http://www.eurekalert.org/pub_releases/2012-04/uoia-hab040912.php

Head and body lice appear to be the same species, genetic study finds

A new study offers compelling genetic evidence that head and body lice are the same species.

CHAMPAIGN, Ill. - The finding is of special interest because body lice can transmit deadly bacterial diseases, while head lice do not. The study appears in the journal Insect Molecular Biology.

Scientists have long debated whether human head and body lice are the same or different species. The head louse (Pediculus humanus capitis) is a persistent nuisance, clinging to and laying its eggs in the hair, digging its mouthparts into the scalp and feeding on blood several times a day. The body louse (Pediculus humanus humanus) tends to be larger than its cranial counterpart, and is a more dangerous parasite. It lays its eggs on clothing, takes bigger blood meals, and can transmit relapsing fever, trench fever and epidemic typhus to its human host.

Previous studies have found that even when they are both present on the same host, head and body lice don't stray into each other's territories. They don't breed with one another in the wild, but they have been shown to successfully reproduce under specific laboratory conditions. The presence of head lice has little to do with human hygiene, but body lice seem to appear out of nowhere when hygiene suffers – in times of war or economic hardship, for example. In the new study, researchers compared the number and sequences of all of the protein-coding genes expressed at every stage of the head and body louse life cycles.

"We were interested in understanding potentially how closely related head lice and body lice are," said University of Illinois entomology professor Barry Pittendrigh, who led the study. "Do they have the same number of genes? Do those genes look very similar or are they very different? What we found is that these two organisms are extremely similar in terms of their protein-coding genes." The researchers also exposed the lice to a variety of environmental conditions to capture the greatest variety of gene activity.

"My colleagues at the University of Massachusetts, led by veterinary and animal sciences professor John Clark, collected lice at every developmental stage, exposed them to every pesticide they could get their hands on, multiple bacterial challenges, several physical challenges – cold, heat – to get the lice to express as many genes as possible," Pittendrigh said. Very few differences were detected in the number or sequences of genes they expressed.

"The differences in their sequences were so minor that if we didn't know they were separate groups, we would have considered them the same species," he said. "As body lice transmit diseases and head lice don't, this system provides a unique opportunity to understand subtle changes that allow body lice to transmit human diseases," said graduate student Brett Olds, who conducted the genetic analysis.

The study team also included Illinois animal biology professor Kenneth Paige; entomology graduate students Laura Steele and Tolulope Agunbiade; and S.H. Lee, from the department of agricultural biotechnology at Seoul National University. The National Institute of Allergy and Infectious Diseases at the National Institutes of Health supported this research.

http://www.eurekalert.org/pub_releases/2012-04/uoe-8fc040512.php

800-year-old farmers could teach us how to protect the Amazon

In the face of mass deforestation of the Amazon, we could learn from its earliest inhabitants who managed their farmland sustainably.

Research from an international team of archaeologists and paleoecologists, published today (9 April 2012) in the journal Proceedings of the National Academy of Sciences, shows for the first time that indigenous people, living in the savannas around the Amazonian forest, farmed without using fire. Led by the University of Exeter, the research could provide insights into the sustainable use and conservation of these globally-important ecosystems, which are being rapidly destroyed. Pressure on the Amazonian savannas today is intense, with the land being rapidly transformed for industrial agriculture and cattle ranching.

By analysing records of pollen, charcoal and other plant remains like phytoliths spanning more than 2,000 years, the team has created the first detailed picture of land use in the Amazonian savannas in French Guiana. This gives a unique perspective on the land before and after the first Europeans arrived in 1492.

The research shows that the early inhabitants of these Amazonian savannas practiced 'raised-field' farming, which involved constructing small agricultural mounds with wooden tools. These raised fields provided better drainage, soil aeration and moisture retention: ideal for an environment that experiences both drought and flooding. The fields also benefited from increased fertility from the muck continually scraped from the flooded basin and deposited on the mounds. The raised-field farmers limited fires, and this helped them conserve soil nutrients and organic matter and preserve soil structure.

It has long been assumed that indigenous people used fire as a way of clearing the savannas and managing their land. However, this new research shows that this was not the case here. Instead, it reveals a sharp increase

in fires with the arrival of the first Europeans, an event known as the 'Columbian Encounter'. The study shows that this labour-intensive approach to farming in the Amazonian savannas was lost when as much as 95 per cent of the indigenous population was wiped out as a result of Old World diseases, brought by European settlers.

The results of this study are in sharp contrast with what is known about the Columbian Encounter's impact on tropical forest, where the collapse of indigenous populations after 1492 led to decreased forest clearance for agriculture, which in turn, caused a decline in burning. This study shows that high fire incidence in these Amazonian savannas is a post-1492, rather than pre-1492, phenomenon.

Dr José Iriarte of the University of Exeter, lead author on the paper, said: "This ancient, time-tested, fire-free land use could pave the way for the modern implementation of raised-field agriculture in rural areas of Amazonia. Intensive raised-field agriculture can become an alternative to burning down tropical forest for slash and burn agriculture by reclaiming otherwise abandoned and new savannah ecosystems created by deforestation. It has the capability of helping curb carbon emissions and at the same time provide food security for the more vulnerable and poorest rural populations."

Dr Mitchell Power of the University of Utah said: "Our results force reconsideration of the long-held view that fires were a pervasive feature of Amazonian savannas."

Professor Doyle McKey of the University of Montpellier said: "Amazonian savannas are among the most important ecosystems on Earth, supporting a rich variety of plants and animals. They are also essential to managing climate. Whereas savannas today are often associated with frequent fire and high carbon emissions, our results show that this was not always so. With global warming, it is more important than ever before that we find a sustainable way to manage savannas. The clues to how to achieve this could be in the 2,000 years of history that we have unlocked."

Dr Francis Mayle of the University of Edinburgh said: "We've got an unprecedented record of these Amazonian savannas that completely overturns previous assumptions about the way in which ancient cultures utilized these globally-important ecosystems."

Dr Stephen Rostain of CNRS said "These raised-field systems can be as productive as the man-made black soils of the Amazon, but with the added benefit of low carbon emissions."

The study was carried out by a team from the University of Exeter (UK), Natural History Museum of Utah (US), Centre National de la Recherche Scientifique (France), University of Edinburgh (UK), Université Montpellier II and Centre d'Ecologie Fonctionnelle et Evolutive (France). It was funded by two CNRS Programmes ('Amazonie' and 'Ingénierie Ecologique'), the Arts and Humanities Research Council and The Leverhulme Trust.

http://www.eurekalert.org/pub_releases/2012-04/nifp-icb040912.php

Immune cells, 'macrophages' become activated by body temperature

Molecular mechanisms involved in the switch-on of the temperature sensor TRPM2 by hydrogen peroxide have been clarified

Macrophages playing an important role in the immune system eat and fight against pathogens and foreign substances in the very beginning of infection. In this condition, macrophages produce reactive oxygen species for sterilization. However, the relation with the temperature sensor was not previously known.

Professor Makoto Tominaga from National Institute for Physiological Sciences (Okazaki Institute for Integrative Bioscience), National Institutes of Natural Sciences, and his research team member Ms. Makiko Kashio have identified the mechanism through which TRPM2 is activated by body temperature with hydrogen peroxide (a kind of reactive oxygen species) produced by immune reactions. This research result was reported (online in the week of 9th April, 2012) by Proceedings of the National Academy of Sciences of the United States of America.

The research group focused on the relation between hydrogen peroxide and TRPM2. Although TRPM2 is usually activated by high temperature near 48oC in the absence of endogenous ligands, it becomes activated at our normal body temperature with hydrogen peroxide production. It means that hydrogen peroxide works as "a switch" which controls TRPM2 function. In addition, they found that phagocytic activity of macrophages was enhanced in the febrile temperature (38.5℃).

Professor Tominaga says, "It was also revealed that oxidation of TRPM2 by hydrogen peroxide is involved in the switch-on mechanism and we identified a single amino acid which is oxidized. This newly identified mechanism of TRPM2 regulation may lead to the development of new treatment strategies or drugs for infection. When we are infected with bacteria, we often run a fever, and it is known that body temperature might be important for our immune system. TRPM2 might explain the mechanism through which fever boosts up our immune system. "

This result was supported by Grant-in-Aid for Scientific Research from the MEXT, Japan.

http://www.sciencedaily.com/releases/2012/04/120409164305.htm

Study Links Toxic Component in Herbal Remedies to Kidney Failure and Cancer

Aristolochic acid (AA), a component of a plant used in herbal remedies since ancient times, leads to kidney failure and upper urinary tract cancer (UUC) in individuals exposed to the toxin

ScienceDaily - Aristolochic acid (AA), a component of a plant used in herbal remedies since ancient times, leads to kidney failure and upper urinary tract cancer (UUC) in individuals exposed to the toxin. In a study of 151 UUC patients in Taiwan -- where the incidence of UUC is the highest reported anywhere in the world and where Aristolochia herbal remedies have been widely used- Arthur Grollman, M.D., Distinguished Professor of Pharmacological Sciences, Stony Brook University School of Medicine, and an international team of scientists, conclude that exposure to AA is a primary contributor to the incidence of UUC in Taiwan.

