Blind man walking: With no visual awareness, man navigates obstacle course flawlessly

Researchers have demonstrated for the first time that people can successfully navigate an obstacle course even after brain damage has left them with no awareness of the ability to see and no activity in the visual cortex, a region of the brain's cortex that is primarily responsible for processing visual inputs. The findings published in the December 23rd issue of Current Biology, a Cell Press publication, reveal the importance of alternative routes in the brain, which are active in both those who have suffered severe brain damage to the visual cortex and in all of our everyday lives, according to the researchers.

Earlier studies had shown a similar ability in monkeys with comparable brain lesions. The new study was possible only because of the participation of an unusual patient known as TN, who was left blind after selective damage to the visual cortex in both hemispheres of his brain following consecutive strokes.

"This is absolutely the first study of this ability in humans," said Beatrice de Gelder of Tilburg University, The Netherlands and of the Martinos Center for Biomedical Imaging and Harvard Medical School. "We see what humans can do, even with no awareness of seeing or any intentional avoidance of obstacles. It shows us the importance of these evolutionarily ancient visual paths. They contribute more than we think they do for us to function in the real world."

TN was previously known to have what is called blindsight—the ability to detect things in the environment without being aware of seeing them. For instance, he responds to the facial expressions of others, as indicated by activity in brain regions consistent with emotional expressions of fear, anger, and joy. He is nevertheless totally blind. He walks like a blind person, using a stick to track obstacles and requiring guidance by another person when walking around buildings.

To test his navigational ability in the current study, the researchers constructed an obstacle course consisting of randomly arranged boxes and chairs and asked him to cross it without the help of his cane or another person. Astonishingly, they report, he negotiated the course perfectly, never once colliding with any obstacle. Several onlookers witnessed the feat and applauded spontaneously when he reached the end of the maze.

The demonstration shows that alternative visual paths available in the brain allow people to orient themselves and rapidly detect obstacles in the environment without any conscious attention or experience of seeing them. "It's a part of our vision that's for orienting and doing in the world rather than for understanding," she said. "All the time, we are using hidden resources of our brain and doing things we think we are unable to do."

That's an important message for patients with brain damage in particular. "There is much that patients can do outside the grip of their being too aware of what they cannot do," de Gelder said. **VIDEO**

The researchers include Beatrice de Gelder, Tilburg University, Tilburg, The Netherlands, Athinoula A. Martinos Center for Biomedical Imaging, MGH-HMS, Charlestown, MA, Marco Tamietto, Tilburg University, Tilburg, The Netherlands, University of Torino, Torino, Italy, Geert van Boxtel, Tilburg University, Tilburg, The Netherlands, Rainer Goebel, University of Maastricht, Maastricht, The Netherlands; Arash Sahraie, University of Aberdeen, Aberdeen, Scotland; Jan van den Stock, Tilburg University, Tilburg, The Netherlands; Bernard M.C. Stienen, Tilburg University, Tilburg, The Netherlands, Lawrence Weiskrantz, University of Oxford, Oxford, UK; and Alan Pegna, Geneva University Hospitals, Geneva, Switzerland.

Honeybees as plant 'bodyguards'

Honeybees are important to plants for reasons that go beyond pollination, according to a new study published in the December 23rd issue of Current Biology, a Cell Press publication. The insects' buzz also defends plants against the caterpillars that would otherwise munch on them undisturbed.

The researchers, led by Jürgen Tautz of Biozentrum Universität Würzburg, Germany, earlier found that many caterpillars possess fine sensory hairs on the front portions of their bodies that enable them to detect air vibrations, such as the sound of an approaching predatory wasp or honeybee.

"These sensory hairs are not fine-tuned," Tautz said. "Therefore, caterpillars cannot distinguish between hunting wasps and harmless bees." If an "unidentified flying object" approaches, generating air vibrations in the proper range, caterpillars stop moving or drop from the plant. If caterpillars are constantly stressed by buzzing bees, as they likely are in fruiting trees heavily laden with blossoms, they will feed a lot less, he said.

In the study, the researchers found that bell pepper plants without fruit suffered 60 to almost 70 percent less damage to their leaves when confined in a tent with bees and caterpillars in comparison to those in a tent with caterpillars alone. The amount of leaf damage was less on fruit-bearing plants as the beet armyworm caterpillars moved into the maturing peppers, they report.

"Our findings indicate for the first time that visiting honeybees provide plants with a totally unexpected advantage," the researchers said. "They not only transport pollen from flower to flower, but in addition also reduce plant destruction by herbivores."

The findings highlight the importance of indirect effects between apparently unrelated members of food webs in nature, Tautz said. They might also have some practical application for sustainable agriculture.

If crops are combined with attractive flowers in such a way that honeybees from nearby beehives constantly buzz around them, it may lead to significantly higher yields in areas with lots of leaf-eating pests—a notion Tautz's team intends to test. "Our finding may be the start of a totally new biological control method," he said.
The researchers include Jürgen Tautz, of BEEgroup, Biozentrum Universität Würzburg, Germany; and Michael Rostás, of Botanic II, Universität Würzburg, Germany.

Yeast mimics severity of mutations leading to fatal childhood illness

Scientists express human gene mutations in yeast in order to study Batten disease, a fatal childhood neurodegenerative disorder

Cambridge, UK – Scientists report that human gene mutations expressed in yeast cells can predict the severity of Batten Disease, a fatal nervous system disorder that begins during childhood. The new study published in Disease Models & Mechanisms (DMM), dmm.biologists.org, describes how the extent of changes in mutated cells paralleled the severity of symptoms seen in humans.

The initial, milder symptoms of Batten disease appear in children between ages 4 and 7. Children with this disorder (also known as juvenile neuronal ceroid lipfuscinosis, or JNCL) suffer vision loss and exhibit learning difficulties and behavioral changes. This is eventually followed by the appearance of seizures, and a devastating, progressive loss of mental and physical function, eventually leading to death before young adulthood.

Mutations in the gene CLN3 cause Batten Disease, but scientists do not fully understand the role of CLN3 in cell function. Thus, in order to learn more about this gene, researchers at the University College London created a variety of mutations based on CLN3 gene defects identified in Batten disease patients. They studied the effects of these mutations in a fission yeast protein highly similar to CLN3. The research team found that human mutations that caused a severe Batten disease progression likewise caused severe cell abnormalities in the yeast. Likewise, mutations found in mild cases of Batten disease resulted in less severe yeast cell changes.

Not only does this study help researchers understand the mechanism underlying Batten disease, but this yeast model can also be used to investigate therapeutic compounds to treat Batten disease and related illnesses.
Commentary on this work will be featured in the DMM Podcast for Volume 2, Issue 1/2 of DMM. Podcasts are available via the DMM website at: dmm.biologists.org.
The report was written by R.L. Haines, S. Codin, and S.E. Mole at the MRC Laboratory for Molecular Cell Biology at University College London. The report is published in the January/February issue of a new research journal, Disease Models & Mechanisms (DMM), published by The Company of Biologists, a non-profit based in Cambridge, UK.

Research team reports how, when life on Earth became so big

Blacksburg, Va. – In 3.5 billion years, life on earth went from single microscopic cells to giant sequoias and blue whales. Scientists have now documented quantitatively that the increase in maximum size of organisms was not gradual, but happened in two distinct bursts "tied to the geological evolution of the planet," said Michal Kowalewski, professor of geosciences at Virginia Tech.

Jonathan L. Payne, assistant professor of geological and environmental sciences at Stanford University; Jennifer A. Stempien, a recent Virginia Tech Ph.D. graduate now a research associate and science teaching fellow in geological sciences at the University of Colorado, Boulder; and Kowalewski are principal investigators on a project to document the increase of body size through time, funded by the National Evolutionary Synthesis Center (www.nescent.org). Ten additional researchers joined the study, including another Virginia Tech Ph.D. graduate Richard A. Krause Jr., now an Alexander von Humboldt fellow at the Museum für Naturkunde der Humboldt-Universität zu Berlin. Krause and Stempien also contributed body size data from their dissertation research at Virginia Tech.

The researchers report their findings in the week of Dec. 22, 2008 early on-line issue of the Proceedings of the National Academy of Sciences in the article, "Two-phase increase in the maximum size of life over 3.5 billion years reflects biological innovation and environmental opportunity."*

"Searching for the largest organisms, we have reviewed the existing knowledge on the history of life on our planet from the oldest, and still controversial, fossil bacteria in 3.5-billion-year-old rocks to the largest animals and plants that live today," said Kowalewski. "The idea was to see if we could reconstruct how maximum size of organisms – as measured in terms of biovolume - increased."

Size is one of the fundamental characteristics of organisms and an important parameter for studying their ecology, evolution, and behavior. And yet, "before our study, the understanding of how maximum body size of organisms changed through time was primarily based on the seminal graph J.T. Bonner put together more than 40 years ago. Moreover, Bonner's curve was neither tied directly to empirical data nor presented in the rigorous taxonomic and temporal contexts," Kowalewski said.

A common thought was that size will increase as animals and plants become more complex or change through time," said Stempien. "But, in fact, in most cases we did not know how the size changed over the entire time span of a group of organisms. Did it increase quickly after the first appearance and then taper off, or vice versa?"

"Our study had been thus motivated by a purely exploratory question regarding the first order pattern of changes in maximum size of organisms through time," Kowalewski said. "And we wanted to be able to answer the question in a rigorous, quantitative way."

But as they pulled together data from the fossil record, the scientists noted a remarkable pattern.

