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SCIENCE SPECTRUM

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THE IIS UNIVERSITY



JAIPUR

(deemed to be University u/s 3 of UGC Act 1956)

INCREDIBLE THERAPEUTIC POTENTIAL OF FUNGI



Hericium erinaceus
Lion's Mane Mushroom



Ganoderma lucidum
Reishi Mushroom



Coriolus versicolor
Turkey Tail Mushroom



Lentinus edodes
Shiitake



Polyporus umbellatus
Lumpy Bracket



Flammulina velutipes
Golden Needle Mushroom

■ Sushmita Aswal

Research Scholar, Department of Biotechnology

Mushrooms are considered as a delicacy with high nutritional and functional value, and they are also accepted as nutraceutical foods; they are of considerable interest because of their organoleptic merit, medicinal properties, and economic significance. However, there is no easy distinction between edible and medical mushrooms because many of the common edible species have therapeutic properties and several used for medical purposes are also edible. The most cultivated mushrooms worldwide are *Agaricus bisporus*, *Lentinus edodes*, *Pleurotus* spp., *Hericium erinaceus*, *Ganoderma lucidum*, *Polyporus umbellatus* and *Flammulina velutipes*. Mushrooms could be an alternative source of new antimicrobial compounds, mainly secondary metabolites, such as terpenes, steroids, anthraquinones, benzoic acid derivatives, and quinolones, but also of some primary metabolites like oxalic acid, peptides, and proteins. They have a great nutritional value since they are quite rich in protein, with an important content of essential amino acids and fiber, poor fat but with excellent important fatty acids content. Moreover, edible mushrooms provide a nutritionally significant content of vitamins (B1, B2, B12, C, D, and E). Thus, they could be an excellent source of many different nutraceuticals and might be used directly in human diet and to promote health for the synergistic effects of all the bioactive compounds present.

Mushrooms have more than 100 medicinal functions. The key functions are antioxidant, anticancer, antidiabetic, antiallergic, immunomodulating, cardiovascular protector, anticholesterolemic, antiviral, antibacterial, antiparasitic, antifungal, detoxification, hepatoprotective and anti-inflammatory processes.

Robustness of Mushrooms

Diabetes: Mushrooms contain natural insulin and enzymes which help the breaking down of sugar or starch in food. They contain certain compounds which help proper functioning of the liver, pancreas and other endocrine glands, thereby promoting the formation of insulin and its proper regulation throughout the body.

Immune System Strength: A powerful antioxidant, Ergothioneine, present in mushrooms helps to strengthen and boost immune system. They can also help to heal ulcers and ulcerous wounds and protect them from developing infections.

Bone Health: Mushrooms are a rich source of calcium and selenium. They are beneficial in bone formation, strength and durability. A steady supply of calcium in the diet can reduce chances of developing osteoporosis and also reduce joint pain and general lack of mobility that is associated with bone degradation.

Blood Pressure: Mushrooms have high content of potassium which acts as a vasodilator, relaxing tension in blood vessels and therefore reducing blood pressure.

Breast Cancer & Prostate Cancer: Mushrooms have significant amount of Beta-glucans and conjugated Linoleic acid, which have anti-carcinogenic effects.

Cholesterol Levels: Mushrooms contain protein accompanied by a very low carbohydrate count, no fat or cholesterol and a good amount of fiber with certain enzymes.

Nutrient Absorption: Vitamin D is a relatively rare vitamin to find in vegetables and mushrooms have it. This can facilitate the absorption and metabolism of calcium and phosphorous.



Pleurotus ostreatus



Agaricus bisporus

Source: <https://www.organicfacts.net/health-benefits>

The Brain Dictionary

■ Dr. Payal Mehtani
Department of Biotechnology

Sometimes we wonder how effortlessly our brain is able to recognize words and understand languages, but it's not that simple. Scientists at the University of California, Berkeley, have actually mapped different words in specific regions of human brain. They used big data techniques to analyze brain scans and map where in our head we process language related information.

