should be considered when interpreting the study findings, Scosyrev said. For some people an earlier stage of cancer at diagnosis may not always translate into better survival. This may happen, for example, in cases when the cancer had already metastasized at the time of screening, but the metastasis remained undetected. In general, however, the study concluded that massive screening and PSA awareness efforts during the 1990s and early 2000s resulted in substantial shifts toward earlier-stage disease and fewer cases of metastases at diagnosis.

In the United States over the most recent 20 years, Messing said, prostate cancer death rates have been reduced by close to 40%. This occurred without substantial changes in how men were treated (via surgery and radiation therapy). Other models published in the scientific literature have suggested that more than 50% of this reduction is due to early detection. *The Ashley Family Foundation funded the URMC research.*

http://www.bbc.co.uk/news/world-africa-19031860

Outbreak of Ebola in Uganda kills 13

An outbreak of the deadly Ebola virus has killed at least 13 people and infected a further seven in Uganda.



The health ministry says emergency measures are in place to deal with the outbreak, which began in late June but has only just been confirmed as Ebola. The cases have been reported in Kibaale district, about 170km (100 miles) to the west of the capital Kampala.
Officials say most are linked to one family, who may have contracted the virus while attending a funeral. Another suspected infection, at Kampala's Mulago hospital, is also being investigated by doctors, says the BBC's Catherine Byaruhanga in the capital.

Up to 90% of those who contract Ebola die from the virus

Ebola is one of the most virulent diseases in the world. It is spread by close personal contact, and kills up to 90% of those who become infected. There is no vaccine for the virus. Symptoms include sudden onset of fever, weakness, headache, vomiting and impaired kidneys.
The first victim of this outbreak was a pregnant woman. More than 1,200 deaths from the virus have been recorded since it was discovered in 1976. Uganda has seen three major outbreaks over the past 12 years. The deadliest was in 2000 when 425 people were infected. More than half of them died.

http://www.eurekalert.org/pub_releases/2012-07/uou-wtw072612.php

When the world burned less

Study: Cool climate, not population loss, led to fewer fires

SALT LAKE CITY - In the years after Columbus' voyage, burning of New World forests and fields diminished significantly – a phenomenon some have attributed to decimation of native populations by European diseases. But a new University of Utah-led study suggests global cooling resulted in fewer fires because both preceded Columbus in many regions worldwide.
"The drop in fire [after about A.D. 1500] has been linked previously to the population collapse. We're saying no, there is enough independent evidence that the drop in fire was caused by cooling climate," says the study's principal author, Mitchell Power, an assistant professor of geography at the University of Utah.
"The implication is that climate is a large-scale driver of fire. That's a key finding. Climate is driving fire on global and continental scales," says Power, who also is curator of the Garrett Herbarium at the Natural History Museum of Utah, which is part of the University of Utah.
The new study analyzed worldwide charcoal samples spanning 2,000 years. It will be published online during August in the journal The Holocene, which is the name of the geological epoch covering roughly the last 11,500 years of Earth's history. It was funded by the National Science Foundation and the Natural History Museum of Utah.
The study deals with the Little Ice Age, a period when Earth's climate cooled, causing New York Harbor to freeze over in 1780, among other effects. Estimates of when the Little Ice Age started range from the 1200s to the 1500s. It ended in the early 1800s. Possible causes include some combination of increased dust from volcanic eruptions, decreased solar activity, and changes in circulation of the ocean and atmosphere.
"The decrease in fire on a very large scale – globally and in the Americas – was controlled by this cooling climate, which began prior to the population collapse, and climate alone is sufficient to explain large scale changes in burning," says Power.
"In a cooler atmosphere, you tend to get reduced convection, so you get reduced thunderstorms and ignition from lightning," he says. "Cooler climate also tends to maintain high levels of fuel moisture and soil moisture."
Today, warming climate and drought have been tied to increasing fires in the U.S. West and elsewhere. "In a world where climate is rapidly changing we need to pay more attention to this relationship between climate and fire," Power says
Power conducted the study with 19 other scientists, including paleoecologist Frank Mayle at the University of Edinburgh, U.K., and climatologist Patrick Bartlein at the University of Oregon. Other coauthors – who provided charcoal data or samples – are from University of Wisconsin, Madison and Oshkosh; Northern