Aristolochic acid (AA), a component of birthwort,a plant used in herbal remedies since ancient times, leads to kidney failure and upper urinary tract cancer (UUC) in individuals exposed to the toxin. (Credit: © mite / Fotolia)

This finding, reported in the Proceedings of the National Academy of Science, holds broad implications for global public health, as individuals treated with herbal preparations available worldwide that contain Aristolochia are at significant risk of developing chronic kidney Aristolochic acid (AA), a component of a plant used in herbal remedies since ancient times, leads to kidney failure and upper urinary tract cancer (UUC) in individuals exposed to the toxin disease or UUC.

Aristolochic acid is recognized by the U.S. Department of Health and Human Services as a powerful nephrotoxin and human carcinogen associated with chronic kidney disease and UUC. The dual toxicities and target tissues were originally revealed when a group of healthy Belgian women developed renal failure and UUC after ingesting Aristolochia herbs to lose weight. Other cases of aristolochic acid nephropathy (AAN) and UUC were subsequently reported worldwide.

Most recently, Dr. Grollman and colleagues proved AA to be the causative agent of endemic nephropathy in the Balkans, solving a 50-year-old medical mystery that pointed to the ingestion of Aristolochia clematitis, or birthwort, contained in wheat. The study results were reported recently in Kidney International.

Using their previous work in the Balkans as a guide, Dr. Grollman and colleagues looked toward other areas where Aristolochia might be consumed and in which there was a high incidence of kidney disease and UUC. Taiwan appeared to demonstrate exactly that connection.

"We believe our latest research highlights the importance of a long-overlooked disease that affects many individuals in Taiwan, and, by extension, in China and other countries worldwide, where Aristolochia herbal remedies traditionally have been used for medicinal purposes," says Dr. Grollman.

An analysis of National Health Insurance data in Taiwan between 1997 and 2003 indicates the widespread use of AA in herbal medications. Based on a 200,000 person random sample of the entire insured population of Taiwan, the data reveals that approximately one-third of those prescribed medicines consumed herbs containing, or likely to contain, AA.

Marc De Broe, University of Antwerp, an investigator not associated with the study says, "From a group of fewer than 200 patients in Belgium, and a geographically confined rural population in the Balkans, the circle of cancer risk due to AA exposure has now grown to potentially global proportions."

In "Aristolochic acid-associated urothelial carcinoma in Taiwan," Dr. Grollman and colleagues describe extracting DNA from tumors of 151 UUC patients. Twenty-five patients with renal cell carcinomas served as the control group. The researchers detected a metabolite of AA bound to DNA (aristolactam(AL)-DNA adducts) in the kidney cortex of 83 percent of the UUC patients.

According to Dr. Grollman, the AL-DNA adducts, formed by the reaction of AA and DNA, cause alterations in the properties of genomic DNA. This DNA-altering process is a crucial step in the development of cancer.

Additionally, alterations of TP53, a gene associated with many forms of cancer, were detected in a majority of the UUC patients. A total of 113 TP53 "signature" mutations were detected in 84 (55.6%) of the 151 patients.

Dr. Grollman explains that these findings from their molecular epidemiologic study in Taiwan clearly illustrate that the presence of AL-DNA in the kidney cortex, together with the specific mutations in tumor tissue, are biomarkers of exposure to AA.

"The findings provide a solid foundation for public health officials to develop strategies designed to eliminate aristolochic acid nephropathy and related upper urinary tract cancer," emphasizes Dr. Grollman.
Collaborators on the study and co-authors include: Kathleen G. Dickman, Masaaki Moriya, and Viktoriya S. Sidorenko, of the Department of Pharmacological Sciences, Stony Brook University School of Medicine; Chung-Hsin Chen and Yeong-Shiau Pu, Department of Urology, National Taiwan University Hospital; Jiri Zavadil, Department of Pathology, Cancer Institute and Center for Health Informatics and Bioinformatics, New York University Langone Medical Center; Karen L. Edwards, Department of Epidemiology, Institute for Public Health Genetics, University of Washington; Dmitri V. Gnatenko, Department of Medicine, Stony Brook University School of Medicine; Lin Wu, Roche Molecular Systems; Robert T. Turesky, Division of Environmental Health Sciences, N.Y. State Department of Health; and Xue-Ru Wu, Departments of Urology and Pathology, NYU School of Medicine and Veterans Affairs Medical Center.
Their research was supported by grants from the National Institute of Environmental Health Sciences, and the
C.-H. Chen, K. G. Dickman, M. Moriya, J. Zavadil, V. S. Sidorenko, K. L. Edwards, D. V. Gnatenko, L. Wu, R. J. Turesky, X.-R. Wu, Y.-S. Pu, A. P. Grollman. Aristolochic acid-associated urothelial cancer in Taiwan. Proceedings of the National Academy of Sciences, 2012; DOI: 10.1073/pnas.1119920109

http://www.eurekalert.org/pub_releases/2012-04/bawh-dxl040912.php

Dental X-rays linked to common brain tumor

Research finds correlation between frequent dental X-rays and increased risk of developing meningioma

Boston, MA – Meningioma, the most common primary brain tumor in the United States, accounts for about 33 percent of all primary brain tumors. The most consistently identified environmental risk factor for meningioma is exposure to ionizing radiation. In the largest study of its kind, researchers from Brigham and Women's Hospital (BWH), Yale University School of Medicine, Duke University, UCSF and Baylor College of Medicine have found a correlation between past frequent dental x-rays, which are the most common source of exposure to ionizing radiation in the U.S, and an increased risk of developing meningioma. These findings are published in the April 10, 2012 issue of Cancer.

"The findings suggest that dental x-rays obtained in the past at increased frequently and at a young age, may be associated with increased risk of developing this common type of brain tumor," said Elizabeth Claus, MD, PhD, a neurosurgeon at BWH and Yale University School of Medicine at New Haven. "This research suggests that although dental x-rays are an important tool in maintaining good oral health, efforts to moderate exposure to this form of imaging may be of benefit to some patients."

Claus and her colleagues studied data from 1,433 patients diagnosed with meningioma between 20 and 79 years of age between May 2006 and April 2011 and compared the information to a control group of 1350 participants with similar characteristics. They found that patients with meningioma were twice as likely to report having a specific type of dental x-ray called a bitewing exam, and that those who reported having them yearly or more frequently were 1.4 to 1.9 times as likely to develop a meningioma when compared to the control group.

Additionally, researchers report that there was an even greater increased risk of meningioma in patients who reported having a panorex x-ray exam. Those who reported having this exam taken under the age of 10, were 4.9 times more likely to develop a meningioma compared to controls. Those who reported having the exam yearly or more frequently than once a year were nearly 3 times as likely to develop meningioma when compared to the control group. "It is important to note that the dental x-rays performed today use a much lower dose of radiation than in the past," said Claus.

According to background information in the study, The American Dental Association's statement on the use of dental radiographs emphasizes the need for dentists to examine the risks and benefits of dental x-rays and confirms that there is little evidence to support the use of dental x-rays in healthy patients at preset intervals.
This research was funded by the National Institutes of Health RO1 grants CA109468, CA109461 CA109745, CA108473, CA109475 and by the Brain Science Foundation and the Meningioma Mommas.

http://www.eurekalert.org/pub_releases/2012-04/uoia-rub041012.php

Researchers use brain-injury data to map intelligence in the brain

Scientists report that they have mapped the physical architecture of intelligence in the brain.

CHAMPAIGN, Ill. - Theirs is one of the largest and most comprehensive analyses so far of the brain structures vital to general intelligence and to specific aspects of intellectual functioning, such as verbal comprehension and working memory.