Semantics is the study of meaning. The meaning of language is represented in regions of the cerebral cortex collectively known as the 'semantic system'. These scientists have shown that the semantic system is organized into intricate patterns that seem to be consistent across individuals.

The experiments conducted by neuroscientist Jack L. Gallant and team included putting volunteers in Functional MRI scanners and made them listen to stories for two hours. They then studied the brain activity patterns by monitoring the flow of blood in different parts of the brain and worked out which places of the brain were responding to the meaning of the word. They found that different bits of the brain responded to different kinds of

words and concepts and could group them into rough categories and marked them by colours. Like the red part shows more brain activity and blue less. But it wasn't one word one location. For example, the word 'top' was seen to trigger activity at a location when referred to clothing or appearance and another location when used in context of numbers and measurements.

This as concluded as one word can trigger activity at multiple locations around the brain depending on the context.

They also used the fMRI data to build a mathematical model or decoder that actually predicts how the brain extracts meaning from silent movies.

Though individual brain map is different, it now seems that people have same concepts in the same region of the brain. This is for the first time that scientists have been able to map the semantic system of the brain in such detail. The scientists claim that this knowledge of neuroscience can be used to cure patients with diseased brain and also to build better computers.



Sources: Huth A. G., de Heer W.A, Griffiths T.L., Theunissen F.E., Gallant J.L. (2016). Natural speech reveals the semantic maps that tile human cerebral cortex, *Nature*. 532; 453-458. doi:10.1038/nature17637

THE GREEN MEDICINE SERIES

Bixa orellana-The Lipstick Tree

■ Dr. Shilpi Rijhwani
Department of Botany

Bixa orellana of the family Bixaceae (Annatto family) is a profusely fruiting shrub or a small tree reaching 6 - 10 meters tall and age up to about 50 years. It has originated from the tropical region of the American Subcontinent. Annatto has large pointed leaves. They are spirally arranged, simple, stipulate, ovate, shallowly cordate to truncate at base and longly acuminate at apex. It bears clusters of 5 cm (2 in) bright white to pink flowers in terminal branched panicles resembling wild roses, appearing at the tips of the branches. The tree is best known as the source of annatto, a natural orange-red condiment (also called "achiote" or "bijol") obtained from the waxy arils.

The natives originally used the seeds to make red body paint and lipstick. For this reason, the plant is sometimes called the lipstick tree. The color of the seed coating is due mainly to the carotenoid pigments bixin and norbixin. It is also used as a food-coloring agent.

Medicinal uses: The leaves of the plant are used as an antimicrobial agent, as a diuretic and digestive stimulant, as a hepatoprotective (liver protector) and hypocholesterolemic source and to treat prostate and urinary infections. The Seeds or capsules have anti-oxidant, insect repellent, diuretic and hypolipidaemic effects. They are also used for skin care and skin anti-aging (for its antioxidant and ultraviolet ray [UV]-protective effect)



The tree was incorporated into the traditional medicine list of India because of its ability to treat various disorders.

Source: www.worldagroforestry.org

Man's headaches due to tapeworm

■ Rakhi Bhargav
M.Sc. Microbiology

A man who went to see his doctor after suffering headaches and experiencing strange smells was found to have been living for more than four years with a rare parasitic worm in his brain.

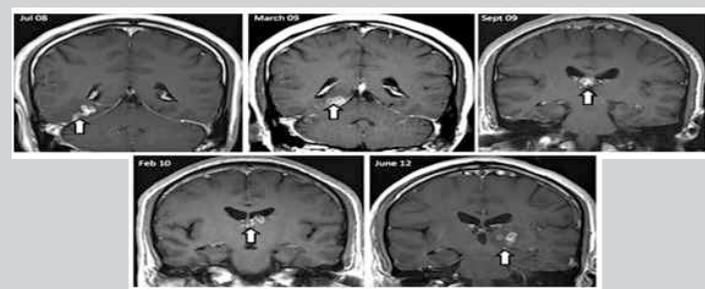
In the first case of its kind in Britain, the ribbon-shaped tapeworm was found to have burrowed from one side of the 50-year-old man's brain to the other.