Arizona University; University of Gottingen, Germany; Canadian Forest Service; University of Montpellier, France; University of Bern, Switzerland; University of Calgary, Canada; University of Tennessee; Virginia Tech; University of North Carolina; University of Chile; Laval University, Quebec; Fordham College, New York; and Central Washington University.

Cooling Climate or Population Collapse?

After Columbus reached the New World in 1492, explorers brought European diseases such as smallpox that "decimated populations in the Americas – 10 million to 100 million dead, with most estimates in the 60 million range," Power says. "All these people died abruptly – Mayans, Incas, Aztecs and down in Patagonia – they were all affected," he adds. "Agriculture was sharply reduced. Landscapes that had been cleared for agriculture started a process of plants growing back and infilling those abandoned fields. In terms of greenhouse gases, when you change from maintained cropland to woodlands, plants take up more carbon dioxide and there is less in the atmosphere. This has been pointed to as one mechanism for causing the Little Ice Age."

Power agrees population collapse may have led to reduced biomass burning in some local regions of the Americas. But the new study indicates the reduction in fire was actually global and began before Columbus in most areas, suggesting the Little Ice Age triggered most of the reduction in burning – not the other way around, Power says. "If you look at independent climate records, cooling from the Little Ice Age was happening about 200 years before the population collapse," or about A.D. 1300, he says. Power notes there is room for debate because the Little Ice Age varied in time and space, and didn't affect all parts of the world equally, although most places cooled.

A Record of Fire Left in Charcoal

The study used existing records and-or new samples of charcoal – burnt wood or other biomass – found in sediment cores from lake bottoms and bogs from some 600 sites around the world, about half in the Americas, and dated within the past 2,000 years. "Whatever was burning, we see a record of that fire in lake sediments, from either aerial transport or erosion" of burned material, Power says.

Power manages the Global Charcoal Database that compiles data from all the existing studies that date charcoal samples and describe where they came from. The new study included 498 existing charcoal records and 93 new samples. "We have gone back in and calculated the ages of all these charcoal samples," except for some dated independently in other recent studies, and then used recent radiocarbon dating calibrations to make sure all data are consistent, Power says.

"Greater than 80 percent of biomass burning records show a decline post-1500 in the Americas, he says. The other 20 percent may be from areas that were still fire-prone despite cooling or that simply had burning declines for which there are inadequate charcoal samples, he adds. The study compared the charcoal records with previously published ancient climate records and population reconstructions. It found:

** Clumping all the charcoal data in two groups – from the Americas or the Eastern Hemisphere – shows that in the Americas, biomass burning declined between 1500 and 1650 and stayed at a minimum until 1700, the same time as the peak of the Little Ice Age. That period was the lowest level of burning in the past 6,000 years.*

** In the Eastern Hemisphere, there was a prominent decline in burning that began about 1400 – well before the population collapse in the Americas. Power says cooling also started about a century earlier in the Eastern Hemisphere than in the Americas – more evidence cooling caused reduced burning. There was no parallel population collapse large enough to explain the reduction in burning, although a small downward blip in burning is noted in Europe around the time of the bubonic plague or Black Death.*

** In tropical Middle America – the Caribbean Basin, Mexico and Central America – climate cooling starting around 1350, when burning also begins to decline. Population collapse didn't begin until around 1500.*

** In tropical South America, climate changed around 1350 to 1400. There is debate whether it warmed or cooled. The population collapsed after 1500. Power says neither climate nor population strongly influenced post-Columbian biomass burning in that region, which declined only subtly and not until 1700. It also is possible the population that collapsed didn't use fire very much in agriculture – something a recent study coauthored by Power found in French Guiana.*