Their study, published in Brain: A Journal of Neurology, is unique in that it enlisted an extraordinary pool of volunteer participants: 182 Vietnam veterans with highly localized brain damage from penetrating head injuries. "It's a significant challenge to find patients (for research) who have brain damage, and even further, it's very

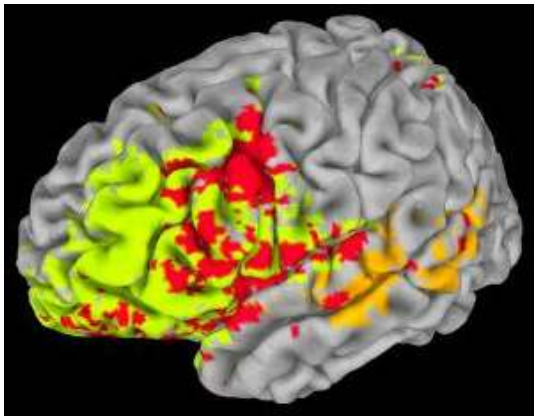
hard to find patients who have focal brain damage," said University of Illinois neuroscience professor Aron Barbey, who led the study. Brain damage – from stroke, for example – often impairs multiple brain areas, he said, complicating the task of identifying the cognitive contributions of specific brain structures.

But the very focal brain injuries analyzed in the study allowed the researchers "to draw inferences about how specific brain structures are necessary for performance," Barbey said. "By studying how damage to particular brain regions produces specific forms of cognitive impairment, we can map the architecture of the mind, identifying brain structures that are critically important for specific intellectual abilities."

The researchers took CT scans of the participants' brains and administered an extensive battery of cognitive tests. They pooled the CT data to produce a collective map of the cortex, which they divided into more than 3,000 three-dimensional units called voxels. By analyzing multiple patients with damage to a particular voxel or cluster of voxels and comparing their cognitive abilities with those of patients in whom the same structures were intact, the researchers were able to identify brain regions essential to specific cognitive functions, and those structures that contribute significantly to intelligence.

"We found that general intelligence depends on a remarkably circumscribed neural system," Barbey said. "Several brain regions, and the connections between them, were most important for general intelligence."

These structures are located primarily within the left prefrontal cortex (behind the forehead), left temporal cortex (behind the ear) and left parietal cortex (at the top rear of the head) and in "white matter association tracts" that connect them. (***Watch a video about the findings***.) The researchers also found that brain regions for planning, self-control and other aspects of executive function overlap to a significant extent with regions vital to general intelligence.



A new study found that specific structures, primarily on the left side of the brain, are vital to general intelligence and executive function (the ability to regulate and control behavior). Brain regions that are associated with general intelligence and executive function are shown in color, with red indicating common areas, orange indicating regions specific to general intelligence, and yellow indicating areas specific to executive function. **Aron Barbey**

The study provides new evidence that intelligence relies not on one brain region or even the brain as a whole, Barbey said, but involves specific brain areas working together in a coordinated fashion.

"In fact, the particular regions and connections we found support an emerging body of neuroscience evidence indicating that intelligence depends on the brain's ability to integrate information from verbal, visual, spatial and executive processes," he said.

The findings will "open the door to further investigations into the biological basis of intelligence, exploring how the brain, genes, nutrition and the environment together interact to shape the development and continued evolution of the remarkable intellectual abilities that make us human," Barbey said.

The research team also included scientists from Universidad Autónoma de Madrid; Medical Numerics, in Germantown, Md.; George Mason University; the University of Delaware; and the Kessler Foundation, in West Orange, N.J.

Barbey also is a professor of psychology and of speech and hearing science, an affiliate of the Beckman Institute, and the director of the Decision Neuroscience Laboratory at Illinois.

The U.S. National Institute of Neurological Disorders and Stroke at the National Institutes of Health provided funding for this research. Editor's notes: To reach Aron Barbey, call 217-333-2230; email barbey@illinois.edu.

*The paper, **"An Integrative Architecture for General Intelligence and Executive Function Revealed by Lesion Mapping**," is available online and from the U. of I. News Bureau.*

http://www.eurekalert.org/pub_releases/2012-04/bhp-ssb040912.php

Study shows botanical formula fights prostate cancer

Third study to show formula's effectiveness also demonstrates no toxic side effects

A non-toxic, botanical formula controls aggressive human prostate tumors in mice, according to a peer-reviewed study in the The International Journal of Oncology. Researchers at Indiana University, Methodist Research Institute, showed the prostate formula significantly suppresses tumor growth in aggressive, hormone-refractory (androgen-independent) human prostate cancer cells. The study also demonstrated the formula has no toxic side effects, even at high dosages.

"This study is a milestone in the research of this formula, demonstrating its safety and effectiveness in treating human prostate cancer in an animal model," says researcher and formula inventor Dr. Isaac Eliaz. "These positive results offer a significant contribution to prostate cancer research and add to the growing body of published data substantiating the role of natural compounds in the treatment of prostate cancer."

The formula combines botanical extracts, phytonutrients, botanically-enhanced medicinal mushrooms and antioxidants. This is the third study from a major university to demonstrate the formula's ability to suppress tumor growth and metastasis. For more information on the formula, visit www.prostatehealthsolutions.org.

"Multiple studies have demonstrated that this prostate formula is a possible treatment for hormone-refractory prostate cancer," says lead researcher, Dr. Daniel Sliva.

The study found that the orally-administered formula suppressed tumor growth by 27 percent, compared to controls. In addition to significant reduction in tumor volume, the formula inhibited several genes (IGF2, NRNF2 and PLAU/uPA) that encourage cancer proliferation and metastasis. The formula also increased expression of CDKN1A, a gene that fights prostate cancer by inhibiting cancer-promoting cellular mechanisms.

By suppressing genes related to aggressive prostate cancer growth and proliferation, and increasing the expression of cancer-fighting genes, the formula demonstrates multiple anti-cancer mechanisms and genetic targets. This pre-clinical in vivo study confirms previously published in vitro data, which showed the formula decreases the expression of PLAU/uPA genes in aggressive, hormone-independent prostate cancer cells.

Prior to this research, the formula was studied at Columbia University and the Cancer Research Laboratory, Methodist Research Institute, at Indiana University Health. These studies also showed the formula inhibits prostate cancer growth and proliferation.

ProstaCaid™ inhibits tumor growth in a xenograft model of human prostate cancer.

http://phys.org/news/2012-04-experts-grazing-cows-sheep-ducks.html

Experts suggest grazing cows, sheep, ducks in forests

Putting cows, sheep and other livestock into forests to graze could prove to be a valuable tool for New York woodland management, say Cornell Cooperative Extension (CCE) agriculture educators and colleagues in the Cornell Forestry Program.

Phys.org - They are advocating for the return of silvopasturing -- managed grazing in woodlands.

With pastureland at a premium, they hope that the practice will appeal to farmers, who could benefit from the increased feed options and better shade protection for their animals.

The ability to use a part of their land long off limits to their animals may also mean a new way for farmers to pay the land's taxes. To give farmers a greater incentive to convert forested acreage into silvopasture, the New York State Senate recently voted to amend the state's agricultural assessment program to include silvopasturing.

Silvopasturing also benefits woodland managers -- livestock can help clear the underbrush and create a more productive stand of timber, said Brett Chedzoy, a CCE agriculture educator.

"We're being forced into a situation where we have to look at how we utilize our limited agricultural land area," he said. "Silvopasturing fits our landscape in the Northeast, where most pastureland is juxtaposed with forest. In the past we did a good job of telling people to keep animals out of the woods, but rules change."

Ithaca area farmer Steve Gabriel of Work With Nature Design, who is an extension aide in Cornell's Department of Horticulture, is experimenting with the practice in a novel way. With a grant from the Northeast Sustainable Agriculture Research and Education program, he is pasturing ducks in a mature sugar maple woodlot, which has the added benefit of providing pest control for another of his agroforestry projects, a shiitake mushroom farm. "Ducks are currently undervalued as a wonderful animal that has potential to both control pests and provide marketable eggs and meat," Gabriel said. "Integrating them into agroforestry practices would likely get more farmers interested in considering producing niche crops like mushrooms."

Joined by state extension forester Peter Smallidge, Ontario County agriculture program leader Jim Ochterski and extension dairy specialist Nancy Glazier, Chedzoy is showing other farmers how silvopasturing can be done safely and in an environmentally friendly way. Trees and livestock must be managed properly so both stay healthy, Chedzoy said. Livestock should be rotated often to avoid damage to trees, for example, and the forest canopy must be kept thinned to allow sunlight to penetrate to allow the growth of grasses.

His team has compiled a silvopasturing guide and website with online forums, led more than two dozen talks across the Northeast, and held a regional conference in Watkins Glen.