Doctors were left baffled after spotting strange ring-like patterns moving 5cm through his brain tissue in a series of scans taken over four years.

Geneticists at the Wellcome Trust Sanger Institute in Cambridge found the creature as a rare species of tapeworm known as *Spirometra erinaceieuropaei*.

This worm is normally found in amphibians and crustaceans in china as it goes through its life cycle it later infects the guts of cats and dogs, where it can grow to 1.5metre adult worms. Even in china, where the parasite is normally found, there have been 1000 cases reported in humans since 1882.

The unfortunate patient, who was of Chinese descent but lived in East Anglia, is thought to have picked up the parasite while on a visit to china, where he visited regularly, He could



Brain scans show the movement of tapeworm in the man's head over the time. Photograph by: Hayley Bennett et al. *Genome Biology* 2014

have picked it from infected meat or water and then the worm burrowed through his body to his brain.

Now scientist believes they have been able to learn new information about this rare parasite after studying its DNA. The parasite is thought to have simply absorbed nutrients from the man's brain through its body as it has no mouth.

Source: www.guardian.com

Adolescent Reproductive Health: An Overview

■ Pragma Tomar

Research Scholar, Department of Home Science

The word adolescence is coined from the Latin verb 'adolescere' that implies "to grow into maturity". It represents individuals between age group of 10-19 according to World Health Organisation. It is one of the critical transitions in the life span and is characterized by a tremendous pace in growth and change that is second to infancy. Worldwide more than 1.2 billion are adolescents, this indicates that one in every six persons is an adolescent. About 21% of Indian population is adolescents (about 243 million), who account for a quarter of the country's population. Over 90 percent of those living in developing countries, under the age of 25 make up as much as 47 percent of the total population. Adolescents are the citizens and working force of tomorrow.

Reproductive health of adolescent girls is of major concern during this as it is of increased risk taking and therefore susceptibility to behavioural problems at the time of puberty and new concerns about reproductive health also emerge. Poor menstrual hygiene is closely related with reproductive tract infections. Many adolescents are sexually active (although not always by choice) and in some regions, as many as half are married. Sexual activity puts adolescents at risk of various reproductive health challenges. Each year about 15 million adolescents aged 15-19 years give birth, as many as 4 million go for an abortion, and up to 100 million become infected with a curable sexually transmitted disease (STD). Globally, 40 percent of all new human immunodeficiency virus (HIV) infections occur among 15-24 year olds; recent estimates are that 7,000 are infected each day. According to UNICEF in 2014 estimated 35.3 million

people was living with HIV at the end of 2012; of these, 2.1 million were adolescents aged 10-19 years, of which the majority were girls (56%). WHO (World Health Organization) revealed that 250 million new cases of STD (Sexually transmitted diseases) occur worldwide each year with a high rate in 16-19yrs age group. Young people are at risk of HIV/AIDS because they are in the transition phase of their life. WHO estimates that half of all the people infected with HIV are younger than age 25 and live in developing countries and up to 60 percent of all new infections occur among 15 to 24 year olds every day, 7,000 young people worldwide acquire the virus, which amounts to around 2.6 million new infections over one year among youth.

Young girls grow up with limited knowledge of menstruation; there are many unhealthy menstrual practices and taboos which can be improved through IEC approaches (Information Education and Communication) which is an essential resource for improving their existing practices. Therefore there is need to train and empower these vulnerable group regarding reproductive health especially for female it is essential to educate them because today's girls are future mothers. The WHO (2010) believes that education for health is a fundamental right of every individual. Hence reproductive health awareness should be given priority in health care to have adolescent which can become healthy mothers to get healthy children which can further strengthen the nation.