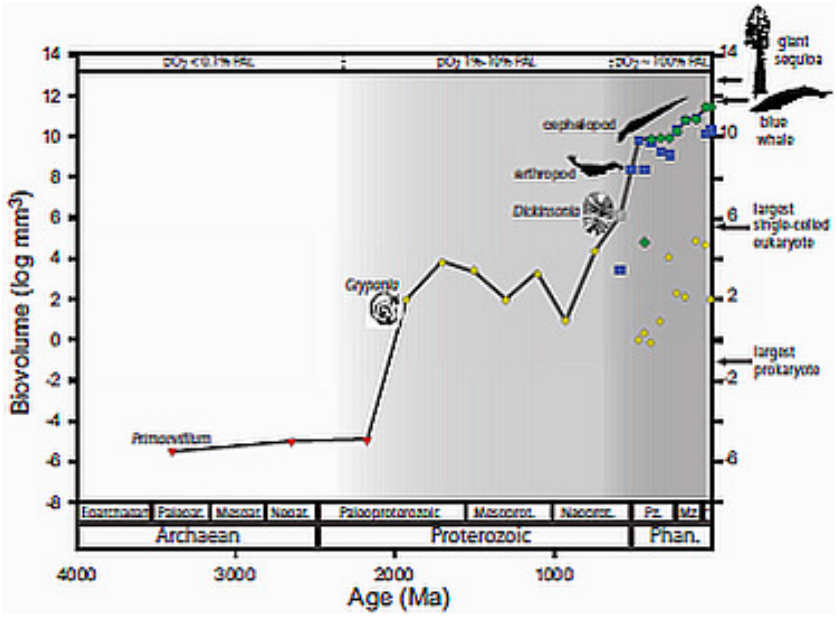


Fig. 1. Sizes of the largest fossils through Earth history. Size maxima are illustrated separately for single-celled eukaryotes, animals, and vascular plants for the Ediacaran and Phanerozoic. The solid line denotes the trend in the overall maximum for all of life. Increases in the overall maximum occurred in discrete steps approximately corresponding to increases in atmospheric oxygen levels in the mid-Paleoproterozoic and Ediacaran-Cambrian-early Ordovician. Sizes of the largest fossil prokaryotes were not compiled past 1.9 Gya. Estimates of oxygen levels from Canfield (38) and Holland (37) are expressed in percentage of PAL. Phan., Phanerozoic; Pz., Paleozoic; Mz., Mesozoic; C, Cenozoic. Red triangles, prokaryotes; yellow circles, protists; blue squares, animals; green diamonds, vascular plants; gray square, Vendobiont (probable multicellular eukaryote).

"During out second working group meeting, we brought together the datasets collected by different working group members for individual groups of organisms," recalls Payne. "Once we brought these datasets together and plotted them against geological time, the basic pattern presented in the paper became very clear. For me, this is always the most exciting part of doing science, seeing your data for the first time, especially when the implications of your results are immediately apparent," said Payne.

"We were surprised to observe that nearly all of the increase in size occurred in two distinct time-intervals. And what is more, those intervals followed two major oxygenation events," Kowalewski said.

Payne said, "The realization that the episodes of size increase correlated with the oxygenation events was essentially immediate, in large part because the stepwise increase in maximum size looks so similar to our current understanding of the history of oxygen increase. The history of atmospheric oxygen concentrations has been an area of active research for several decades, and has experienced a great deal of recent attention and refinement. So, many of us were quite familiar with the oxygen curve from our reading of the geological literature and it was not hard to see that connection."

"What is really interesting is that each of these 'steps' correlate with a time in life's history where there is innovation in the complexity of life, the first one being the eukaryotic cell and the second is the mulitcellularity of life," said Stempien, who was so impressed with the discovery that she included it in material about the fossil record for the introductory course she was teaching about geologic history.

Here is what the research team learned:

During the first 1.5 billion years of the recorded history of life - from about 3.5 billion to 2 billion years ago - only bacteria-like fossils are found. Maximum size to which a bacteria cell can grow is severely limited. Consequently, the maximum size of life could not, and did not, change until the arrival of more complex organisms, which happened somewhere around 2 billion years ago.

But before that occurred something else happened that changed the planet. Way back in Archean times, more than 3 billion years ago, some primitive bacteria invented a metabolism that allowed them to use the sun's energy and carbon dioxide for nourishment; that is, they invented photosynthesis. These bacteria thrived in oceans devoid of oxygen. The atmosphere also lacked oxygen then. Like today's plants, the bacteria released oxygen back into the ocean and eventually into the atmosphere. The appearance of free oxygen, even as scarce as it was, had numerous consequences, including biological ones. Free oxygen made it possible for the evolution of a more complex cellular structure. Organisms developed a nucleus to contain their genetic material and incorporated other intra-cellular machinery.

The eukaryotic cell arrived on earth - still a single cell organism, but able to develop much larger single-celled structures than any bacteria. In about two hundred million years, organisms went from cells not visible to the naked eye to macroscopic organisms, some about the size of a dime.

"In a way, thus, an increase in size and complexity was a consequence of geobiological interactions between life and earth. Life itself enabled life to become more complex," Kowalewski said.

Life languished as single cells for another billion years or so, until just before the Precambrian-Cambrian transition about 540 million years ago, when atmospheric oxygen again increased notably reaching as much as 10 percent of its current concentration.

Many scientists argue that the second increase in oxygen levels was a key prerequisite for evolution of yet more complex, multi-cellular (tissue-forming) life. Once this new level of complexity was achieved, body size limits imposed on single-celled organisms were removed and larger organisms started appearing in the fossil record. Relatively quickly in evolutionary terms – in about one hundred million years – largest life forms transitioned from dime-size, single-celled forms to giant marine animals such as Ordovician cephalopods, tens of feet in length. Dinosaurs, which came much later, come to mind, although not mentioned in the PNAS paper. "At the time they existed, they were indeed the largest life forms on land, but they were not much larger than giant cephalopods that existed in the oceans already in the Ordovician," said Kowalewski.

Incidentally, marine animals and vascular plants can attain even larger body size than the largest of dinosaurs. Today, such enormous organisms include blue whales and the giant sequoia, the latter being the largest life form known.

The scientists report in their PNAS article that through the 3.5 billion years of the documented history of life, maximum body size of organisms increased by 16 orders of magnitude. But most of that increase was realized in two relatively short intervals representing less than 20 percent of the total recorded history of life.

Stempien, one of the three principal investigators for the NESCent working group that authored the PNAS paper, noted that this effort is just a starting point for the team. "Each individual chose a topic for a manuscript, so there will be more exciting papers soon about size and evolutionary history, from origination to extinction and across different groups," she said.

**Authors of the PNAS article are: Payne, Alison G. Boyer, recent Ph.D. graduate, and James H. Brown, professor of biology, both at the University of New Mexico; Seth Finnegan, postdoctoral research fellow in the Department of Geological and Environmental Sciences, Stanford; Kowalewski; Krause ; S. Kathleen Lyons of the Smithsonian Museum of Natural History; Craig R. McClain of the Monterey Bay Aquarium Research Institute; Daniel W. McShea, associate professor of biology, Duke University; Philip M. Novack-Gottshall, assistant professor of geosciences, University of West Georgia; Felisa A. Smith, associate professor of biology, University of New Mexico; Stempien; and Steve C. Wang, associate professor of statistics, Swarthmore College.*

Data used in the paper will be posted at the NEScent website (www.nescent.org/index.php), said Stempien, who is writing an introduction. Educational material is also being created by the center.

Cousin marriage laws outdated

Laws banning marriage between first cousins are based on outdated assumptions about a high degree of genetic risk for offspring and should be repealed, according to a population genetics expert.

In an opinion article published in the US open-access journal PLoS Biology, University of Otago Department of Zoology Professor Hamish Spencer and Professor Diane Paul, a Research Associate at Harvard's Museum of Comparative Zoology, argue that laws against cousin marriage are ill-advised.

"Neither the scientific nor social assumptions behind such legislation stand up to close scrutiny," says Professor Spencer. For example, a 2002 expert review of studies regarding birth defects in offspring of cousins found that the risk was much smaller than generally assumed, he says.

The US National Society of Genetic Counselors (NSGC) report estimated the average risk as 1.7 – 2 per cent higher than the background population risk of congenital defects and 4.4 per cent higher than general risk for dying in childhood. "Women over the age of 40 have a similar risk of having children with birth defects and no one is suggesting they should be prevented from reproducing. People with Huntington's Disease or other autosomal dominant disorders have a 50 per cent risk of transmitting the underlying genes to offspring and they are not barred either," Professor Spencer says.

In the USA, there are 31 state laws that either bar cousin marriage outright, or permit it only where the couple obtains genetic counseling or is beyond reproductive age or if one partner is sterile.

"Such legislation reflects outmoded prejudices about immigrants and the rural poor and relies on oversimplified views of heredity. There is no scientific grounding for it," Spencer adds.

The article can be viewed at http://biology.plosjournals.org/

Activating the lung's antioxidant defense by targeting Nrf2 inhibits the development of emphysema

Using a molecule similar to one found in an experimental cancer drug, researchers at the Johns Hopkins Bloomberg School of Public Health demonstrated that activation of a key component of the lung's antioxidant defense system, Nrf2, can prevent emphysema in mice. The researchers believe that activation of Nrf2 could be a novel target for therapies to prevent chronic obstructive pulmonary disease (COPD), which comprises emphysema and chronic bronchitis. COPD is a major public health problem and it is the fourth leading cause of death in the U.S. The study is published in the online Early Edition of PNAS: Proceeding of the National Academy of Sciences.

"There are no effective therapies for COPD and there is an urgent need to develop novel intervention strategies. Targeting the Nrf2 pathway presents a novel strategy which needs to be tested for their efficacy in intervening COPD in patients," said Shyam Biswal, PhD, senior author of the study and an associate professor in the Bloomberg School of Public Health's Department of Environmental Health Sciences and the Division of Pulmonary and Critical Care Medicine at the Johns Hopkins School of Medicine.

Nrf2 (nuclear factor erythroid-derived 2-related factor 2) works as a "master gene" that turns on numerous antioxidant and pollutant-detoxifying genes to protect the lungs from environmental pollutants, such as cigarette smoke. Biswal previously identified that disruption of Nrf2 expression in mice caused early onset and severe emphysema. More recently, his team demonstrated for the first time a close correlation between the Nrf2 decline and the progression of COPD in humans.

For the current study, Biswal, along with postdoctoral fellows, Thomas Sussan, PhD, Tirumalai Rangasamy, PhD, and David J. Blake, PhD, observed mice exposed to cigarette smoke to determine if activation of Nrf2 could prevent emphysema. Exposed mice - a diet containing CDDO-Im, which is known to activate Nrf2—were significantly less likely to have oxidative stress and lung cell damage associated with emphysema. The researchers also noted substantially improved function in the portion of the heart responsible circulating oxygenated blood through the body - unction that is typically diminished with emphysema. CDDO-Im is closely related to CDDO-Me, an experimental cancer drug approved for phase II clinical trials.

"Nrf2 is an important regulator of the body's antioxidant defense system, and activation of Nrf2 is a promising therapeutic strategy for attenuating COPD progression in patients," said Thomas Sussan, PhD, lead author of the study.

According to the researchers, COPD affects more than 16 million Americans and it is the only disease among the top 10 causes of death with a rising mortality rate in the United States. It is predicted to be the third largest cause of death by 2020 and has already reached worldwide epidemic proportions.