** In southern South America, ice-core and tree-ring growth studies show cooling began about 1450, well before an abrupt decline in burning in 1550. That would seem to support the theory that population collapse reduced burning – except that the region had little population, certainly not enough for any decline to trigger a reduction in burning.*

** Ice cores from Greenland show cooling started about 1450, and fire started to decline about 1500, according to charcoal for boreal Canada and the western United States. Cooling and reduced burning stopped about*

1800. Despite the 50-year lag, Power says that is more evidence tying climate cooling to reduced biomass burning, particularly since the region had relatively few people at the time.

http://phys.org/news/2012-07-pakistan-abandoned-nobel-laureate.html

Why Pakistan abandoned its Nobel laureate

The two-room bungalow, the birth place of Pakistan's only Nobel laureate, today stands empty, testament to the indifference, bigotry and prejudice surrounding the country's greatest scientist.

Professor Abdus Salam, the child prodigy born to a humble family on the sun-blasted plains of Punjab who won accolades all over the world for his ground-breaking research in theoretical physics, is all but forgotten.

He was the trailblazer who helped pave the way to the recently hailed discovery of the "God particle" -- one of the greatest achievements in science for the last 100 years -- but as the world went into overdrive, Pakistan stayed largely silent.

Not even boasting from India, whose late physicist Satyendra Nath Bose also contributed to the discovery, snapped Pakistan out of lethargy. And the reason? Because in the eyes of the law, Salam was a heretic.

"Our people are not educated. They just know this is the house of Dr Salam, who was a scientist, and they, including me, are unaware of his contributions. They also know he was Ahmadi," said local resident Kamran Kishwar, 23.

One of the most religiously polarised towns in Pakistan, Jhang, 188 miles (300 kilometres) southwest of Islamabad, is home to thousands of Ahmadis and tensions run high between the community and mainstream Muslims. Ahmadis, who believe their founder was the messiah after Prophet Mohammad, were declared non-Muslims in 1974 as part of Islamisation that has made the Pakistani state one of the most religiously intolerant in the world.

In 1984, they were banned from calling themselves Muslim. They are banned from preaching and even from travelling to Saudi Arabia for pilgrimage. Their publications are prohibited. Ahmadi mosques have been shut down. Others have reportedly been desecrated. In May 2010, suicide bombers killed 80 people at two mosques during Friday prayers.

Dashed dreams

Salam's portrait hangs in his old school and he paid for a block to be built in his father's name in the 1970s, but locals are still fighting to have any connotations with him wiped from the premises. "Elements are still trying to remove Dr Salam's name from the school," said Rana Nadeem, an Ahmadi who lives near Salam's house.

It wasn't like that when Salam was born in 1926, under British rule. The entire town turned out to welcome him after he scored the highest marks ever to get into the University of the Punjab. After a PhD at Cambridge, he returned home to teach and determined to set up a centre to encourage world-class science from the developing world. But his dreams were dashed. Associates say ignorant bureaucrats rubbished his ideas and to pursue an international career he returned to Britain in 1954.

In 1957, he was made professor of theoretical physics at Imperial College, London and in 1964 set up the International Centre for Theoretical Physics in Trieste in an effort to advance scientific expertise in the developing world.

He continued to advise Pakistan on science and atomic energy, and was chief scientific adviser to the president from 1961-1974. But after the law changed in 1974, he found an increasingly hostile reception on visits home.

After winning the Nobel prize for physics in 1979 with American scientists Steven Weinberg and Sheldon Lee Glashow, he was banned from lecturing at public universities under pressure from right-wing students and religious conservatives.

'Victim of narrow-mindedness

On the other hand, he was given a rapturous welcome in Bangladesh and India. "Dr Salam is a great hero and possibly the most famous Pakistani in the world but he became victim of the narrow-mindedness of our society," says Hassan Amir Shah, head of the physics department at Government College, Lahore.