Source: www.who.int

Christmas tree worms

■ Priyanka Yadav
M.Sc. Biotechnology



This widespread marine worm (*Spirobranchus giganteus*) gets its holiday nickname from its gills: a wildly coloured pair of tapering, feathery spires. They stick up from the top of the worm's burried retreat like the ornamental trees. One can see these worms sport gills in red, orange, blue, yellow – even stripes.

When a shadow looms, the tree like gills drop down into a protective tube where the rest of the worm hides. Its eyes, which check for scary things, sit beneath the branches like forgotten presents. To see the bright orange compound eyes, you have to kind of sneak up on them and look at them from the right angle. That tucked-under spot limits what the worm's eyes can do. For instance, they can only see directly in front or behind.

They are possibly the only animals growing eyes on their gills. Some parts of the worms have features often seen in a typical visual system. Like other worms, for instance, some have patches

of light catching compounds on the segments of their bodies - even their tails. A lump of light sensitive tissue in their heads even monitors light-dark cycles. But hidden in their tubes, the worm's visual bits seem useless for detecting danger. So their emerging gills, which also double as feeding tentacles, went visionary. Evolution scattered them with light catching molecules or even eyes. The nerves from these gill eyes don't go to the usual optic section of the brain. They connect to another, less well known area not usually thought to be involved in vision.

The light sensitive proteins in their eyes - opsins - aren't typical eye compounds. They are a form of opsin hardly ever found outside the brain. Even the fanciest of these gill-based eyes, like those in the Christmas tree worm, may only detect scary shadows. But that's a lot. Without their make do warning systems for predators, they'd get their gills and 'mouth' ripped off all the time.

Sunscreen killing coral reef

■ Rashi Rana
M.Sc. Biotechnology

Oxybenzone, a UV-filtering compound used in sunscreens, has been found in high concentrations in the waters around popular coral reefs in Hawaii and the Caribbean. According to new research, the chemical not only kills coral, it causes DNA damage in adults and deforms DNA in coral in the larval stage, making it unlikely for their development.

"Coral reefs are the world's most productive marine ecosystems and support commercial and recreational fisheries and tourism", In addition, reefs protect coastlines from storm surge. Worldwide, the total value of coral reefs is tremendous. But they are in danger.

Oxybenzone also caused coral bleaching, which is a prime cause of coral mortality worldwide. Corals bleach when they lose or expel the algae that normally live inside them, thus losing a valuable source of nutrition. In addition, coral larvae exposed to increasing oxybenzone concentrations suffered more DNA damage.

Source: en.wikipedia.org

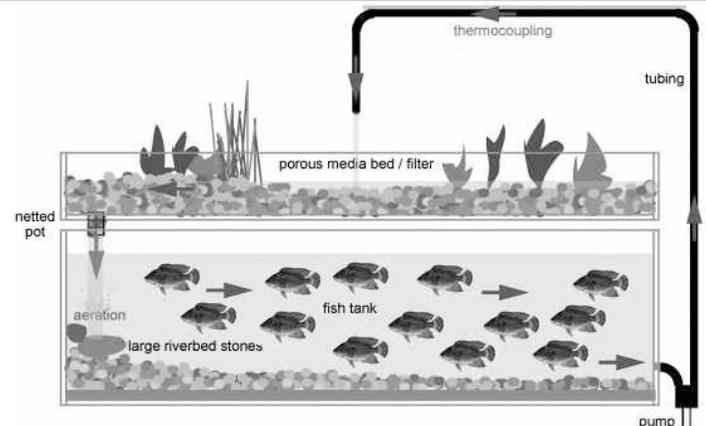
AQUAPONICS: A SUSTAINABLE AND WATER EFFICIENT PRODUCTION SYSTEM

■ Swati Chaudhary
M.Sc. Biotechnology

One of the greatest challenges that we face today is to achieve global food security by producing enough nutritious food for continuously growing world's population and doing so sustainably. It is estimated that by 2050, there will be 9.5 billion people on the planet so there is a growing need for local sustainable food production technologies.