"We're trying to teach people that it's okay to use intensive livestock grazing to productively use woodland areas. It's a restoration tool to restore healthy successional dynamics to an ecosystem," Chedzoy said. "Most farmers don't see their woods as an integral part of the farm operation, but it's very popular in other regions."

Legislative outreach has also become a big part of the team's activities. "It's encouraging to see Albany showing interest in updating tax abatement programs and other policies to reflect hybrid agroforestry productions systems, versus a narrow focus that treats land as strictly 'forest' land, or 'agricultural' land," Chedzoy said.

Julie Suarez of the New York Farm Bureau says she's hopeful the Senate silvopasturing amendment will also pass in the Assembly later this year, due in no small part to efforts from extension educators.

http://www.sciencedaily.com/releases/2012/04/120410101908.htm

Antioxidant May Disrupt Alzheimer's Disease Process

An increasing amount of evidence suggests that changes in the way the body handles iron and other metals like copper and zinc may start years before the onset of AD symptoms

ScienceDaily - Alzheimer's disease (AD) is now the sixth leading cause of death among Americans, affecting nearly 1 in 8 people over the age of 65. There is currently no treatment that alters the course of this disease. However, an increasing amount of evidence suggests that changes in the way the body handles iron and other metals like copper and zinc may start years before the onset of AD symptoms. A new study shows that reducing iron levels in blood plasma may protect the brain from changes related to AD.

In the current study a group of investigators from led by Dr. Othman Ghribi, PhD, Associate Professor, Department of Pharmacology, Physiology, and Therapeutics, University of North Dakota School of Medicine and Health Sciences, rabbits were fed a high-cholesterol diet which caused them to accumulate plaques of a small protein called beta-amyloid (Aß). These plaques are toxic to neurons and central to the development of Alzheimer's disease. The rabbits also developed changes in tau protein, which is part of the skeleton of neurons. When this protein becomes heavily phosphorylated, the ability of neurons to conduct electrical signals is disrupted. Following treatment with a drug called deferiprone (an iron chelator), the iron level in the rabbits' blood plasma was reduced and the levels of both beta-amyloid and phosphorylated tau in the brain were returned to normal levels.

Another degenerative process in AD involves the production of reactive oxygen species (ROS) that can damage neurons in the brain. Deferiprone is also thought to suppress this reactive oxygen damage caused by free iron in the bloodstream, however in this study there was no difference in reactive oxygen species in the treated group. It appears that iron in the AD brain is located in the wrong places -- in particular it accumulates to very high levels in the cores of beta-amyloid plaques and is very reactive in this setting.

According to Dr. Ghribi, "Our data show that treatment with the iron chelator deferiprone opposes several pathological events induced by a cholesterol-enriched diet…Deferiprone reduced the generation of Aß and lowered levels of tau phosphorylation." While there was no effect on ROS levels, he comments that "It is possible that a higher dose of deferiprone, or combination therapy of deferiprone together with an antioxidant to prevent ROS generation would more-fully protect against the deleterious effects of cholesterol-enriched diet that are relevant to AD pathology."

Noted expert on metals metabolism research on AD Ashley Bush, MD, PhD, Mental Health Research Institute, Melbourne, Australia, adds that "this research highlights the role of metal ions as key modulators for the toxic interactions of risk factors for Alzheimer's disease, in this case cholesterol. Drugs targeting these metal interactions hold promise as disease-modifying agents."

Jaya R.P. Prasanthi, Matthew Schrag, Bhanu Dasari, Gurdeep Marwarha, Wolff M. Kirsch and Othman Ghribi. Deferiprone Reduces Amyloid-ß and Tau Phosphorylation Levels but not Reactive Oxygen Species Generation in Hippocampus of Rabbits Fed a Cholesterol-Enriched Diet. Journal of Alzheimer's Disease, May 2012 DOI: 10.3233/JAD-2012-111346

http://phys.org/news/2012-04-teamwork-brainier-scientists.html

Teamwork made Man brainier, say scientists

Learning to work in teams may explain why humans evolved a bigger brain, according to a new study published on Wednesday.

Compared to his hominid predecessors, Homo sapiens is a cerebral giant, a riddle that scientists have long tried to solve. The answer, according to researchers in Ireland and Scotland, may lie in social interaction.

Working with others helped Man to survive, but he had to develop a brain big enough to cope with all the social complexities, they believe.

In a computer model, the team simulated the human brain, allowing a network of neurons to evolve in response to a series of social challenges. There were two scenarios. The first entailed two partners in crime who had been caught by the police, each having to decide whether or not to inform on the other.

The second had two individuals trapped in a car in a snowdrift and having to weigh whether to cooperate to dig themselves out or just sit back and let the other do it. In both cases, the individual would gain more from selfishness. But the researchers were intrigued to find that as the brain evolved, the individual was likelier to choose to cooperate. "We cooperate in large groups of unrelated individuals quite frequently, and that requires cognitive abilities to keep track of who is doing what to you and change your behaviour accordingly," co-author Luke McNally of Dublin's Trinity College told AFP.

McNally pointed out, though, that cooperation has a calculating side. We do it out of reciprocity. "If you cooperate and I cheat, then next time we interact you could decide: 'Oh well, he cheated last time, so I won't cooperate with him.' So basically you have to cooperate in order to receive cooperation in the future."

McNally said teamwork and bigger brainpower fed off each other. "Transitions to cooperative, complex societies can drive the evolution of a bigger brain," he said. "Once greater levels of intelligence started to evolve, you saw cooperation going much higher." The study appears in Proceedings of the Royal Society B, a journal published by Britain's de-facto academy of sciences.

Commenting on the paper, Robin Dunbar, an evolutionary anthropologist at Oxford University, said the findings were a valuable add to understanding brain evolution. But he said there were physiological limits to cooperation. Man would need a "house-sized brain" to take cooperation to a perfect level on a planet filled with humans. "Our current brain size limits the community size that we can manage ... that we feel we belong to," he said. Our comfortable "personal social network" is limited to about 150, and boosting that to 500 would require a doubling of the size of the brain.

"In order to create greater social integration, greater social cohesion even on the size of France, never mind the size of the EU, never mind the planet, we probably have to find other ways of doing it" than wait for evolution, said Dunbar.

http://www.eurekalert.org/pub_releases/2012-04/tu-dde041112.php

Duck-billed dinosaurs endured long, dark polar winters

Duck-billed dinosaurs that lived within Arctic latitudes approximately 70 million years ago likely endured long, dark polar winters

Duck-billed dinosaurs that lived within Arctic latitudes approximately 70 million years ago likely endured long, dark polar winters instead of migrating to more southern latitudes, a recent study by researchers from the University of Cape Town, Museum of Nature and Science in Dallas and Temple University has found.

The researchers published their findings, "Hadrosaurs Were Perennial Polar Residents," in the April issue of the journal The Anatomical Record: Advances in Integrative Anatomy and Evolutionary Biology. The study was funded through a grant from the National Science Foundation.

Anthony Fiorillo, a paleontologist at the Museum of Nature and Science, excavated Cretaceous Period fossils along Alaska's North Slope. Most of the bones belonged to Edmontosaurus, a duck-billed herbivore, but some others such as the horned dinosaur Pachyrhinosaurus were also found.

Fiorillo hypothesized that the microscopic structures of the dinosaurs' bones could show how they lived in polar regions. He enlisted the help of Allison Tumarkin-Deratzian, an assistant professor of earth and environmental science, who had both expertise and the facilities to create and analyze thin layers of the dinosaurs' bone microstructure.

Another researcher, Anusuya Chinsamy-Turan, a professor of zoology at the University of Cape Town, was independently pursuing the same analysis of Alaskan Edmontosaurus fossils. When the research groups discovered the similarities of their studies, they decided to collaborate and combine their data sets to provide a larger sampling. Half of the samples were tested and analyzed at Temple; the rest were done in South Africa.

"The bone microstructure of these dinosaurs is actually a record of how these animals were growing throughout their lives," said Tumarkin-Deratzian. "It is almost similar to looking at tree rings."

What the researchers found was bands of fast growth and slower growth that seemed to indicate a pattern.

"What we found was that periodically, throughout their life, these dinosaurs were switching how fast they were growing," said Tumarkin-Deratzian. "We interpreted this as potentially a seasonal pattern because we know in modern animals these types of shifts can be induced by changes in nutrition. But that shift is often driven by changes in seasonality."

The researchers questioned what was causing the dinosaurs to be under stress at certain times during the year: staying up in the polar region and dealing with reduced nutrition during the winter or migrating to and from lower latitudes during the winter.