Even in 1989, the world's first Muslim woman prime minister, Benazir Bhutto, who herself knew prejudice, refused to meet him, recalls nuclear physicist Pervez Hoodbhoy.

"That day I was with Salam in his hotel in Islamabad and he had come all the way from Trieste. Salam was very disappointed when her personal assistant rang up to say the prime minister did not have the time," he told AFP.

Although Salam's achievements far outstrip those of A.Q. Khan, the father of Pakistan's nuclear bomb and a Muslim, it is he who is revered as a national hero, despite Khan's alleged role in nuclear proliferation. "Ninety-eight percent of people in this country are Muslim but still they are insecure and intolerant to the two-percent minority," said Shah.

It took until 2000 for Government College to establish a physics chair in his name. The university has also named one of its halls after Salam. Salam's colleagues also wanted to get the National Centre for Physics in Islamabad named the Abdus Salam Centre for Physics, whose first director had been a PhD student of the Nobel laureate, but Hoodbhoy said the authorities refused.
The Ahmadiyya community certainly feels he was betrayed. "Even after he was buried, local administration asked the Ahmadi community to remove the word 'Muslim' from the inscription on the grave which said 'the first Muslim Nobel laureate," said Shah. The word has been painted over, leaving just: "the first Nobel laureate".

http://www.wired.com/wiredscience/2012/07/gas-fracking-science-conflict/

Natural Gas Fracking Industry May Be Paying Off Scientists

Authors of pro-fracking studies are coming under fire for their cozy relationships with the fossil fuel industry.

By Tim McDonnell, Climate Desk

Last week the University of Texas provost announced he would re-examine a report by a UT professor that said fracking was safe for groundwater after the revelation that the professor pocketed hundreds of thousands of dollars from a Texas natural gas developer. It's the latest fusillade in the ongoing battle over the basic facts of fracking in America.
Texans aren't the only ones having their fracking conversations shaped by industry-funded research. Ohioans got their first taste last week of the latest public-relations campaign by the energy policy wing of the US Chamber of Commerce. It's called "Shale Works for US," and it aims to spend millions on advertising and public events to sell Ohioans on the idea that fracking is a surefire way to yank the state out of recession.
The campaign is loaded with rosy employment statistics, which trace to an April report authored by professors at three major Ohio universities and funded by, you guessed it, the natural gas industry. The report paints a bright future for fracking in Ohio as a job-creator.
One co-author of the study, Robert Chase, is poised at such a high-traffic crossroads of that state's natural gas universe that his case was recently taken up by the Ohio Ethics Commission, whose chairman called him "more than a passing participant in the operations of the Ohio oil and gas industry," and questioned his potential conflicts of interest. As landowners in a suite of natural gas-rich states like Texas and Ohio struggle to to decipher conflicting reports about the safety of fracking, Chase is a piece in what environmental and academic watchdogs call a growing puzzle of industry-funded fracking research with poor disclosure and dubious objectivity.
"It's hard to find someone who's truly independant and doesn't have at least one iron in the fire," said Ohio oil and gas lease attorney Mark F. Okey. "It's a good ol' boys network and they like to take care of their own."
Chase got his petroleum engineering PhD from Penn State. In 2009, long after Chase left the university, it came under fire for a fracking report, widely cited by state politicians as evidence for opening up the fracking market, which an in-house investigator said "crossed the line between policy analysis and policy advocacy." Early in his career, Chase worked as a consultant for many of the nation's biggest oil and gas developers, including Halliburton, Cabot, and EQT. In 1978 he began teaching petroleum engineering at Marietta College, the small Ohio liberal arts school where he remains on faculty today. In 2008, Ohio's then-governor Ted Strickland appointed him to the Ohio Oil & Gas Commission, an independant judiciary board that hears complaints from landowners and developers against the state's Division of Mineral Resources Management. And last year, he founded his own consultancy, Chaseland LLC, that helps connect landowners with gas companies seeking drilling rights, for which Chase collects a commission.
In February, Chase gave glowing testimony to Congress on the benefits of fracking, and included a swipe at anti-fracking advocates by citing the very same study now being investigated at the University of Texas. In recent years, Chase has taken his pro-fracking stance to the pages of Ohio newspapers to call for increased fracking and to assure locals of its safety; his latest column was soundly rebutted by a pair of Cincinnati geologists, who wrote that Chase had made "several misleading assertions." State officials tightened fracking regulations after a series of earthquakes in northeastern Ohio, including a 4.0 quake in Youngstown on New Year's Eve.
The founding of Chaseland was a bit too much for Oil & Gas Commission director Linda Osterman, who in February asked the state ethics board to investigate Chase; they ruled that he would have to recuse himself from any Commission hearings involving companies or people he had worked with at Chaseland. Chase has only had to sit out once, Osterman told Climate Desk, on the Commission's most recent hearing, in which a local cattle farm disputed a permit given to Chesapeake Energy to drill on the farm's land, because he had consulted with