Aquaponics is the combined culture of fish and plants in closed recirculating system of the water from the fish tanks through hydroponic system to produce horticultural plants. Waste materials, which are excreted directly by the fish or generated by the microbial breakdown of organic wastes, are absorbed by plants cultured hydroponically (without soil). This technique is based on the natural process called nitrogen cycle where the ammonia excreted by fish is broke down into useful nutrients and cleaned water is reused back into the system. This system can be scaled from household backyards / balcony or up to commercial enterprises.

The aquaponics system represents an appropriate sustainable agriculture technique due to its unlimited advantages over conventional agriculture. Some of them are -



- Protects lakes and rivers- no use of chemical fertilizers
- Land conservation-no requirement of farmland with fertile soil, can be grown on sand, gravel or rocky surface
- Water conservation- uses 90% less water than traditional farming

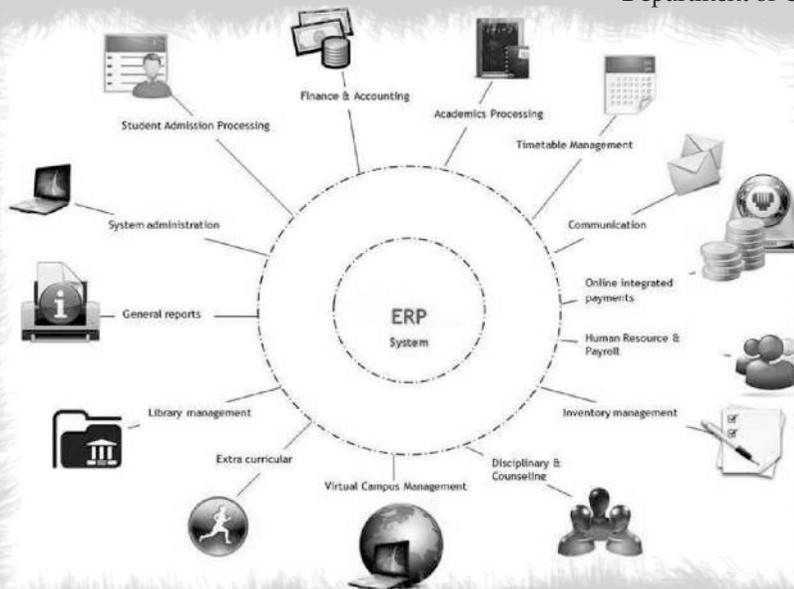
Source: epublications.marquette.edu

Education ERP System

■ Rajneesh Chaturvedi
Department of CS & IT

College and universities are having large capacity of students in the current global scenario. They are having plenty of different types of departments and courses. They are also spreading their campus at various geographical areas, in such scenario for effective management and to reduce running costs of different functional areas of the university there is a need of the educational ERP system.

The Educational ERP System (Enterprise Resource Planning) is a complete software solution to automate different process of a university and bring all functional areas of university on a common software platform. The Educational ERP System will provide the following advantages:



- ❖ Automate attendance, assignment, examination and other activities related to students.
- ❖ Establish a proper communication channel between parents and the university.
- ❖ Systematic and automate notifications to parents regarding attendance, marks and other activities of universities.
- ❖ Generates various types of customized reports for management to provide a 360o view about various functional aspects of the university.