They did bone microstructure analysis on similar duck-billed dinosaur fossils found in southern Alberta, Canada, but didn't see similar stress patterns, implying that those dinosaurs did not experience regular periodic seasonal stresses. "We had two sets of animals that were growing differently," said Tumarkin-Deratzian.

Since the Alaska fossils had all been preserved in the same sedimentary horizon, Fiorillo examined the geology of the bonebeds in Alaska where the samples were excavated and discovered that these dinosaurs had been preserved in flood deposits. "They are very similar to modern flood deposits that happen in Alaska in the spring when you get spring melt water coming off the Brooks Mountain Range," said Fiorillo. "The rivers flood down the Northern Slope and animals get caught in these floods, particularly younger animals, which appear to

be what happened to these dinosaurs. "So we know they were there at the end of the dark winter period, because if they were migrating up from the lower latitudes, they wouldn't have been there during these floods," he said.

"It is fascinating to realize how much of information is locked in the bone microstructure of fossil bones," said Chinsamy-Turan. "It's incredible to realize that we can also tell from these 70 million-year-old bones that the majority of the polar hadrosaurs died just after the winter season."

http://www.eurekalert.org/pub_releases/2012-04/mu-ktn040412.php

Key to new antibiotics?

University researchers find antibiotic-resistant bacteria deep in 1 of the world's largest and unspoiled underground caves

Hamilton, ON - McMaster University and University of Akron researchers are leading the way in understanding the origins of antibiotic resistance, a global challenge that is creating a serious threat to the treatment of infectious diseases.

Gerry Wright, scientific director of the Michael G. DeGroote Institute for Infectious Disease Research (IIDR) at McMaster University, and Hazel Barton, associate professor of biology at the University of Akron, discovered a remarkable prevalence of antibiotic resistance bacteria isolated from Lechuguilla Cave in New Mexico, one of the deepest and largest caves in the world and a place isolated from human contact for more than four million years. The research was published today in the Journal PLoS ONE.

"Our study shows that antibiotic resistance is hard-wired into bacteria, it could be billions of years old, but we have only been trying to understand it for the last 70 years," says Wright. "This has important clinical implications. It suggests that there are far more antibiotics in the environment that could be found and used to treat currently untreatable infections."

Amid the rare beauty of the Lechuguilla Cave, in Carlsbad Cavern National Park, researchers collected strains of bacteria from its deep and isolated recesses. They then examined these bacteria for antibiotic resistance. They found that while none of the bacteria are capable of causing human disease nor have they ever been exposed to human sources of antibiotics, almost all were resistant to at least one antibiotic, and some were resistant to as many as 14 different antibiotics. In all, resistance was found to virtually every antibiotic that doctors currently use to treat patients. For instance, the researchers were able to identify a type of resistance that has yet to emerge in the clinic in a group of bacteria distantly related to the bacterium that causes anthrax.

Says Barton: "We can say to doctors, 'while this isn't a problem right now, it could be in the future so you need be aware of this pre-existing resistance and be prepared if it emerges in the clinic. Or you are going to have a problem'."

The development of antibiotic resistant bacteria is becoming an increasing health concern. With the emergence of bacteria, such as multi-drug resistant Staphylococcus and the global spread of resistance to all clinically used drugs, where and how these organisms acquire resistance is an important question, says Wright.

"Most practitioners believe that bacteria acquire antibiotic resistance in the clinic," he says. "As doctors prescribe antibiotics, they select for members of the community that are resistant to these drugs. Over time, these organisms spread and eventually the bacteria that commonly cause these infections are all resistant. In extreme cases these organisms are resistant to seven or more drugs and are untreatable using traditional treatment, and ¬ doctors must resort to surgery to remove infected tissue. The actual source of much of this resistance are harmless bacteria that live in the environment."

Because antibiotics are heavily prescribed and used in agriculture, it is difficult to find an environment where antibiotics do not exert some kind of influence, adds Barton, noting this is why Lechuguilla Cave was the perfect environment to look at the pre-existing reservoir of antibiotic resistance in nature. Discovered in 1986, access to the cave has been limited to a few expert cavers and researchers each year. It is also surrounded by an impermeable layer of rock, meaning infiltration of water into the cave can take up to 10,000 years to reach its deepest recesses, an age well beyond the discovery of antibiotics. The researchers sampled bacteria from so far deep into the cave that Barton and some other researchers involved in the study camped in the cave during the collection process.

Their findings support recent studies at McMaster that suggest antibiotic resistance has a long evolutionary past.
Funding for the project came from the Canada Research Chairs program, a Canadian Institutes of Health Research Operating Grant, the National Science Foundation Microbial Interactions and Processes Program and a Canadian Institutes of Health Research Frederick Banting and Charles Best Canada Graduate Scholarship.
The paper will be available at: http://dx.plos.org/10.1371/journal.pone.0034953 after the embargo lifts.
Photos are available at: http://fhs.mcmaster.ca/media/lechuquilla_cave_paper/media_20120407.html:

http://www.sciencedaily.com/releases/2012/04/120411102434.htm

Stem Cells from Pelvic Bone May Preserve Heart Function

Stem cells from the pelvic bone may help hearts beat stronger.

ScienceDaily - Doctors and other clinicians at the Orlando Health Heart Institute are researching the use of stem cells from pelvic bone marrow to restore tissue and improve heart function after muscle damage from heart attacks.

"The thought is the body may use itself to heal itself," said Vijaykumar S. Kasi, MD, PhD, an interventional cardiologist, director, Cardiovascular Research, and principal investigator for the clinical trial at ORMC. "Because stem cells are immature cells they have the potential to develop into new blood vessels and preserve cardiac muscle cells. By infusing certain stem cells into the area of the heart muscle that has been damaged from a heart attack, tissue can be preserved and heart function restored."

The PreSERVE-AMI Study, sponsored by Amorcyte, LLC, a NeoStem, Inc. company (NYSE Amex: NBS), is for patients who have received a stent to open the blocked artery after a specific heart attack history (in part a ST-Segment Elevation Myocardial Infarction, or STEMI, a critical type of heart attack caused by a prolonged period of blocked blood supply, affecting a large area of the heart muscle and causing changes in the blood levels of key chemical markers). The study evaluates the effectiveness and safety of infusing stem cells collected from a patient's bone marrow into the artery in the heart that may have caused the heart attack. About 160 patients will participate in this national study at approximately 34 sites.

The infusion procedure begins with a catheter inserted through an incision in the groin. An X-ray camera is used to guide doctors in positioning the catheter in the heart artery where the stent was placed. A balloon is inflated within the stent and the infusion takes place in the area impacted by the heart attack. Because the study is randomized, double blinded and placebo controlled, patients are infused with either AMR-001, a cell therapy product composed of stem cells taken from one's own bone marrow, or a placebo (inactive substance).

Prior to the infusion, patients are screened using various assessments including an electrocardiogram, a cardiac MRI (magnetic resonance image) and a cardiac nuclear test. After the necessary screenings, patients have a mini-bone marrow procedure where the stem cells are "harvested" (removed) from the bone marrow in their pelvic bone, using a special needle. The stem cells are processed at Progenitor Cell Therapy, another NeoStem, Inc. company, in preparation for infusion. Patients who are randomized to placebo will have their bone marrow frozen and stored and available to them for clinical use, should they require bone marrow for any reason.

"We are excited to participate in innovative clinical trials as part of our continued efforts to play a vital role in future solutions to improve patient outcomes," said Dr. Kasi. "Heart disease remains the No.1 killer of men and women in our country." Effective treatment options are part of the medical journey to more heart healthy communities locally and globally.

"Severe heart failure, often the end result of large or multiple heart attacks, is a major health care challenge, impacting more than five million people in the United States and costing more than $35 billion annually," said Dr. Kasi. "Stem cell therapy is part of the movement from treatment to cure and has the potential to overcome limitations and expenses of heart transplants and offers hope for patients who are desperately praying for another chance at life."

http://www.eurekalert.org/pub_releases/2012-04/plos-dso040512.php

Deep sequencing of 15 samples of traditional Chinese medicines

Deep sequencing reveals undeclared, potentially toxic, and trade-restricted ingredients within 15 samples of traditional Chinese medicines

Researchers at Murdoch University have used new DNA sequencing technology to reveal the animal and plant composition of traditional Chinese medicines (TCMs). Some of the TCM samples tested contained potentially toxic plant ingredients, allergens, and traces of endangered animals.