Chesapeake. Otherwise, Osterman said, “I’ve never had any concerns about his ability to be impartial.” Still, Osterman was concerned enough to initiate the ethics inquiry.

In an interview, Chase said his wide network made him uniquely suited to put the pieces together for his most recent economic impact study. “It’s very cut and dry,” he said. “If you don’t have someone who really has the experience, then it doesn’t make sense to do the study.” The study’s other authors were economists and business professors.

David Brown, a member of Marietta’s Faculty Council, defended his colleague, saying that the fracking study’s funding source “should not by itself call into question his research,” and that Chase letting his varied roles compromise his academic research “is not something I would expect from him.”

But Jack Shaner of the Ohio Environmental Council expressed a different take.

“There’s a clear and present danger of industry and university being way too cozy. [Chase] is cleary a poster child for the need for a clear bright line between industry and academia.” A staff attorney for OEC called for Chase to step down from his seat on the Commission.

Indeed, Chase isn’t the only professor who has come under fire for not disclosing proximity to the natural gas industry. Two more recent examples:

Timothy Considine, another Penn State grad who’s now a geologist at the University of Wyoming, was the lead author on a SUNY-Buffalo report in May that claimed state regulation had made fracking safe in Pennsylvania. Within days, a top Pennsylvania environmental official quoted the Buffalo study in testimony to Congress about the effectiveness of fracking regulations. But both the official and the study itself declined to mention that Considine’s close ties to the industry—and that his department had received nearly $6 million in donations from the oil and gas industry last year. Considine—whom one Pennsylvania newspaper called “the shale gas industry’s go-to professor”—also helped write the controversial 2009 Penn State study and a 2010 expansion of it that was funded by the American Petroleum Institute.

In February a University of Texas professor and former head of the US Geological Survey, Charles G. Groat, penned a study that found no evidence of groundwater contamination from fracking; the study didn’t disclose Groat’s seat on the board of major Texas fracker Plains Exploration & Production Company, for which he was reportedly paid $400,000 in 2011—more than double his university salary. The director of Groat’s UT program told Bloomberg News he had “no idea” of Groat’s connection to Plains, but last Tuesday the University of Texas provost said in response to mounting concern that he would convene a panel to re-examine Groat’s findings.

Of course, industry funding of research has been commonplace since at least the heyday of Big Tobacco, and is still de rigueur for pharmaceuticals, among others. But Thomas McGarity, a UT-Austin law professor whose research on industry money in university research led him to write the book Bending Science: How Special Interests Corrupt Public Health Research, said it’s almost impossible to imagine a bias-free study with industry cash behind it.

“They’re trying to buy the prestige of the university,” he said. “And the universities are happy to sell their prestige, I suppose.”