Source: www.ellucin.com

Nutrition transition v/s Non Communicable Diseases

Dr. Swati Vyas & Isha Sukhwai
Department of Home Science

Nutrition transition is a shift in the dietary consumption and energy expenditure of the population in the developing countries like India. Nutrition transition occurs due to economic development in a country resulting from a change in diet, physical activity and body composition patterns. Other important factors contributing are globalization, international food trade investment, commercialization, marketing and demographic transition. Above all one of the most prominent causes of it is lifestyle changes. The reduced activity levels are seen at both workplaces as well as in home. Daily task which were earlier more laborious engagements, are now easier with the help of technological advancements. The most important lifestyle changes fueling the nutrition transition is the composition of diet. Diets rich in legumes and pulses, vegetables and coarse grains are disappearing from all the regions of India. Other diets which are rich in fat and vegetable oils, cheap animal sources, artificially sweetened food high in sugar have influenced food market. Consumption of soda represented 40% of all calorie intakes in our country. The desires for these new diets and lifestyle are very easily understandable from biological psychological point of view Previous studies revealed the fact that socioeconomic and influence of western culture contribute to the lifestyle changes associated with it. Researchers also suggested that socioeconomic status contribute greatly to nutrition transition ,



therefore lack of healthy food alternatives increases the risk of diet related non communicable diseases. India is facing the “epidemic” of diet related non communicable diseases as well as under nutrition resulting in substantial socio economic burden. The burden of chronic diseases mainly comprised of malnutrition (which may extend from conception to old age), immunodeficiency and recurrent infection, cardiovascular diseases, diabetes, cancer, etc. According to WHO there is a huge prevalence of NCDs and it accounts for almost 36 million deaths of people worldwide. In India the burden of diabetes is reaching a total of 62.4 million (ICMR, INDAIB 2014). It is impressive to understand the diet, lifestyle (smoking, alcoholism and chewing of pan masala, supari) which are known to increase the risk of NCDs. Government should take strong action and frame policies for combating this nutrition transition, certain measures can be taken while giving approvals for town planning for restricting outlets of fast food junctions. Thus it can be concluded for ensuring the economic prosperity of any nation, investment in health planning is an essential component.

Source: Venkatasubramanian .S, (2012), Nutrition Transition and its effect on Non Communicable Diseases-Review, Journal of Community Nutrition and health,1(2).
Kapoor .S.K, Anand .K, (2013), Nutrition Transition: a public health challenge in developing countries. Retrieved from www.jech.com

COCONUT - A BOON TO HUMAN HEALTH

The scientific name of coconut is *Cocos nucifera*. Early Spanish explorers called it coco, which means "monkey face" because the three indentations (eyes) on the hairy nut resemble the head and face of a monkey. *Nucifera* means "nut-bearing."

Coconut or the "tree of life," in tropical climates is a way of life for millions of people all around the globe. Coconut is a versatile product and has multiple uses. Almost all the parts of a freshly grown coconut, eatable or otherwise, are used in some or the other manner. India is one of the leading coconut producers in the world, producing 13 billion nuts per annum. India accounts for nearly 20% of global coconut output.

The coconut provides a nutritious source of meat, juice, milk and oil that has fed and nourished populations around the world for generations. On many Islands coconut is a staple in the diet and provides majority of the food eaten. Nearly one third of the world's population depends on coconut to some degree for their food and their economy.

Coconut is classified as functional food because it provides many health benefits beyond its nutritional content.

Health Benefits of Coconut

❖ Anti-viral agent

Coconut kills viruses that cause influenza, herpes, measles, hepatitis C and other illness. Thus, it is called as antiviral agent.

❖ Anti-bacterial agent

Coconut kills bacteria that cause ulcers, throat infections, urinary tract infections, gum disease and cavities, pneumonia and gonorrhea and other disease. Thus it is called an anti-bacterial agent.

❖ Anti-fungal agent

Coconut kills fungi and yeast that causes candidiasis, ringworm, athlete's foot, thrush and other infections. Thus it is called as anti-fungal agent.

❖ Increase immunity

Coconut boosts energy and endurance enhancing physical and

athletic performance.

❖ Healthy digestive system

Coconut improves digestion and absorption of other nutrients including vitamin, minerals and amino acids. Coconut improves insulin secretion and utilization of blood glucose. Coconut relieves stress on pancreas and enzyme system of body. Coconut reduces symptoms associated with pancreatitis, malabsorption syndrome.