"TCMs have a long cultural history, but today consumers need to be aware of the legal and health safety issues before adopting them as a treatment option," Dr Bunce, research leader and Murdoch University Australian Research Council Future Fellow, said.

The 15 TCM samples, seized by Australian border officials, in the form of powders, tablets, capsules, flakes, and herbal teas were audited using the DNA preserved in the samples. The results are published in the journal PLoS Genetics. "In total we found 68 different plant families in the medicines – they are complex mixtures of species," Dr Bunce said. "Some of the TCMs contained plants of the genus Ephedra and Asarum. These plants contain chemicals that can be toxic if the wrong dosage is taken, but none of them actually listed concentrations on the packaging."

"We also found traces from trade restricted animals that are classified as vulnerable, endangered, or critically endangered, including the Asiatic black bear and Saiga antelope."

Until now it has been difficult to determine the biological origins of ingredients contained within TCMs because processing into pills and powders makes identification difficult.

PhD student Megan Coghlan, who is studying the application of DNA techniques in wildlife forensic applications, said the research shows that second-generation, high throughput sequencing is an efficient and cost-effective way to audit the species composition. "The approach has the ability to unravel complex mixtures of plant and animal products," Ms Coghlan said.

Further testing of TCMs would reveal the extent of the problem and make it easier for customs officials to identify the trade of endangered species. The increasing popularity of the medicines has seen the value of the industry increase to hundreds of millions of dollars per annum. "We found multiple samples that contained DNA from animals listed as trade-restricted according to the Convention on International Trade in Endangered Species Legislation. Put simply, these TCMs are not legal," Ms Coghlan said.

Another concern is the mislabelling of TCMs, meaning consumers are unaware of the presence of some ingredients, including animal DNA and potential allergens such as soy or nuts.

"A product labelled as 100 per cent Saiga antelope contained considerable quantities of goat and sheep DNA," Dr Bunce said. "Another product, Mongnan Tianbao pills, contained deer and cow DNA, the latter of which may violate some religious or cultural strictures."

Incorrect labelling makes it difficult to enforce legislation and to prosecute cases of illegal trade. "It is hoped that this new approach to genetically audit medicinal products will bring about a new level of regulation to the area of complementary and alternative medicine," Dr Bunce said. "Auditing TCMs would assist in prosecuting individuals who seek to profit from the illegal trade in animal products."

The Australian Customs and Border Protection Service and the International Wildlife Trade Section (Department of Sustainability, Environment, Water, Population and Communities) supplied the seized TCM samples that were tested in this research. Dr Bunce and his team plan to expand the use of these new DNA tests to evaluate other herbal medicines.

Funding for this research was provided by the Australian Research Council FT0991741) and Murdoch University. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Coghlan ML, Haile J, Houston J, Murray DC, White NE, et al. (2012) Deep Sequencing of Plant and Animal DNA Contained within Traditional Chinese Medicines Reveals Legality Issues and Health Safety Concerns. PLoS Genet 8(4): e1002657. doi:10.1371/journal.pgen.1002657

http://www.eurekalert.org/pub_releases/2012-04/nioa-tls041212.php

Test links strains of common parasite to severe illness in US newborns

NIH-supported research underscores value of screening for toxoplasmosis

Scientists have identified which strains of the Toxoplasma gondii parasite, the cause of toxoplasmosis, are most strongly associated with premature births and severe birth defects in the United States. The researchers used a new blood test developed by scientists at the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, to pinpoint T. gondii strains that children acquire from their acutely infected mothers while in the womb.

Pregnant women can become infected with T. gondii through contact with cat feces that contain infectious forms of the parasite or by eating undercooked meat. Women who become infected while pregnant may miscarry, give birth prematurely, or have babies with eye or brain damage. “If undetected or untreated, congenital toxoplasmosis can have serious consequences for a child’s quality of life,” noted NIAID Director Anthony S. Fauci, M.D. “The findings from this study support the value of screening for toxoplasmosis to identify patients who could benefit from treatment.”

Currently available blood tests can determine whether a person has ever been infected with any strain of Toxoplasma parasite. The experimental test developed at NIAID improves upon the older tests because it can detect the presence of strain-specific antibodies that distinguish infecting strains from one another. The test was developed by Michael Grigg, Ph.D., of NIAID’s Laboratory of Parasitic Diseases, and his colleagues. It was applied to blood samples collected between 1981 and 2009 as part of the National Collaborative Chicago-Based Congenital Toxoplasmosis Study. The study of congenitally infected children was initiated by NIAID grantee Rima McLeod, M.D., of the University of Chicago, who is the first author of the new study, published online in Clinical Infectious Diseases.

At least 15 distinct T. gondii strain types have been found throughout the world. In France, where research has been done to establish which strains are most common, a strain called type II predominates. Type II

parasites can be distinguished from all other strains, which are collectively termed not exclusively type II strains (or NE-II).

Using the new test, the researchers found evidence of either type II or NE-II infections in 183 of the mother-child pairs in the national congenital toxoplasmosis study. Statistical analysis revealed that NE-II parasites were more likely to be associated with premature birth, and infants infected with these strains were more likely to have severe manifestations of disease than infants infected by type II parasites. For example, severe eye damage was seen in 67 percent of NE-II cases (59 out of 88), while such eye damage was present in only 39 percent of type II cases (18 out of 46). The researchers noted, however, that the association is not absolute, and that mild, moderate or severe disease can result regardless of the infecting strain.

"We knew that, in mice, certain parasite strains are clearly associated with severe disease," said Dr. Grigg. "But we didn't know if the same association between strain type and disease severity would hold true for people. Until now, we had not systematically determined whether infected people in the United States had European-type strains or other types, and we also hadn't determined whether strains found here would have more severe disease symptoms associated with them."

When she helped start the congenital toxoplasmosis study in 1981, optimal drug treatment regimens were unknown, said Dr. McLeod. Now, thanks in part to controlled clinical trials run under the auspices of the study, the condition can be successfully treated and many babies who are diagnosed before or shortly after birth and who are treated suffer few or no ill effects. When the researchers looked at the clinical histories of those children in the long-term study who had been diagnosed with congenital toxoplasmosis during gestation and whose mothers had received drug treatment prior to giving birth, the association between NE-II and severe disease at birth vanished. "Our study demonstrates that outcomes are equally good following postnatal treatment for type II and NE-II parasites, although not all outcomes are favorable for all children," she said.

In France, all pregnant women are screened for Toxoplasma infection. Prompt treatment is offered to any woman who becomes infected while pregnant, thus lessening the chance that the parasite will damage the fetus, Dr. McLeod noted. "In the United States, obstetrical screening for Toxoplasma infection is rarely practiced. This new study underscores the value of identifying all patients who will benefit from treatment and suggests that widespread screening and treatment of pregnant women who are infected could prevent infants from suffering eye and brain damage due to congenital toxoplasmosis," she said.

Unlike in France, where type II is the most common strain detected, the new study found that NE-II parasites predominated (61 percent) in the United States over the three-decade span of the national collaborative study. NE-II parasites were more common than type II along the Gulf Coast, the Pacific coast and in Hawaii. NE-II strains were also more common among lower-income and rural populations.

This work was funded by NIH, NIAID, under grant number R01AI027530. The clinicaltrials.gov identifier for the Pyrimethamine, Sulfadiazine, and Leucovorin in Treating Patients with Congenital Toxoplasmosis study is NCT00004317. Reference: R McLeod et al. Prematurity and severity are associated with Toxoplasma gondii alleles (NCCCTS, 1981-2099). Clinical Infectious Diseases DOI: 10.1093/cid/cis258 (2012).

http://bit.ly/HCMGfb

Chimp beds hint how early humans ditched tree-sleeping

WHERE did early humans bed down for the night?

12 April 2012 by Colin Barras

Evidence that some chimps routinely eschew the safety of treetops to sleep on the ground raises the possibility that some early hominins did too - with possible implications for their cognitive development.

By about 3.2 million years ago Australopithecus afarensis had arches in the soles of its feet - a key adaptation for walking on the ground. But its long arms and slender fingers suggest to some researchers that it was still comfortable with climbing.

That skeleton makes sense if australopithecines slept in trees at night to escape predators, as chimps do today. If that was the case, hominins may not have slept on the ground until Homo erectus appeared 1.9 million years ago. They lacked upper body adaptations for climbing and may have used fires to ward off ground-dwelling nocturnal predators, although the evidence for controlled fire stretches back only 1 million years.