Additional authors of "Targeting Nrf2 with the triterpenoid CDDO-imidazolide attenuates cigarette smoke-induced emphysema and cardiac dysfunction in mice" are Tirumalai Rangasamy, David J. Blake, Deepti Malhotra, Hazim El-Haddad, Djahida Bedja, Melinda S. Yates, Ponvijay Kombairaju, Masayuki Yamamoto, Karen T. Liby, Michael B. Sporn, Kathleen L. Gabrielson, Hunter C. Champion, Rubin M. Tuder and Thomas W. Kensler. The researchers were supported by grants from the National Institutes of Health, National Heart, Lung and Blood Institute, the National Cancer Institute, the Flight Attendants Medical Research Institute, the Maryland Cigarette Restitution Fund, the National Foundation for Cancer Research, Reata Pharmaceuticals, the National Institute on Environmental Health Sciences, PhRMA Foundation and the Bernard A. and Rebecca S. Bernard Foundation.

Study on cytotoxicity of carbon nanotubes

Owing to the novel properties of carbon nanotubes (CBNs), a series of problems associated with in vitro toxicity assessments of carbon nanotubes (CNTs) have appeared in many literatures. In order to properly evaluate the potential risk to human health, the cell toxicity assay of CBNs can not be conducted by traditional methods employed in common toxicology.

Ying Zhu and Wenxin Li in Laboratory of Nano-biology and Medicine, Shanghai Institute of Applied Physics, Shanghai, P. R.China gave this point of view in their review articles. This paper, "Study on Cytotoxicity of Carbon Nanotubes" was published in Issue 51 (November, 2008) of the Science in China Series B: Chemistry .

With their production and application at large scale, CNTs may cause adverse response to the environment and human health. Thus, the study on bio-effects and safety of CNTs has attracted great attention from scientists and governments worldwide. Unfortunately experimental information obtained thus far on CNTs' cytotoxicity is often lack of comparability, or even in contradiction.

This paper systematically reviewed most of the experimental results reported in the literatures. The emphasis was placed on the examination of a variety of factors affecting CNTs cytotoxicity, including species of CNTs, impurities contained, lengths of CNTs, aspect ratios, chemical modification, and assaying methods of

cytotoxicity. Based on analysis of the research status on cytotoxicity of CNTs, the authors suggested that care should be taken for several issues such as chemical modification and realistic exposure, more complete and quantified characterization of CNTs, determination methods of cell viability. More importantly, the studies on physical and chemical mechanisms of CNTs' cytotoxicity should be strengthened.

In view of novel properties of CNTs, namely huge surface areas, high adsorption activity, and great ability of internalization into cells, CNTs are able to deliver various molecules in surroundings which usually can not enter cells due to poor cell permeability, into the cell interior and then effectively perform their biological activity. Accordingly "nanotoxicology should have its own characteristics differing from common toxicology in respect to research thinking, assay methods, technical routes, and evaluation criteria", as pointed out by the authors in this paper. Finally, the authors hoped that the scientists should deeply understand the uniqueness of nanomaterials, enhance the collaboration of physics, chemistry and toxicology, and push forward the study of nanotoxicology with the goal of making contribution to application of nanoscience and nanotechnology in various fields of national economy.

This work was supported by the National Natural Science Foundation of China (Nos.10475109 and 10775169), Shanghai Municipal Commission for Science and Technology (Nos. 0552nm033, 0652nm016 and 0752nm021) and MOST973 Program (No. 2006CB705605).

This paper deserves publication because the dissertation is sound, and the topic attracted the public interesting, concerning in nanoscience, environment, and health. In addition, the main ideals delivery in this paper bridged over a gap between the substance science and the life science in the frame of nanoscience and technology.

Reference: Zhu Y, Li WX. Cytotoxicity of carbon nanotubes. Science in China Series B: Chemistry, 2008; 51(11): 1021-1029 http://dx.doi.org/10.1007/s11426-008-0120-6

New evidence that people make aspirin's active principle -- salicylic acid

WASHINGTON, Dec. 22, 2008 - Scientists in the United Kingdom are reporting new evidence that humans can make their own salicylic acid (SA) - the material formed when aspirin breaks down in the body. SA, which is responsible for aspirin's renowned effects in relieving pain and inflammation, may be the first in a new class of bioregulators, according to a study scheduled for the Dec. 24 issue of ACS' biweekly Journal of Agricultural and Food Chemistry.

In the report, Gwendoline Baxter, Ph.D. and colleagues discuss how their past research revealed that SA exists in the blood of people who have not recently taken aspirin. Vegetarians had much higher levels, almost matching those in patients taking low doses of aspirin. Based on those findings, the researchers previously concluded that this endogenous SA came from the diet, since SA is a natural substance found in fruits and vegetables.

Now the group reports on studies of changes in SA levels in volunteers who took benzoic acid, a substance also found naturally in fruits and vegetables that the body could potentially use to make SA. Their goal was to determine whether the SA found in humans (and other animals) results solely from consumption of fruits and vegetables, or whether humans produce their own SA as a natural agent to fight inflammation and disease. The results reported in the study suggest that people do manufacture SA.

"It is, we suspect, increasingly likely that SA is a biopharmaceutical with a central, broadly defensive role in animals as well as plants," they state. "This simple organic chemical is, we propose, likely to become increasingly recognized as an animal bioregulator, perhaps in a class of its own."

The American Chemical Society - the world's largest scientific society - is a nonprofit organization chartered by the U.S. Congress and a global leader in providing access to chemistry-related research through its multiple databases, peer-reviewed journals and scientific conferences. Its main offices are in Washington, D.C., and Columbus, Ohio.

**The research in this press release is from a copyrighted publication, and stories must credit the journal by name or the American Chemical Society.*

News media may obtain a full text of this report ("Salicylic Acid sans Aspirin in Animals and Man: Persistence in Fasting and Biosynthesis from Benzoic Acid") in ACS' Journal of Agricultural and Food Chemistry by contacting Michael Bernstein.

Giant stinking flower reveals a hot secret

* 15:07 22 December 2008 **by Nora Schultz**

You would think a flower that resembles a 3-metre phallus would have no problems attracting attention, especially if it also stinks like a rotting corpse.

But for the carrion flower, which has the world's largest flowering head, getting noticed by flesh-eating insect pollinators in its jungle home requires yet another amazing adaptation – and one that only came to light thanks to a serendipitous TV recording.

"The film crew was using very strong backlighting and suddenly we saw smoke rising up along the flower's central column. We thought the plant was on fire," says Wilhelm Barthlott from the University of Bonn in Germany.

The 'smoke' turned out to be steam that is puffed out in regular pulses, coinciding with waves of carrion scent. "We had wondered before why one moment the flower would stink like a dead donkey, and a little while later there would be hardly any smell. It never occurred to us that there was cyclic odour production."

Night-time image of carrion flower with flash photography (left) and (right) with thermal image **Image Jörg Szarzynski**

Hot rod

Intrigued by the stink rhythm, Barthlott and his team hypothesised that the carrion flower, which is also known as the titan arum, uses heat to pump hot clouds of stench into the night sky.

They filmed three blossoms with infrared cameras and sure enough found that waves of heat travel up the flower until the tip reaches an impressive 36 °C and steam is released.

Related flowers that also emit carcass smell were already known to get hot – probably to further attract the carrion beetles and flesh-eating flies by simulating the body temperature of a freshly deceased animal. But the rhythmic steam production has another function, the researchers say.

Amorphophallus titanium (translation: "giant misshapen penis") grows in clearings in the Sumatran forest. This presents that plant with a problem.

Smell trap

At night, a layer of cooler air forms beneath the tree canopy that could prevent the plant's smell from rising and being dispersed on the breeze.

By growing so tall and shooting out hot steam, the carrion flower overcomes this stratification. The warm scent rises and gets distributed widely above the crowns of the trees, attracting pollinating insects from far and wide.

"This explains why the flower is so big," says Barthlott. "It's literally like a torch in the rainforest that blasts carrion smell into the sky."

He suggests that the enormous energetic expense of the tall growth and the heat production is the reason why the bloom famously only lasts for two nights – anything more would be too costly. But two nights of a stink this strong is plenty of time to attract insects, he says.

Journal reference: Plant Biology (DOI: 10.1111/j.1438-8677.2008.00147.x)

Did warfare drive out-of-Africa migration?

* 17:08 22 December 2008 **by Ewen Callaway**

Roving bands of men might have waged history's first traceable war against the ancestors of all Europeans, Asians and other non-Africans, some 60,000 years ago. A new analysis of DNA variations in contemporary humans indicates that non-Africans descend from a population that contained far more males than females.

This is potential evidence for conquests of the first people who embarked out of Africa, says Alon Keinan, a geneticist at Harvard Medical School in Boston. It might be that they killed some males, stole the females, and kept on moving, he says.

A steady trickle of peaceful wandering men could have accomplished the same genetic effect – but if prehistoric migrations worked anything like Viking conquests, or the discovery of the New World, male migrants did not go looking for peace and love.

Keinan's theory rests on comparisons of more than 100,000 genetic differences, peppered across the genomes of African, Asian and European men.

Ancient war?

In populations where males pair equally with females, on average they will have three X-chromosomes for every four of a non-sex chromosome called an autosome. This is because women have two Xs and men just one.

If more men than women pass on their DNA over time, the female contribution to the gene pool falls, resulting in less X-chromosomes. "You have many more grandfathers than grandmothers," Keinan says. This skew exists in peoples from all parts of the world except Africa, Keinan and colleague David Reich have found.

The ancestors of Europeans and Asians left Africa sometime between 60,000 and 100,000 years ago. Keinan's team speculate that males from Africa, who may have settled in the Arabian Peninsula, Egypt, or elsewhere, attacked the first "out of Africa" population.

Escape route

"It sounds plausible to me," says Martin Richards, a geneticist who studies human history at the University of Leeds, UK.

"We don't know the route people used to get out of Africa," says Chris Stringer, an anthropologist at the Natural History Museum in London. But he thinks the Nile valley is a strong contender for the path of the first migrants – and perhaps their later adversaries.

However, the chance of finding archaeological evidence for these migrants is slim. "You're looking for a population that was there only a short period of time, perhaps only 10 generations, so the physical impact of that population in that environment wouldn't be enough to detect," Reich says.

Mating customs

Their analysis also challenges a study published earlier this year, which found that all humans descend from fewer numbers of males than females. The researchers suggested that polygyny, where few men procreate with many women, accounts for this result. "It's possible, in principle, that both are true in some level," says Reich.

Polygyny that occurred over the last million years of human evolution could have left an imprint in our genomes, says Michael Hammer, a geneticist at the University of Arizona, who led that study.

Reich and Keinan, on the other hand, focused their analysis on the period when anatomically modern humans left Africa. "We'll have to figure out this issue in future work," Reich says.

Journal reference: Nature Genetics (DOI: 10.1038/ng.303)

How godless geeks celebrate Christmas

'Tis the season for carols and nativity plays, but atheists no longer have to miss out on all the fun. In a twist on the traditional Christmas carol service, British comedian Robin Ince has come up with a show called **Nine Lessons and Carols for Godless People**, which he describes as "a rational celebration of Christmas".

On Friday night, I went along to see how his atheistic vision - starring luminaries such as Richard Dawkins and Ricky Gervais - measured up.

"Tonight is a celebration of geeks and nerds," announced Ince. And so it was. Comedian Stewart Lee set the tone by announcing that he had started to believe in God and creationism because of the existence of Richard Dawkins. "When I look at something as intricate and detailed as Professor Richard Dawkins I think, surely, that can't have evolved by chance. Dawkins was put here by God to test us - rather like fossils... and facts," he quipped.

Physicist and writer Simon Singh followed up with his scientifically accurate version of Katie Melua's hit song **Nine Million Bicycles** - sample lyric: "We are 13.7 billion light-years from the edge of the observable universe / That's a good estimate with well-defined error bars... And with the available information, I predict that I will always be with you".

Not all of the evening was so light-hearted. The event was supposed to be a celebration of rationality, but it was perhaps inevitable that Richard Dawkins would attack religion. His contribution was to read extracts of his 1998 book **Unweaving the Rainbow** on the dangers of the drug Gerin Oil (hint: it's an anagram) and the *real* romance of the stars.

And while it was something of a coup to have persuaded Ricky Gervais to perform at the event, I couldn't see how his jokes about rape (among other, less edgy subjects) were relevant to the theme. The evening ended on a high note with a beat poem from Aussie comedian/musician Tim Minchin, about a dinner party encounter with a new-age hippy: "Isn't this enough, this beautiful, complex, unfathomable, natural world?"

The Godless Christmas shows have finished now, but Ince is planning another run of Godless shows for next year. You can listen to interviews with acts from the show here. And if this event is your cup of tea, you might enjoy this alternative advent calendar: every day a comedian or scientist chooses a scientist or philosopher to celebrate as a rational substitute for Jesus... *Alison George, opinion editor*

Mosquito helps police grab car thief

It sounds like something from CSI: Crime Scene Investigation. Police in Finland say they have caught a car thief after making a DNA fingerprint of blood from a mosquito found in an abandoned car.

Forensic investigators and prosecutors know only too well that criminals are becoming more "forensically aware", a phenomenon they call "the CSI effect" but this is the first time I've heard of a suspect's blood and DNA being extracted from an insect.

Sometimes car thieves apparently dump ash trays into the cars they steal, giving forensic investigators a greater variety of potential suspects, as each cigarette end carries the DNA of a different person. Does this mean thieves will have to start wearing mosquito repellent when they want to steal a car?

Rowan Hooper, online news editor

Scientists sniff out prion secret

The brain protein which has a hand, when defective, in the lethal disease CJD may also be involved in aiding our sense of smell.

Mice bred to lack the prion protein could not find buried food or choose between smells.

Columbia University scientists said some symptoms of prion disease might be due to the loss of the protein's original role. The study was published in the journal Nature Neuroscience.

The prion protein has historically received something of a bad press, being blamed in its misshapen form for degenerative brain diseases in humans and other animals. However, many scientists have been trying to uncover what it actually does when it is behaving correctly.

Dr Stuart Firestein's team believe that one of these roles is to help us smell. While his prion-protein free mice were still able to detect scents, they had lost some higher functions which required that smell information to be analysed and processed by the brain.

The scientists found changes in the communication between neurons in the nerve cells of the olfactory bulb, part of the forebrain which deals with odours. When the protein was restored to this part of the brain, the ability to discriminate between odours came back.

Symptom clue

The scientists said that while the discovery had no direct link to the diseases caused by faulty prion proteins, it might help account for some of the symptoms experienced by patients, which might be due to the failure of the proteins to do their normal job properly, rather than the damage caused by accumulation of defective prions.

This is not the first suggested role for the prion protein - in 2007, Leeds University scientist Professor Nigel Hooper said that it might help reduce the formation of "plaques" linked to the onset of Alzheimer's Disease.

He said of the newly-reported research : "It's likely that these proteins have a number of roles in various different body systems, including the olfactory system, as suggested here.

"I don't think you can say that it is so mysterious any more, or that we do not understand what it does."

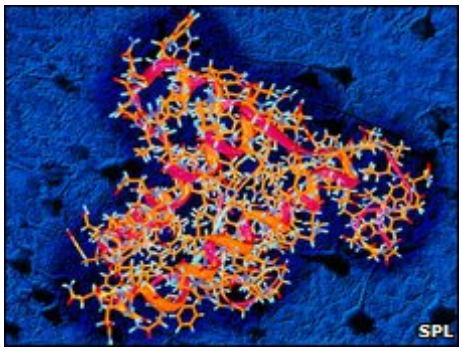
Biomedical researchers create artificial human bone marrow in a test tube

ANN ARBOR, Mich.--- Artificial bone marrow that can continuously make red and white blood cells has been created in a University of Michigan lab.

This development could lead to simpler pharmaceutical drug testing, closer study of immune system defects and a continuous supply of blood for transfusions.

The substance grows on a 3-D scaffold that mimics the tissues supporting bone marrow in the body, said Nicholas Kotov, a professor in the U-M departments of Chemical Engineering; Materials Science and Engineering; and Biomedical Engineering.

The marrow is not made to be implanted in the body, like most 3-D biomedical scaffolds. It is designed to function in a test tube.



Kotov, principal investigator, is an author of a paper about the research currently published online in the journal Biomaterials. Joan Nichols, professor from the University of Texas Medical Branch, collaborated on many aspects of the project.

"This is the first successful artificial bone marrow," Kotov said. "It has two of the essential functions of bone marrow. It can replicate blood stem cells and produce B cells. The latter are the key immune cells producing antibodies that are important to fighting many diseases."

Blood stem cells give rise to blood as well as several other types of cells. B cells, a type of white blood cell, battle colds, bacterial infections, and other foreign or abnormal cells including some cancers.

Cancer-fighting chemotherapy drugs can strongly suppress bone marrow function, leaving the body more susceptible to infection. The new artificial marrow could allow researchers to test how a new drug at certain potencies would affect bone marrow function, Kotov said. This could assist in drug development and catch severe side effects before human drug trials.

Bone marrow is a complicated organ to replicate, Kotov said. Vital to the success of this new development is the three-dimensional scaffold on which the artificial marrow grows. This lattice had to have a high number of precisely-sized pores to stimulate cellular interaction.

The scaffolds are made out of a transparent polymer that nutrients can easily pass through. To create the scaffolds, scientists molded the polymer with tiny spheres ordered like billiard balls. Then, they dissolved the spheres to leave the perfect geometry of pores in the scaffold.

The scaffolds were then seeded with bone marrow stromal cells and osteoblasts, another type of bone marrow cell.

"The geometrical perfection of the polymer molded by spheres is very essential for reproducibility of the drug tests and evaluation of potential drug candidates," Kotov said. "The scaffold for this work had to be designed from scratch closely mimicking real bone marrow because there are no suitable commercially products.

"Certain stem cells that are essential for immunity and blood production are able to grow, divide and differentiate efficiently in these scaffolds due to the close similarity of the pores in the scaffold and the pores in actual bone marrow."

The researchers demonstrated that the artificial marrow gives a human-like response to an infectious New Caledonia/99/H1N1 flu virus. This is believed to be a first.

To determine whether the substance behaves like real bone marrow, the scientists implanted it in mice with immune deficiencies. The mice produced human immune cells and blood vessels grew through the substance. The paper is called "In vitro analog of human bone marrow from 3D scaffolds with Biomimetic inverted colloidal crystal geometry."

For more information: Nicholas Kotov: http://www.engin.umich.edu/dept/cheme/people/kotov.html

Skipping sleep may signal problems for coronary arteries

One extra hour of sleep per night appears to decrease the risk of coronary artery calcification, an early step down the path to cardiovascular disease, a research team based at the University of Chicago Medical Center reports in the Dec. 24/31 issue of JAMA. The benefit of one hour of additional sleep was comparable to the gains from lowering systolic blood pressure by 17 mm Hg.

About 12 percent of those in the study, healthy volunteers in their 40s, first developed coronary artery calcification over five years of follow-up. Calcified arteries, however, were found in 27 percent of those who slept less than five hours a night. That dropped to 11 percent for those who slept five to seven hours and fell to six percent for those who slept more than seven hours a night.

The benefits of sleep appeared to be greater for women. They did not vary according to race.

"The consistency and the magnitude of the difference came as a surprise," said study director Diane Lauderdale, PhD, associate professor of health studies at the University of Chicago Medical Center. "It's also something of a mystery. We can only speculate about why those with shorter average sleep duration were more likely to develop calcification of the coronary arteries."

Recent studies have suggested that chronic partial sleep deprivation may be a risk factor for an array of common medical problems, including weight gain, diabetes and hypertension. One study found that both long and short self-reported sleep durations were independently associated with a modestly increased risk of coronary events. This is the first study to link objectively measured sleep duration to a pre-clinical marker for heart disease.

The research focused on 495 participants in the Coronary Artery Risk Development in Young Adults (CARDIA) study. An ongoing project begun in 1985, CARDIA was designed to assess the long-term impact of various factors on the development of coronary artery disease.

Participants underwent two electron beam computed tomography scans, designed to assess the buildup of calcium within the arteries that deliver blood to the heart muscle, five years apart.

They also filled out sleep questionnaires, kept a log of their hours in bed and participated in 6 nights of sleep studies with a technique called wrist actigraphy that uses a motion sensor--worn like a watch--to estimate actual sleep duration. This approach provides the most accurate measure of routine sleep behavior without subjecting the volunteers to the unfamiliarity of multiple sensors that determine sleep by monitoring brain activity.

In a previous study, Lauderdale and colleagues used actigraphy and nightly logs to study, on average, how long people spent in bed (7.5 hours), how long it took them to fall asleep (22 minutes), how long they slept (6.1 hours), and their total sleep efficiency--time asleep divided by time trying to sleep in bed (81 percent).

This time they looked at the connections between sleep duration and coronary artery calcification. They found more than they anticipated.

Previous studies have correlated decreased sleep times with established risk factors for calcification, including high blood pressure, excess weight, and poor glucose regulation. But in this study, "after adjusting for age, sex, race, education, smoking, and apnea risk," the authors note, "longer measured sleep duration was associated with reduced calcification incidence."

The authors suggest three possible ways that shorter sleep could connect to calcification. First, there may be some factor not yet identified that can both reduce sleep duration and increase calcification. Second, although blood pressure measured during examinations did not seem to explain the association, blood pressure generally declines during sleep, so the 24-hour average blood pressure of those who sleep less may be higher, and that

could lead to calcification. Finally, stress or a stress hormone like cortisol, which has been tied to decreased sleep and increased calcification, may play a role. Cortisol data were not available for all study participants.