Now, evidence from west African chimps (Pan troglodytes verus) of the Nimba mountains in Guinea suggests ground-sleeping may predate such innovations. Of the 634 sleeping nests that Kathelijne Koops of the University of Cambridge found in Nimba, 90 were built on the ground. With colleagues at Cambridge and Kyoto University in Japan, Koops collected hairs from 46 ground nests. DNA analysis showed that at least 12 chimps had slept on the ground, suggesting it is a widespread behaviour (American Journal of Physical Anthropology, DOI: 10.1002/ajpa.22056).

The chimps of Nimba have few predators, but similar ground nests are seen in the Democratic Republic of the Congo, where leopards are also present. "Ground nesting can become established despite the presence of predators and without the use of fire," says Koops, adding that this suggests australopithecines may have slept on the ground too.

Carol Ward at the University of Missouri in Columbia points out that there are too many differences between chimps and early hominins to draw firm conclusions about early human behaviour from chimp studies.

Tim White at the University of California, Berkeley, is comfortable with the idea of ground-sleeping hominins, though - largely because other evidence points that way. Upper-body evidence notwithstanding, he says, the anatomy of A. afarensis shows that its ability to climb trees was compromised. "It's nice to have a study that indicates that [ground-sleeping] is not necessarily related to the adoption of fire," he says. Gorillas also routinely sleep on the ground, he adds.

The period that hominins began sleeping on the ground may have been pivotal for their cognitive development, says Thomas Wynn at the University of Colorado in Colorado Springs. It allowed them to spend more of the night in REM sleep, which he says is important for memory consolidation and cognition. A common feature of REM sleep is muscle paralysis, which makes it precarious for apes that sleep in trees, says Wynn.

Koops agrees a feedback loop may have been at work: ground-sleeping could have provided cognitive boosts that helped hominins to ward off nocturnal predators - like mastering fire - allowing for even more restful sleep and further cognitive development. Proving any of this will be difficult, says Ward. "This topic is far into the realm of speculation."

http://www.sciencedaily.com/releases/2012/04/120412141813.htm

Breakthrough Discovery Unveils Master Switches in Colon Cancer

A team of researchers at Case Western Reserve University School of Medicine have identified a new mechanism by which colon cancer develops.

ScienceDaily - By focusing on segments of DNA located between genes, or so-called "junk DNA," the team has discovered a set of master switches, i.e., gene enhancer elements, that turn "on and off" key genes whose altered expression is defining for colon cancers. They have coined the term Variant Enhancer Loci or "VELs," to describe these master switches. Importantly, VELs are not mutations in the actual DNA sequence, but rather are changes in proteins that bind to DNA, a type of alteration known as "epigenetic" or "epimutations." This is a critical finding because such epimutations are potentially reversible.

Over the course of three years, the team mapped the locations of hundreds of thousands of gene enhancer elements in DNA from normal and cancerous colon tissues, pinpointing key target VELs that differed between the two types.

"What is particularly interesting is that VELs define a 'molecular signature' of colon cancer. Meaning, they are consistently found across multiple independent colon tumor samples, despite the fact that the tumors arose in different individuals and are at different stages of the disease," says Peter Scacheri, PhD, senior author of the study and assistant professor, Genetics and Genome Sciences, School of Medicine, and member, Case Comprehensive Cancer Center at Case Western Reserve University. "The set of common VELs govern a distinct set of genes that go awry in colon cancer."

"The VELs signature is notable because it cuts through the complexity of the many genes that are changed in colon cancer, to identify genes that are direct targets of alterations on chromosomes," says Sanford Markowitz, MD, PhD, Ingalls Professor of Cancer Genetics in the Division of Hematology-Oncology at the School of Medicine, member, Case Comprehensive Cancer Center, and oncologist at University Hospitals Seidman Cancer Center, whose team collaborated on the study. "The key next step will be to determine whether we can use VELs for 'personalized medicine,' to molecularly define distinct groups of colon cancers that differ in their clinical behavior, and to enable selection of specific drugs that will best treat a given colon tumor."

In addition to finding that VELs are a "signature" of colon cancer, the team showed that genetic variants which predispose individuals to colon cancer are located within VELs. This suggests that individual differences within VELs may play significant roles in determining different individuals' susceptibility to colon cancer.

"Epigenetics has transformed the way we think about genomes. The genetic code isn't just a series of As, Ts, Gs, and Cs strung together. Epigenetic 'marks' on DNA tell genes when, where, and how much to turn on or off to keep cells healthy," says Batool Akhtar-Zaidi, PhD candidate in Dr. Scacheri's lab and lead author of the study. "When this epigenetic machinery is disrupted, as we see with VEL events, this can tip the balance to cancer."

This research was supported by the National Cancer Institute, as well as the Case Comprehensive Cancer Center.

http://www.scientificamerican.com/article.cfm?id=helping-neurons-heal

Alzheimer's Drug Candidate May Help Brain Injuries Heal

Researchers uncover a potential new path to spinal cord regeneration

By Erica Westly | Friday, April 13, 2012

Nerve cells in our limbs can regenerate after injury, but neurons in the central nervous system, which includes the brain and spinal cord, cannot. Figuring out why this is the case is critical to helping brain and spinal cord injuries heal.

A study published in the January 26 issue of Neuron may offer a promising solution. Not only did the researchers, Rachid El Bejjani and Marc Hammarlund of Yale University, identify what appears to be a key chemical regulator of neuron repair, but drugs that target this regulator already exist, making the path to clinical treatments easier.

The molecule they identified, called Notch, is a receptor that influences many biochemical pathways inside cells. Scientists used to think that Notch was active only during fetal and childhood development, but increasing evidence suggests that Notch is also involved in neurodegenerative conditions such as Alzheimer's disease and stroke. Using C. elegans, a microscopic worm, El Bejjani and Hammarlund showed that Notch impeded neurons from healing themselves. When they blocked Notch's activity with a drug, the neurons' growth improved.

The drug used in the study is already being tested in rodents and humans for potential use in Alz-hei-mer's and other disorders, although whether it can help damaged neurons regenerate in mammals is unclear. "We know that the Notch pathway is con-served in vertebrates, but we don't know if the re-generation mechanism is conserved," Hammarlund says. If Notch stops neurons from growing back in humans as it does in C. elegans, it could be a major breakthrough in spinal cord medicine.

http://news.sciencemag.org/scienceinsider/2012/04/a-new-record-for-retractions.html?ref=hp

A New Record for Retractions?

Editors representing 23 journals have publicly asked officials at seven Japanese institutions to investigate the integrity of 193 publications authored by anesthesiologist Yoshitaka Fujii.

by Dennis Normile on 11 April 2012

As reported yesterday by Retraction Watch, questions were first raised about Fujii's work a decade ago. Tokyo-based Toho University, his most recent employer, dismissed him in February for not following ethical review procedures in producing eight of nine papers investigated by an internal committee. (Fujii agreed to retract those papers, according to a statement on the university's Web site.)

On 8 March, the journal Anaesthesia published an analysis questioning data in 168 of Fujii's papers. Now the group of editors, mostly from journals focusing on anesthesiology, is planning to retract what may be Fujii's entire English language body of work if the institutions with which he was affiliated cannot confirm that the studies took place, that the original research data have been verified, and that the studies had been properly reviewed in advance for ethical considerations. (A link to the Joint Editors-in-Chief Request is on the Anesthesia & Analgesia Web site.)

Given the results of the Toho University investigation, getting those confirmations might be problematic. According to Ken Takamatsu, dean of the university's faculty of medicine, Fujii told Toho's investigating committee that he had discarded the experimental data for all of the studies then being questioned, but he claimed there had been no fabrication. "We have no evidence to say there was fabrication, but we don't think the papers are truthful," Takamatsu told ScienceInsider. Kazutoshi Shibuya, who chairs the university's ethics committee, says the panel did determine that Fujii deliberately bypassed ethical procedures in eight of nine cases.

The university is now looking into nine additional papers brought to its attention by the editors. Some are review articles citing the retracted papers, which means they are also under suspicion, Takamatsu says. But determining the validity of other papers is challenging. Some of the experimental work was done elsewhere. In a few cases involving a minor journal, the university had to request copies of the papers from the publisher. University officials are no longer in touch with Fujii and don't know his whereabouts. Nonetheless, Takamatsu says a report should be filed in about 10 days.

Masafumi Akahira, head of research integrity at University of Tsukuba, which Fujii lists as his affiliation in 100 papers, wrote in an e-mail that the university is also working on an appropriate response to the editors. The dubious record for the most retractions is now believed to be held by Joachim Boldt, a German anesthesiologist. The validity of some 90 of his papers was first questioned several years ago by the same group of editors.

http://www.sciencedaily.com/releases/2012/04/120413145220.htm

How a Bump On the Head Could Have Caused Permanent Disability

When Dr. Irene Gatti de Leon slipped on the ice and bumped her head, she wasn't too concerned.