"This was a small study and a new finding, so we would love to see it duplicated in another study population," Lauderdale said. "But there is enough here to make a point. Although there are constant temptations to sleep less, there is a growing body of evidence that short sleep may have subtle health consequences. Although this single study does not prove that short sleep leads to coronary artery disease, it is safe to recommend at least six hours of sleep a night."

Additional authors of the paper include Christopher King, Kristen Knutson and Paul Rathouz from the University of Chicago; Kiang Liu from Northwestern University; and Steve Sidney from Kaiser Permanente, Oakland, California. The study was supported by grants from the National Heart, Lung and Blood Institute and the National Institute on Aging.

SUNY Downstate researchers find that memory storage molecule preserves complex memories

Finding suggests that unwanted memories might be erasable without harming other brain functions

The brain acts as a computer to both store information and process that information. In a computer, separate devices perform these roles; while a hard disk stores information, the central processing unit (CPU) does the processing. But the brain is thought to perform both these functions in the same cells – neurons – leading researchers to ask if distinct molecules within the brain cells serve these different functions.

In a discovery that may one day lead to the ability to erase debilitating painful memories and addictions from the brain, researchers at SUNY Downstate Medical Center have found that a molecule known to preserve memories – PKMzeta – specifically stores complex, high-quality memories that provide detailed information about an animal's location, fears, and actions, but does not control the ability to process or express this information. This finding suggests that PKMzeta erasure that is designed to target specific debilitating memories could be effective against the offending memory while sparing the computational function of brain.

The findings are detailed in the December edition of PLoS Biology in a paper titled, "PKMzeta Maintains Spatial, Instrumental, and Classically Conditioned Long-Term Memories." The paper is authored by Andre A. Fenton, PhD, associate professor of physiology and pharmacology, Todd C. Sacktor, MD, professor of physiology and pharmacology and of neurology, and Peter Serrano, PhD, research assistant professor of physiology and pharmacology, at SUNY Downstate, as well as by colleagues at other institutions in Michigan, New York, Wisconsin, and the Czech Republic.

Dr. Fenton said, "The work published in PLoS reveals that PKMzeta is a general storage mechanism for different types of memory content but, fortunately, that PKMzeta stores only high-quality memories, the kind that provide detailed information rather than general abilities. If further work confirms this view we can expect to one day see therapies based on PKMzeta memory erasure," Dr. Fenton suggests. "Negative memory erasing not only could help people forget painful experiences, but might be useful in treating depression, general anxiety, phobias, post-traumatic stress, and addictions," he adds.

Dr. Sacktor said the research "shows that PKMzeta is fundamental for storing many different forms of memory, which previously has been viewed as potentially mediated by distinct mechanisms."

The PloS Biology paper may be accessed via this link: http://biology.plosjournals.org/perlserv/?request=get-document&doi=10.1371/journal.pbio.0060318

Really?

The Claim: Holly and Its Decorative Berries Can be Deadly

By ANAHAD O'CONNOR

Leif Parsons

THE FACTS Like mistletoe and poinsettia, holly is prized for its beauty and feared for its rumored toxicity. But studies show that much like its two Christmas companions, holly is not quite as deadly as portrayed. Its berries, which contain a caffeinelike alkaloid, might cause irritation, but a fatal ingestion is unlikely.

According to a one study by the Children's Hospital of Pittsburgh, plant exposures are the fourth most common cause of poisoning in the country. Ingestion of holly is among the five most common when it comes to plants.

A study by researchers at the University of Rochester reviewed 103 cases of toxic berry ingestion over two years, all involving children who swallowed six or fewer berries of holly, yew or nightshade. The children who were given ipecac experienced vomiting, diarrhea and "sedation." The others, who were simply monitored closely, did not, suggesting that symptoms attributed to holly and other berries might be a result of ipecac.

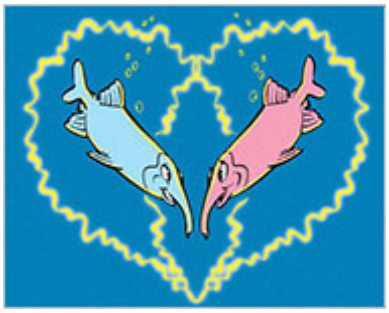
When accidental ingestion occurs, scientists said, it is best to consult a poison control center. But no need to banish that bough of holly.

THE BOTTOM LINE Holly may be problematic, but it is not as toxic as widely believed.

Observatory

African Fish Need a Little Electricity for Love to Bloom

By HENRY FOUNTAIN



Chris Gash

In the Congo River in Africa, there is a species of fish for which choosing a mate really depends on whether there's a certain spark.

Females of the species Campylomormyrus compressirostris, a fish that produces a weak electrical discharge from an organ near its tail, can distinguish males of their own species by their electrical signature, scientists at the University of Potsdam in Germany report in Biology Letters. The females' ability may effectively serve as a reproductive barrier that is important in speciation, the divergence of new species from existing ones.

C. compressirostris and similar species use their electrical discharge for navigation (they can sense when the electrical field they create is altered by the presence of an object) and for communication. Philine G. D. Feulner, now at the University of Sheffield in England, and colleagues tested whether that communication extended to choosing a mate. They found that females chose males of their species consistently over those of a closely related species that produce an electrical signal with different phase and other characteristics.

"The females really prefer males that have the same signal as themselves," Dr. Feulner said.

The finding may help explain why there are so many closely related species in the Congo River, she added. For two species to diverge while living in proximity, there must be a barrier to mating between them. That barrier often involves mate choice, based on sensory cues like how potential mates look, smell or sound. This species appears to use the electrical signal as another kind of cue, Dr. Feulner said.

Speciation like this also requires some kind of ecological differentiation between the diverging species. By affecting how the fish navigates for foraging, the electrical signal may serve that role as well, Dr. Feulner said.

Basics

A Highly Evolved Propensity for Deceit

By NATALIE ANGIER

When considering the behavior of putative scam operators like Bernard "Ponzi scheme" Madoff or Rod "Potty Mouth" Blagojevich, feel free to express a sense of outrage, indignation, disgust, despair, amusement, schadenfreude. But surprise? Don't make me laugh.

Sure, Mr. Madoff may have bilked his clients of $50 billion, and Governor Blagojevich, of Illinois, stands accused of seeking personal gain through the illicit sale of public property — a United States Senate seat. Yet while the scale of their maneuvers may have been exceptional, their apparent willingness to lie, cheat, bluff and deceive most emphatically was not.

Deceitful behavior has a long and storied history in the evolution of social life, and the more sophisticated the animal, it seems, the more commonplace the con games, the more cunning their contours.

In a comparative survey of primate behavior, Richard Byrne and Nadia Corp of the University of St. Andrews in Scotland found a direct relationship between sneakiness and brain size. The larger the average volume of a primate species' neocortex — the newest, "highest" region of the brain — the greater the chance that the monkey or ape would pull a stunt like this one described in The New Scientist: a young baboon being chased by an enraged mother intent on punishment suddenly stopped in midpursuit, stood up and began scanning the horizon intently, an act that conveniently distracted the entire baboon troop into preparing for nonexistent intruders.

Much evidence suggests that we humans, with our densely corrugated neocortex, lie to one another chronically and with aplomb. Investigating what they called "lying in day-to-day life," Bella DePaulo, now a visiting professor of psychology at the University of California, Santa Barbara, and her colleagues asked 77 college students and 70 people from the community to keep anonymous diaries for a week and to note the hows and whys of every lie they told.

Tallying the results, the researchers found that the college students told an average of two lies a day, community members one a day, and that most of the lies fell into the minor fib category. "I told him I missed him and thought about him every day when I really don't think about him at all," wrote one participant. "Said I sent the check this morning," wrote another.

In a follow-up study, the researchers asked participants to describe the worst lies they'd ever told, and then out came confessions of adultery, of defrauding an employer, of lying on a witness stand to protect an employer. When asked how they felt about their lies, many described being haunted with guilt, but others confessed that once they realized they'd gotten away with a whopper, why, they did it again, and again.

In truth, it's all too easy to lie. In more than 100 studies, researchers have asked participants questions like, Is the person on the videotape lying or telling the truth? Subjects guess correctly about 54 percent of the time, which is barely better than they'd do by flipping a coin. Our lie blindness suggests to some researchers a human desire to be deceived, a preference for the stylishly accoutred fable over the naked truth.

"There's a counterintuitive motivation not to detect lies, or we would have become much better at it," said Angela Crossman, an assistant professor of psychology at the John Jay College of Criminal Justice. "But you may not really want to know that the dinner you just cooked stinks, or even that your spouse is cheating on you."

The natural world is rife with humbug and fish tales, of things not being what they seem. Harmless viceroy butterflies mimic toxic monarch butterflies, parent birds draw predators away from the nest by feigning a broken wing, angler fish lure prey with appendages that wiggle like worms.

Biologists distinguish between such cases of innate or automatic deception, however, and so-called tactical deception, the use of a normal behavior in a novel situation, with the express purpose of misleading an observer. Tactical deception requires considerable behavioral suppleness, which is why it's most often observed in the brainiest animals.

Great apes, for example, make great fakers. Frans B. M. de Waal, a professor at the Yerkes National Primate Research Center and Emory University, said chimpanzees or orangutans in captivity sometimes tried to lure human strangers over to their enclosure by holding out a piece of straw while putting on their friendliest face.

"People think, Oh, he likes me, and they approach," Dr. de Waal said. "And before you know it, the ape has grabbed their ankle and is closing in for the bite. It's a very dangerous situation."

Apes wouldn't try this on their own kind. "They know each other too well to get away with it," Dr. de Waal said. "Holding out a straw with a sweet face is such a cheap trick, only a naïve human would fall for it."

Apes do try to deceive one another. Chimpanzees grin when they're nervous, and when rival adult males approach each other, they sometimes take a moment to turn away and close their grins with their hands. Similarly, should a young male be courting a female and spot the alpha male nearby, the subordinate chimpanzee will instantly try to cloak his amorous intentions by dropping his hands over his erection.

Rhesus monkeys are also artful dodgers. "There's a long set of studies showing that the monkeys are very good at stealing from us," said Laurie R. Santos, an associate professor of psychology at Yale University.

Reporting recently in Animal Behavior, Dr. Santos and her colleagues also showed that, after watching food being placed in two different boxes, one with merrily jingling bells on the lid and the other with bells from which the clappers had been removed, rhesus monkeys preferentially stole from the box with the silenced bells. "We've been hard-pressed to come up with an explanation that's not mentalistic," Dr. Santos said. "The monkeys have to make a generalization — I can hear these things, so they, the humans, can, too."