ScienceDaily - But two months later, she began to experience weakness in her right leg and right arm while she and her husband were visiting their daughter in suburban Chicago.

So she made an urgent appointment with Loyola University Medical Center neurologist Dr. José Biller, a fellow native of Uruguay whom she has known for years.

Biller ordered an immediate MRI scan, which showed a large subdural hematoma -- a mass of blood on the surface of the brain. With the hematoma compressing the brain, de Leon was in imminent danger of suffering permanent paralysis or cognitive deficits, similar to disabilities caused by strokes.

Biller referred de Leon to Loyola neurosurgeon Dr. Douglas Anderson, who stayed late to perform emergency surgery. Anderson drilled two holes in her skull and drained the hematoma, which was about 2 inches long and 1½ inches thick. De Leon has made a full recovery.

Subdural hematomas are triggered by head injuries that cause blood vessels between the surface of the brain and its outer covering (the dura) to stretch and tear. Subdural hematomas usually are caused by severe head injuries that cause bleeding, which rapidly fills the brain area. But less severe head injuries can cause chronic subdural hematomas. These slow bleeds may not cause symptoms for days or weeks.

De Leon's case "is an excellent illustration of why patients should not ignore neurological symptoms," Biller said.

Anderson said he collaborates closely with neurologists on brain surgeries he performs for neurological conditions, including hematoma, stroke, multiple sclerosis, epilepsy and Parkinson's disease. "We communicate and work together very closely," Anderson said.

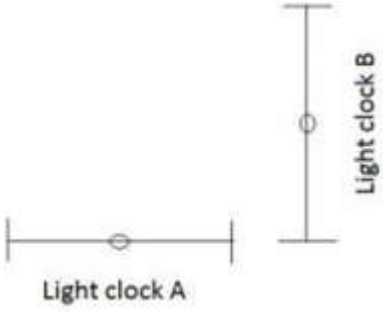
Biller is chairman of the Department of Neurology and Anderson is a professor in the Department of Neurological Surgery of Loyola University Chicago Stritch School of Medicine.

http://phys.org/news/2012-04-physicists-abolish-fourth-dimension-space.html

Physicists continue work to abolish time as fourth dimension of space

Philosophers have debated the nature of time long before Einstein and modern physics.

Phys.org - But in the 106 years since Einstein, the prevailing view in physics has been that time serves as the fourth dimension of space, an arena represented mathematically as 4D Minkowski spacetime. However, some scientists, including Amrit Sorli and Davide Fiscaletti, founders of the Space Life Institute in Slovenia, argue that time exists completely independent from space. In a new study, Sorli and Fiscaletti have shown that two phenomena of special relativity - time dilation and length contraction - can be better described within the framework of a 3D space with time as the quantity used to measure change (i.e., photon motion) in this space.



Light clocks A and B moving horizontally through space. According to length contraction, clock A should tick faster than clock B. In a new study, scientists argue that there is no length contraction, and both clocks should tick at the same rate in accordance with special relativity. **Image credit: Sorli and Fiscaletti.**

The scientists have published their article in a recent issue of Physics Essays. The work builds on their previous articles, in which they have investigated the definition of time as a "numerical order of material change."

The main concepts of special relativity - that the speed of light is the same in all inertial reference frames, and that there is no absolute reference frame - are traditionally formulated within the framework of Minkowski spacetime. In this framework, the three spatial dimensions are intuitively visualized, while the time dimension is mathematically represented by an imaginary coordinate, and cannot be visualized in a concrete way.

In their paper, Sorli and Fiscaletti argue that, while the concepts of special relativity are sound, the introduction of 4D Minkowski spacetime has created a century-long misunderstanding of time as the fourth dimension of space that lacks any experimental support. They argue that well-known time dilation experiments, such as those demonstrating that clocks do in fact run slower in high-speed airplanes than at rest, support special relativity and time dilation but not necessarily Minkowski spacetime or length contraction. According to the conventional view, clocks run slower at high speeds due to the nature of Minkowski spacetime itself as a result of both time dilation and length contraction. But Sorli and Fiscaletti argue that the slow clocks can better be described by the relative velocity between the two reference frames, which the clocks measure, not which the clocks are apart of. In this view, space and time are two separate entities.

“With clocks we measure the numerical order of motion in 3D space,” Sorli told Phys.org. “Time is 'separated' from space in a sense that time is not a fourth dimension of space. Instead, time as a numerical order of change exists in a 3D space. Our model on space and time is founded on measurement and corresponds better to physical reality.”

To illustrate the difference between the two views of time, Sorli and Fiscaletti consider an experiment involving two light clocks. Each clock's ticking mechanism consists of a photon being reflected back and forth between two mirrors, so that a photon's path from one mirror to the other represents one tick of the clock. The clocks are arranged perpendicular to each other on a platform, with clock A oriented horizontally and clock B vertically. When the platform is moved horizontally at a high speed, then according to the length contraction phenomenon in 4D spacetime, clock A should shrink so that its photon has a shorter path to travel, causing it to tick faster than clock B.

But Sorli and Fiscaletti argue that the length contraction of clock A and subsequent difference in the ticking rates of clocks A and B do not agree with special relativity, which postulates that the speed of light is constant in all inertial reference frames. They say that, keeping the photon speed the same for both clocks, both clocks should tick at the same rate with no length contraction for clock A. They mathematically demonstrate how to resolve the problem in this way by replacing Minkowski 4D spacetime with a 3D space involving Galilean transformations for three spatial coordinates X, Y, and Z, and a mathematical equation (Selleri's formalism) for the transformation of the velocity of material change, which is completely independent of the spatial coordinates.

Sorli explained that this idea that both photon clocks tick at the same rate is not at odds with the experiments with flying clocks and other tests that have measured time dilation. This difference, he says, is due to a difference between photon clocks and atom-based clocks.

“The rate of photon clocks in faster inertial systems will not slow down with regard to the photon clocks in a rest inertial system because the speed of light is constant in all inertial systems,” he said. “The rate of atom clocks will slow down because the 'relativity' of physical phenomena starts at the scale of pi mesons.”

He also explained that, without length contraction, time dilation exists but in a different way than usually thought.

“Time dilatation exists not in the sense that time as a fourth dimension of space dilates and as a result the clock rate is slower,” he explained. “Time dilatation simply means that, in a faster inertial system, the velocity of change slows down and this is valid for all observers. GPS confirms that clocks in orbit stations have different rates from the clocks on the surface of the planet, and this difference is valid for observers that are on the orbit station and on the surface of the planet. So interpreted, 'time dilatation' does not require 'length contraction,' which as we show in our paper leads to a contradiction by the light clocks differently positioned in a moving inertial system.”

He added that the alternative definition of time also agrees with the notion of time held by the mathematician and philosopher Kurt Gödel.

“The definition of time as a numerical order of change in space is replacing the 106-year-old concept of time as a physical dimension in which change runs,” Sorli said. “We consider time being only a mathematical quantity of change that we measure with clocks. This is in accord with a Gödel view of time. By 1949, Gödel had produced a remarkable proof: 'In any universe described by the theory of relativity, time cannot exist.' Our research confirms Gödel's vision: time is not a physical dimension of space through which one could travel into the past or future.”

In the future, Sorli and Fiscaletti plan to investigate how this view of time fits with the broader surroundings. They note that other researchers have investigated abolishing the idea of spacetime in favor of separate space and time entities, but often suggest that this perspective is best formulated within the framework of an ether, a physical medium permeating all of space. In contrast, Sorli and Fiscaletti think that the idea can be better modeled within the framework of a 3D quantum vacuum. Rather than viewing space as a medium that carries light, light's propagation is governed by the electromagnetic properties (the permeability and permittivity) of the quantum vacuum.

“We are developing a mathematical model where gravity is a result of the diminished energy density of a 3D quantum vacuum caused by the presence of a given stellar object or material body,” Sorli said. “Inertial mass and gravitational mass have the same origin: diminished energy density of a quantum vacuum. This model gives exact calculations for the Mercury perihelion precession as calculations of the general theory of relativity.”

More information: Amrit Sorli and Davide Fiscaletti. “Special theory of relativity in a three-dimensional Euclidean space.” Physics Essays: March 2012, Vol. 25, No. 1, pp. 141-143. DOI: 10.4006/0836-1398-25.1.141