One safe generalization seems to be that humans are real suckers. After dolphin trainers at the Institute for Marine Mammals Studies in Mississippi had taught the dolphins to clean the pools of trash by rewarding the mammals with a fish for every haul they brought in, one female dolphin figured out how to hide trash under a rock at the bottom of the pool and bring it up to the trainers one small piece at a time.

We're desperate to believe that what our loved ones say is true. And now we find otherwise. Oh, Flipper, et tu?

F.D.A. to Reconsider Plastic Bottle Risk

By JULIE SCELFO

WEEKS after its own advisory board accused the Food and Drug Administration of failing to adequately consider research about the dangers of bisphenol-A, found in many plastic baby bottles, plastic food containers and metal can linings, the agency has agreed to reconsider the issue.

The F.D.A.'s draft risk assessment in August, finding the chemical safe as it is now used, stood out against a tide of recent scientific opinion. The National Toxicology Program, part of the Department of Health and Human Services, has said there was reason to be concerned that BPA, as the chemical is called, could harm the brain, behavior and the prostate gland in fetuses, infants and children. Canada added the chemical to its list of toxic substances this year and has said it will ban BPA from polycarbonate baby bottles.

In September, a study published in the Journal of the American Medical Association found that adults with high levels of BPA in their urine were more prone to heart and liver disease and diabetes.

More than 200 animal studies have linked ingesting minute amounts of the substance to a range of reproductive problems, brain damage, immune deficiencies, metabolic abnormalities, and behavioral oddities like hyperactivity, learning deficits and reduced maternal willingness to nurse offspring.

The F.D.A.'s position that current human exposure to BPA in food-packaging materials provides an adequate margin of safety appeared to be based on two large multigenerational studies by research groups that received funding from the American Plastics Council, according to a letter sent to the F.D.A. by Representatives John D. Dingell and Bart Stupak, Democrats of Michigan.

SAFE OR NOT? Questions surround the chemical bisphenol-A, found in bottles like these. **David McNew/Getty Images**

Although the F.D.A. had reviewed other studies, only the two multigenerational ones met its guidelines for determining safety for human consumption, said Dr. Mitchell Cheeseman, deputy director of the agency's Office of Food Additive Safety.

"I don't want to suggest that published studies are not valuable to F.D.A.'s safety assessment — they are," Dr. Cheeseman said. "But they lacked details about how the study was done, they don't include all the raw data, so independent auditing can't be done by agency scientists, and they have a variety of protocol limitations."

The F.D.A.'s science board subcommittee on BPA, however, after receiving comments from an independent advisory panel, determined that the F.D.A. was wrong to disregard the large body of research showing health effects even at extremely low doses. The agency's decision to reconsider was made public earlier this month.

"This was the F.D.A. finally acknowledging that its assertion that BPA is safe may not be correct," said Dr. Anila Jacob, a physician and senior scientist at the Environmental Working Group, a Washington-based advocacy group. "Still, we don't think it's enough. With millions of babies being exposed to this chemical on a daily basis, every day we continue to delay removing this chemical from baby products is another day millions of infants continue to be exposed."

Makers of BPA say that the chemical poses no known risk to human health.

Some manufacturers have begun introducing products for infants and children that are BPA-free, but BPA-containing polycarbonate bottles are still widely available. Shannon Jenest, a spokeswoman for the consumer lifestyle division of Philips, one of the world's largest producers of reusable baby bottles (under the Avent brand name), said that the company would rather let consumers "decide what works for their family." Philips manufacturers Avent products with, and without, the chemical.

Although Philips has made no public announcement, the manufacturer recently notified retailers that it will no longer accept orders for polycarbonate baby bottles after Dec. 31. But the manufacturer has not pulled its polycarbonate bottles from store shelves. "If you're not melting the bottle in the microwave," Ms. Jenest said, "then we don't believe there's an issue with bottles that contain BPA."

More than 2 billion pounds of BPA are produced each year. According to the Can Manufacturers Institute, more than 22 billion cans to be used for food and more than 100 billion cans for beer and soft drinks were produced last year. John Rost, a chemist and chair of the North American Metal Packaging Alliance, says "the vast majority" of them are lined with a resin coating containing BPA.

The Environmental Protection Agency has calculated that adults and infants can consume 50 micrograms of BPA per kilogram of body weight every day over a lifetime with little appreciable risk of harm. Yet more than 40 studies have found health effects in rodents fed as little as 0.2 micrograms per kilogram of body weight, according to Frederick S. vom Saal, a reproductive endocrinologist at the University of Missouri, Columbia, and a leading BPA researcher.

Exposure to BPA is widespread. A study by the Centers for Disease Control and Prevention found it in the urine of nearly 93 percent of a sample population.

Activists guilty of hate campaign

Four animal rights activists have been convicted of orchestrating a blackmail campaign against firms that supplied an animal testing research centre.

They used paedophile smears, criminal damage and bomb hoaxes to intimidate companies associated with Huntingdon Life Sciences (HLS) in Cambridgeshire. The four, members of Stop Huntingdon Animal Cruelty (SHAC) from Hampshire and London, had denied the charges. A fifth defendant was cleared by the Winchester Crown Court jury.

During a six-year campaign the group falsely claimed managers of the companies were paedophiles. They also sent hoax bombs parcels and made threatening telephone calls to firms telling them to cut links with HLS.

One of the features of intimidation included sending used sanitary items in the post to the firms and daubing roads outside managers' homes with slogans such as "puppy killer".

Heather Nicholson, 41, of Eversley, Hampshire; Gerrah Selby, 20, of Chiswick, London; Daniel Wadham, 21, of Bromley, south London, and Gavin Medd-Hall, 45, of Croydon, south London, were found guilty of conspiracy to blackmail. Another defendant, Trevor Holmes, 51, from Newcastle, was cleared.

Earlier, three other people, Gregg Avery and Natasha Avery, both of Hampshire, and Daniel Amos, of no fixed address, pleaded guilty to conspiracy to blackmail.

'Greater openness'

The court heard the defendants were part of SHAC, which was based near Hook, Hampshire, and targeted companies in the UK and Europe between 2001 and 2007. It was told Nicholson, from Eversley in Hampshire, was a founder member of SHAC, who managed the "menacing" campaigns against the firms.

Selby, Wadham and Medd-Hall were released on conditional bail, while Nicholson was remanded in custody.

A man who worked for a company which transported animals for HLS said he still fears reprisals after being sent obscene packages.

"We received a lot of phone calls and letters [which] contained things like used condoms, used sanitary towels, razor blades and syringe needles claiming to be from people who are infected with AIDS," he added.

A spokesman for HLS said: "Freedom of expression and lawful protest are important rights in our democratic society but so too is the right to conduct vital biomedical research, or to support organisations that perform such research, without being harassed and threatened.

"The UK environment for such biomedical research has improved greatly in recent years; this is the direct result of positive action taken by law enforcement agencies to control animal rights extremism.

"As a consequence we have seen greater openness in the research community that must lead to improved dialogue and better understanding - animal research remains a small but essential part of such research."

The verdict on Tuesday came after seven days of deliberation. One of the jurors refused to be seen in court while the verdict was announced. Sentencing will take place on 19 January.

Det Ch Insp Andy Robbins, of Kent Police, told the BBC: "We are very satisfied with the outcome of this prosecution. "This conspiracy to blackmail involved the systematic and relentless intimidation of individuals and their companies who the defendants suspected to be involved with HLS. "There was a whole group of tactics used by SHAC and I would like to pay tribute to the many victims who have had to carry on their lawful business while living through this criminal campaign.

"The public should also be aware that money donated to SHAC in good faith was in fact being used to finance criminal conduct.

"SHAC and the ALF [Animal Liberation Front] are one of the same, there is no club, no rules of membership."

Dr Simon Festing, from the Research Defence Society, said: "One of the effects of animal rights extremism has been to scare scientists, to actually stifle any kind of debate and it's been very frustrating for us. "We want to enter into a debate and a dialogue with the public about the ethics of this and we know it's a matter of concern.

"We want to be able to show people into research facilities especially where huge sums are being invested in making the welfare for the animals as good as possible."

Tiny clues to collision in space

Evidence that a massive meteorite shower had an impact on Earth on a global scale 470 million years ago have been found on a Highlands beach.

Researchers from the University of Aberdeen uncovered tiny remnants of meteorites, smaller than a grain of sand, within rocks in Sutherland. The find is linked to others made in China, the US and Australia.

The scientists think the meteorites - a result of a collision in space - triggered earthquakes and tsunami.

The university said the find near Durness confirmed previous scientific speculation that the meteorite shower - which followed a "catastrophic event" in an asteroid belt between Mars and Jupiter - was so vast in size that it affected locations across the globe. The study, led by Professor John Parnell from the School of Geosciences at the University of Aberdeen and published in Nature Geoscience, found the Sutherland meteorites were linked to those found elsewhere in the world.

Prof Parnell said these findings would help scientists to investigate further if there was any connection between the meteorites falling and changes to underwater species which took place around the same period of time.

He said: "We tested the piece of rock in Durness by dissolving the limestone in acid which allowed us to detect meteorites, smaller than can be seen by the naked eye.

"This confirmed that 470 million years ago these enormous meteorites fell in a wide span of locations across the globe - including Scotland. "This is the first time we have been able to prove the mammoth scale of the event and just how many geographical locations felt its impact."

The scientist added: "Our research has also pinpointed that the meteorites falling caused earthquakes and tidal waves to take place at the edge of many continents.

"Records show that the underwater life which existed on earth at this time became a lot more diverse directly after this major event. Any connection between these occurrences is not clear, but our findings will help us to investigate and potentially pinpoint how it happened."

Recipe for capturing authentic embryonic stem cells may apply to any mammal, study suggests

Researchers have what they think may be a basic recipe for capturing and maintaining indefinitely the most fundamental of embryonic stem cells from essentially any mammal, including cows, pigs and even humans. Two new studies reported in the December 26th issue of the journal Cell, a Cell Press publication, show that a cocktail first demonstrated to work in mice earlier this year, which includes inhibitory chemicals, also can be used to successfully isolate embryonic stem cells from rats.

Authentic rat embryonic stem cells had never before been established.

The new discovery made in labs at both the University of Edinburgh and the University of Southern California (USC), Los Angeles, is a major breakthrough for biomedical research, said Qi-Long Ying, an author on both studies who was at the University of Edinburgh and is now at USC. That's because it will allow researchers to readily produce genetically altered strains of rats, with conditions that mimic human disease, in a very targeted way. Austin Smith led the team at the University of Edinburgh and Ying led the USC team.

Humans and rats are physiologically more similar than humans and mice, making the study of rats more directly applicable to people, and rats' larger size also makes them easier to work with in many cases, according to the researchers. Humans and rats also tend to have similar responses to drugs.

The findings lend support to the notion that embryonic stem cells will remain in their undifferentiated, pluripotent state when they are shielded from particular outside signals. (Pluripotent refers to the ability to differentiate into any cell or tissue type). Scientists had previously thought that the maintenance of stem cells depended on activating signals from outside, including growth factors and other chemicals.

Embryonic stem cells are derived from the inner cell mass of blastocysts. Blastocysts are hollow balls of cells that form in early development. The inner cell mass is a cluster of cells inside the blastocyst that goes on to form the embryo.

Authentic embryonic stem cells are defined by three cardinal properties: unlimited symmetrical self-renewal in the lab; comprehensive contribution to primary chimeras; and generation of functional egg and sperm for genome transmission. Chimeras are produced when embryonic stem cells are inserted into a developing blastocyst and those stem cells go on to contribute to a normal embryo with cells of two origins, Ying explained. Because those embryonic stem cells can contribute to the germ line, any genetic alterations they carry –such as the loss or gain of a gene--can be passed on to the next generation.

The versatility of embryonic stem cells, combined with the ease with which they can be manipulated genetically, has provided a powerful means to elucidate gene function and create disease models via the generation of transgenic, chimeric, and knock-out animals. Although embryonic stem cells have been routinely derived from particular strains of mice since 1981, their capture from rats or other animals had remained elusive.

While human embryonic stem cell lines do exist, Ying said, it's not clear that they represent the most grounded stem cell state because the essential properties can't be demonstrated for obvious ethical reasons.

Now, Ying and Smith's teams show that a two- or three-ingredient concoction known as 2i or 3i respectively, which inhibits signals that would otherwise activate the differentiation process, maintains rat embryonic stem cells in their natural default state, allowing them to self-renew, or multiply, as generic stem cells. (The cocktails include inhibitors of GSK3, MEK, and FGF receptor tyrosine kinases.)

Most importantly, the isolated cells can produce high rates of chimerism when reintroduced into early stage embryos and can transmit through the germline, they report.

"In the past two decades, embryonic stem cells have been routinely used to create loss of function (knockout) or gene replacement (knockin) mutations by homologous recombination in the mouse, providing an invaluable tool for the functional characterization of genes," Ying's group wrote. "Now, the availability of true rat embryonic stem cells provides an opportunity to adapt the technology developed in the mouse to the rat."

The new findings raise "the possibility that culture formulations based on the 3i/2i principle could facilitate derivation of embryonic stem cells from other mammals, including livestock species," Austin Smith's team wrote. "It will also be of interest to investigate whether supernumerary human embryos cultured in 3i/2i may give rise to pluripotent cell lines that are qualitatively different from current human 'embryonic stem' cells" more like ground state rodent embryonic stem cells.

article 1:

The researchers include Ping Li, University of Southern California, Los Angeles, CA, Fudan University, Shanghai, China; Chang Tong, University of Southern California, Los Angeles, CA; Ruty Mehrian-Shai, University of Southern California, Los Angeles, CA; Li Jia, University of Southern California, Los Angeles, CA; Nancy Wu, University of Southern California, Los Angeles, CA; Youzhen Yan, University of Southern California, Los Angeles, CA; Robert E. Maxson, University of Southern California, Los Angeles, CA; Eric N. Schulze, University of Southern California, Los Angeles, CA; Houyan Song, Fudan University, Shanghai, China; Chih-Lin Hsieh, University of Southern California, Los Angeles, CA; Martin F. Pera, University of Southern California, Los Angeles, CA; and Qi-Long Ying, University of Southern California, Los Angeles, CA.

article 2:

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Brain starvation as we age appears to trigger Alzheimer's

Improving blood flow to brain is a preventive strategy

CHICAGO --- A slow, chronic starvation of the brain as we age appears to be one of the major triggers of a biochemical process that causes some forms of Alzheimer's disease.

A new study from Northwestern University's Feinberg School of Medicine has found when the brain doesn't get enough sugar glucose - as might occur when cardiovascular disease restricts blood flow in arteries to the brain - a process is launched that ultimately produces the sticky clumps of protein that appear to be a cause of Alzheimer's.

Robert Vassar, lead author, discovered a key brain protein is altered when the brain has a deficient supply of energy. The altered protein, called elF2alpha, increases the production of an enzyme that, in turn, flips a switch to produce the sticky protein clumps. Vassar worked with human and mice brains in his research.

The study is published in the December 26 issue of the journal Neuron.

"This finding is significant because it suggests that improving blood flow to the brain might be an effective therapeutic approach to prevent or treat Alzheimer's," said Vassar, a professor of cell and molecular biology at the Feinberg School.

A simple preventive strategy people can follow to improve blood flow to the brain is getting exercise, reducing cholesterol and managing hypertension. "If people start early enough, maybe they can dodge the bullet," Vassar said. For people who already have symptoms, vasodilators, which increase blood flow, may help the delivery of oxygen and glucose to the brain, he added.

Vassar said it also is possible that drugs could be designed to block the elF2alpha protein that begins the formation of the protein clumps, known as amyloid plaques.

An estimated 10 million baby boomers will develop Alzheimer's in their lifetime, according to the Alzheimer's Association. The disease usually begins after age 60, and risk rises with age. The direct and indirect cost of Alzheimer's and other dementias is about $148 billion a year.

The initial trigger of Alzheimer's has long been a mystery.

Ten years ago, it was Vassar who discovered the enzyme, BACE1, that was responsible for making the sticky, fiber-like clumps of protein that form outside neurons and disrupt their ability to send messages.

But the cause of the high levels of the protein in people with the disease has been unknown. Vassar's study now shows that energy deprivation in the brain might be the trigger starting the process that forms plaques in Alzheimer's.

Vassar said his work suggests that Alzheimer's disease may result from a less severe type of energy deprivation than occurs in a stroke. Rather than dying, the brain cells react by increasing BACE1, which may be a protective response in the short term, but harmful in the long term.

"A stroke is a blockage that prevents blood flow and produces cell death in an acute, dramatic event," Vassar said. "What we are talking about here is a slow, insidious process over many years where people have a low level of cardiovascular disease or atherosclerosis in the brain. It's so mild, they don't even notice it, but it has an effect over time because it's producing a chronic reduction in the blood flow."

Vassar said when people reach a certain age, some may get increased levels of the enzymes that cause a build-up of the plaques. "Then they start falling off the cliff," he said.

Rice psychologist identifies area of brain key to choosing words

New research by a Rice University psychologist clearly identifies the parts of the brain involved in the process of choosing appropriate words during speech.

The study, published in the current issue of the Proceedings of the National Academy of Sciences, could help researchers better understand the speech problems that stroke patients experience.

When speaking, a person must select one word from a competing set of words. For example, if the speaker wants to mention a specific animal, he has to single out "dog" from "cat," "horse" and other possibilities. If he wants to describe someone's temperament, he has to choose whether "happy," "sad," "ecstatic" or some other adjective is more appropriate.

Tatiana Schnur, assistant professor of psychology at Rice, wanted to determine whether one particular part of the brain, the left inferior frontal gyrus (LIFG), is necessary for resolving the competition for choosing the correct word. She and her colleagues compared brain images from 16 healthy volunteers and 12 volunteers who suffer from aphasia, an acquired language disorder as a result of stroke. People who have aphasia frequently experience difficulty with speech.

The researchers found that while two parts of the brain, the LIFG and the left temporal cortex, respond to increased conflict among words competing for selection during speech, only the LIFG is necessary to resolve the competition for successful word production. The LIFG includes Broca's area, named after the 19th-century French scientist Paul Pierre Broca. It is responsible for aspects of speech production, language processing and language comprehension.

The study covered two experiments where people name a series of images and conflict between words increases as more images are named. In the first experiment, healthy speakers' brain activations were measured using functional magnetic resonance imaging. The second experiment mapped performance deficits to lesion locations in participants with aphasia.

By looking at direct parallels between the healthy and aphasic volunteers, Schnur and colleagues coupled location in the brain with specific speech processes. The research found that the ability of aphasic speakers "to resolve competition that arises in the course of language processing appears to depend on the integrity of the LIFG." This result could open an exciting line of research, as damage to this mechanism may explain the hesitant, nonfluent speech exhibited by those described as Broca's aphasics.

The study, "Localizing Interference During Naming: Convergent Neuroimaging and Neuropsychological Evidence for the Function of Broca's Area," was funded by the National Institutes of Health.

Cancer drug effectively treats transplant rejections

CINCINNATI—University of Cincinnati (UC) researchers have discovered a new therapy for transplant patients, targeting the antibody-producing plasma cells that can cause organ rejection.

Results of the study are published in the Dec. 27, 2008, edition of the journal Transplantation.

Steve Woodle, MD, and colleagues found that a cancer drug—bortezomib—used to treat multiple myeloma, or cancer of the plasma cells, is effective in treating rejection episodes caused by antibodies that target transplanted kidneys and reversing rejection episodes that did not respond to standard therapies.

B-lymphocytes, or B cells, play a large role in the humoral immune response by making immune proteins that attack transplanted organs.

"We found a body of literature demonstrating that bortezomib works well in suppressing transplant rejection in the laboratory," says Woodle, lead author of the study and chief of transplant surgery at UC. "Moreover, it worked well in models of autoimmune diseases."

T-lymphocytes, or T cells, are white blood cells that were commonly thought to cause the rejection of transplanted organs.

Woodle and his team began searching for agents that targeted plasma cells in 2005.

"It has become clear that plasma cells and the antibodies they produce play a bigger role in rejection than previously thought, and the development of therapies targeting these cells has lagged," he says. "We realized that current therapies don't target the plasma cells which may produce the antibody, in general."

Researchers administered this drug to six kidney transplant recipients with treatment-resistant organ rejection, evaluating and recording their responses to the treatment.

In each case, treatment with the drug provided prompt rejection reversal, prolonged reductions in antibody levels and improved organ function with suppression of recurrent rejection for at least five months.

Jason Everly, a board-certified oncology pharmacist in the division of transplant surgery at UC and co-author of the study, says the toxicities associated with this drug were predictable and manageable and were much less than those associated with other anti-cancer agents.

"We are pleased to see its toxicities are similar in transplant recipients suffering from treatment-resistant mixed organ rejection," he adds. "We hope it will be a viable therapeutic treatment option in this patient group."

Woodle says although this data is promising, it is difficult to overestimate the implications of this drug.

"We have an immunosuppressive agent that for the first time can target antibody-producing plasma cells with an efficacy similar to drugs that target T cells," he says. "This has significant implications for transplantation and auto immune disease."

UC researchers are currently conducting four industry-supported clinical trials to expand these findings.

This research was investigator-initiated. In addition to grants, researchers have received honoraria from the manufacturer of bortezomib.

Common food additive found to increase risk and speed spread of lung cancer

New research in an animal model suggests that a diet high in inorganic phosphates, which are found in a variety of processed foods including meats, cheeses, beverages, and bakery products, might speed growth of lung cancer tumors and may even contribute to the development of those tumors in individuals predisposed to the disease.

The study also suggests that dietary regulation of inorganic phosphates may play an important role in lung cancer treatment. The research, using a mouse model, was conducted by Myung-Haing Cho, D.V.M., Ph.D., and his colleagues at Seoul National University, appears in the first issue for January of the American Journal of Respiratory and Critical Care Medicine, published by the American Thoracic Society.

"Our study indicates that increased intake of inorganic phosphates strongly stimulates lung cancer development in mice, and suggests that dietary regulation of inorganic phosphates may be critical for lung cancer treatment as well as prevention," said Dr. Cho.

Lung cancer is the number one cause of cancer deaths in the world and is also the most frequently diagnosed solid tumor. Non–small cell lung cancer (NSCLC) constitutes over 75 percent of lung cancers and has an average overall 35-year survival rate of 14 percent. Earlier studies have indicated that approximately 90 percent of NSCLC cases were associated with activation of certain signaling pathways in lung tissue. This study revealed that high levels of inorganic phosphates can stimulate those same pathways.

"Lung cancer is a disease of uncontrolled cell proliferation in lung tissue, and disruption of signaling pathways in those tissues can confer a normal cell with malignant properties," Dr. Cho explained. "Deregulation of only a small set of pathways can confer a normal cell with malignant properties, and these pathways are regulated in response to nutrient availability and, consequently, cell proliferation and growth.

"Phosphate is an essential nutrient to living organisms, and can activate some signals," he added. "This study demonstrates that high intake of inorganic phosphates may strongly stimulate lung cancer development by altering those (signaling) pathways."

In the study, lung cancer-model mice were studied for four weeks and were randomly assigned to receive a diet of either 0.5 or 1.0 percent phosphate, a range roughly equivalent to modern human diets. At the end of the four-week period, the lung tissue was analyzed to determine the effects of the inorganic phosphates on tumors.

"Our results clearly demonstrated that the diet higher in inorganic phosphates caused an increase in the size of the tumors and stimulated growth of the tumors," Dr. Cho said.

Dr. Cho noted that while a moderate level of phosphate plays an essential role in living organisms, the rapidly increasing use of phosphates as a food additive has resulted in significantly higher levels in average daily diets. Phosphates are added to many food products to increase water retention and improve food texture.

"In the 1990s, phosphorous-containing food additives contributed an estimated 470 mg per day to the average daily adult diet," he said. "However, phosphates are currently being added much more frequently to a large number of processed foods, including meats, cheeses, beverages, and bakery products. As a result, depending on individual food choices, phosphorous intake could be increased by as much as 1000 mg per day."

"Although the 0.5 percent was defined as close to 'normal,' the average diet today is actually closer to the one percent diet and may actually exceed it," Dr. Cho noted. "Therefore, the 0.5 percent intake level is actually a reduced phosphate diet by today's scale."

Dr. Cho said future studies will help refine what constitutes a "safe" level of dietary inorganic phosphate, with recommendations that will be easily achievable in the average population. "The results of this study suggest that dietary regulation of inorganic phosphates has a place in lung cancer treatment, and our eventual goal is to collect sufficient information to accurately assess the risk of these phosphates," he said.

John Heffner, M.D., past president of the ATS, stated that this line of investigation in animals addresses the complex interactions between host factors and the environment that underlie cancer in man. "We know that only some patients who smoke develop lung cancer but the reasons for this varying risk are unknown. This

study now provides a rationale for funding case-control studies in humans to determine the potential role of dietary phosphates in promoting cancer."

Family members of critically ill patients want to discuss loved ones' uncertain prognoses

Critically ill patients frequently have uncertain prognoses, but their families overwhelmingly wish that physicians would address prognostic uncertainty candidly, according to a new study out of the University of San Francisco Medical Center.

"Our interviews revealed that caregivers appear to believe that some uncertainty is unavoidable, and just the nature of life," said lead author Douglas White, M.D., M.A.S., assistant professor in UCSF's Division of Pulmonary and Critical Care Medicine and the UCSF Program in Medical Ethics. "The vast majority of families of critically ill patients want physicians to openly discuss the prognosis, even when physicians can't be certain that their estimates are correct."

But past research showing that physicians are reluctant to discuss uncertain prognoses reveals a schism between families' wishes and physicians' comfort.

The results were reported in the second issue for January of the American Journal of Respiratory and Critical Care Medicine, published by the American Thoracic Society.

Between January 2006 and October 2007, researchers at the University of San Francisco Medical Center conducted face-to-face interviews with 179 surrogate decision-makers for patients in four separate intensive care units (ICUs). The interviews explored surrogates' attitudes about whether physicians should discuss prognoses when they cannot be certain their prognostic estimates are correct.

When asked whether they would prefer to hear physicians' prognoses, 87 percent of caregivers indicated that they would want to be told of all prognostic estimates, even if the estimates were tentative. Most also indicated that they appreciated a physician's candor in discussing uncertain outcomes as honest, rather than seeing it as a source of confusion or anxiety.

"We learned that family members wanted prognostic information in order to know whether they needed to begin to prepare for the chance that their loved one might die, and so begin the bereavement process," Dr. White said. "I think one of the strongest messages that comes from this study is that family members want to have this discussion with the physician, and want to have the opportunity to take care of unfinished personal and familial business before their loved one dies. They need that chance to say their goodbyes, in case the patient does die."

Dr. White also noted that while the majority of family members indicated that they did want physicians to discuss all possible outcomes, a not-insignificant portion— 12 percent— said they did not want to discuss uncertain prognoses, indicating that a "one-size-fits-all" approach is insufficient in critical care situations.

"Our findings suggest that physicians need to develop the skills to understand the unique needs of surrogates, and then tailor their approach to discussing prognosis to meet those needs," he said. "This is an area in need of well-designed quantitative and qualitative studies."

Dr. White and his colleagues are currently involved in a follow-up study to help family members navigate the process of surrogate decision making in the ICU setting.

John Heffner, M.D., past president of the ATS, emphasized that the results of this study parallel previous investigations that examined patient and family preferences in discussing do-not-resuscitate orders and end-of-life care. "In almost all studies, patients and families express a desire for clear information to inform their decisions. Although physicians often wish to shelter their patients and patient families from what might seem to be harsh realities, the human spirit is resilient. Patients and families access to information from their doctors."

Orangutans learn to trade favours

Orangutans can help each other get food by trading tokens, scientists have discovered - but only if the help goes in both directions.

Researchers from the University of St Andrews found orangutans could learn the value of tokens and trade them, helping each other win bananas. An article in Biology Letters, claims it is the first evidence of "calculated reciprocity" in non-human primates. Gorillas and chimpanzees were much less willing to cooperate, they report.

Two orangutans - Bim and Dok - who live in Leipzig Zoo, Germany, were especially good at helping each other. Initially, they were given several sets of tokens, and learned the value of the different types. An animal could exchange one type for bananas for itself, another type could be used to gain bananas for a partner, and a third had no value.

Initially, Dok, the female, was especially good at swapping tokens to get bananas for Bim, the male. Sometimes Bim would point at the tokens to encourage her. But he was less interested in trading tokens that would win bananas for her. As she became less willing to help him out, Bim responded by trading more and more, until their efforts were more or less equal.

"So we have a calculation behind the giving," explained Valerie Dufour who led the research at the Scottish university. "If you don't give me enough, then I don't give you either; but if you give me enough, OK, then I buy your co-operation, and I secure it by giving too."

Many animals exchange goods and services with each other; the grooming of primates is an obvious example.

But the researchers say there has been no experimental evidence before of "calculated reciprocity", where animals adapt their own behaviour in response to how another is helping them.

"It's not just humans that calculate about giving, and it's not just humans who expect to be given something in return when they are co-operative," Dr Dufour told BBC News. "Orangutans do that too."

Orangutans from Sumatra and Borneo are among our closest relatives

However, other apes - chimpanzees, gorillas and bonobos - were less able or willing to play the game.

Facial expressions of emotion are innate, not learned, says new study

SAN FRANCISCO, Dec. 29, 2008 -- Facial expressions of emotion are hardwired into our genes, according to a study published today in the Journal of Personality and Social Psychology. The research suggests that facial expressions of emotion are innate rather than a product of cultural learning. The study is the first of its kind to demonstrate that sighted and blind individuals use the same facial expressions, producing the same facial muscle movements in response to specific emotional stimuli.

The study also provides new insight into how humans manage emotional displays according to social context, suggesting that the ability to regulate emotional expressions is not learned through observation.

San Francisco State University Psychology Professor David Matsumoto compared the facial expressions of sighted and blind judo athletes at the 2004 Summer Olympics and Paralympic Games. More than 4,800 photographs were captured and analyzed, including images of athletes from 23 countries.

"The statistical correlation between the facial expressions of sighted and blind individuals was almost perfect," Matsumoto said. "This suggests something genetically resident within us is the source of facial expressions of emotion."

Matsumoto found that sighted and blind individuals manage their expressions of emotion in the same way according to social context. For example, because of the social nature of the Olympic medal ceremonies, 85 percent of silver medalists who lost their medal matches produced "social smiles" during the ceremony. Social smiles use only the mouth muscles whereas true smiles, known as Duchenne smiles, cause the eyes to twinkle and narrow and the cheeks to rise.

Photos show comparison of facial expressions by blind and sighted athletes who just lost a match for a medal.
Bob Willingham

"Losers pushed their lower lip up as if to control the emotion on their face and many produced social smiles," Matsumoto said. "Individuals blind from birth could not have learned to control their emotions in this way through visual learning so there must be another mechanism. It could be that our emotions, and the systems to regulate them, are vestiges of our evolutionary ancestry. It's possible that in response to negative emotions, humans have developed a system that closes the mouth so that they are prevented from yelling, biting or throwing insults."

David Matsumoto is professor of psychology at San Francisco State University. Matsumoto co-authored the paper with Bob Willingham from the Center for Psychological Studies.

"Spontaneous Facial Expressions of Emotion in Congenitally and Non-Congenitally Blind Individuals" will be published in the January issue of The Journal of Personality and Social Psychology, Vol. 96, No.1.