❖ Strong Bones

Coconut improves Calcium and magnesium absorption and support the development of strong bones and teeth. Coconut helps protect against osteoporosis.

❖ Makes skin healthy.

Coconut provides protection to skin against harmful UV rays from the sun. Coconut prevents wrinkles, sagging skin and age spots. Coconut softens skin and helps prevent dryness and flaking. Coconut supports natural chemical balance of skin. Coconut reduces symptoms associated with the eczema, dermatitis.

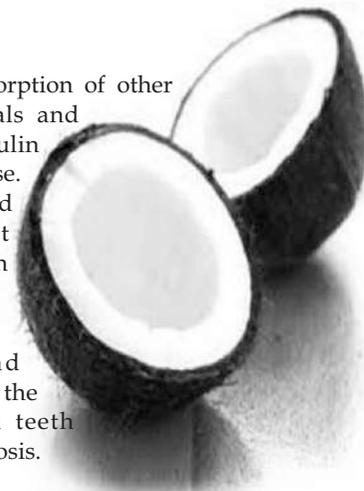
❖ Good for hairs

Coconut helps to control dandruff. Coconut provides protection against harmful UV rays from the sun.

❖ Loss of weight

Coconut promotes loss of excess weight by increasing metabolic rate. Coconut is lower in calories than all other fats. Coconut is utilized by body to produce energy in preference to being stored as body fat like other dietary fat. Coconut prevents obesity and overweight problems.

■ Dr Gargi Saxena
Department of Home Science



Source: www.eatingwell.com

How useless tyres are useful for cows to increase productivity?

The comfort of cows is directly proportional to their productivity and profitability. Their comfort levels will also affect their health and well-being. It is especially important for cows to be comfortable where they are lying down because cows need to lie down for at least twelve hours in order to increase milk production, as circulation of blood to the udder increases by 30 percent. If the barn is not comfortable, the cow will spend a shorter time lying down, and this will affect their overall health and well-being.

Comfortable cow mats have a direct impact on the productivity of cows. Most mats are made from recycled materials, and therefore they are environmentally friendly. Rubber mats are usually made from old vehicle tires. This is one of the reasons why they are so durable, and they can endure years of rough usage. They are therefore perfect for farmers who are looking for a high-quality product that will not harm the environment in any way.

Cows that sleep on these mats are usually very well-rested. They therefore produce more milk. When they lie down on comfortable mats, the blood circulation to their udder will increase, and this will improve the quality of the milk that the produce. Comfortable mats



■ Monisha Singhal
M.Sc. Biotechnology

can also improve the pregnancy productivity of dairy cows. Therefore, the farmer can expect higher profits if they get these mats for their cows. The insulating qualities of rubber mats and runners help your herd retain body heat, which can result in a greater quantity and quality of milk production. Rubber cow mats are designed with channels underneath them that direct fluids away from the surface of the mats. When urine is allowed to remain in contact with bedding, it can release harmful fumes into the air, causing respiratory issues. Livestock mats are useful because it does not allow for liquids to sit in bedding. Cow mats are also resistant to microbes and harmful bacteria. This is especially important for animals living in areas where a lot of bacteria could be present. They also protect cows from the inside out because they can protect against internal injuries. Stall flooring has an anti-slip surface and reduces the risk of slipping and falling. It also protects animals from any potential cuts or scrapes that may occur when an animal stands up. Since there is a risk for bacterial infections in living areas like these, protection from cuts is an important feature to have.

A comfy cow is a happy cow, and a comfy cow producing more milk, is a happy farmer.

Source: www.findmats.com

Critical role of histones (DNA binding proteins) in inherited risk of disease from father

■ Dr. Sanjoli Mobar
Department of Zoology

A father's life experiences involving food, drugs, exposure to toxic products and even stress can affect the development and health not only of his children, but even of his grandchildren. Recent researches have shown that stressed parents can pass on epigenetic changes to offspring that influence their risk of diseases like diabetes and heart diseases.

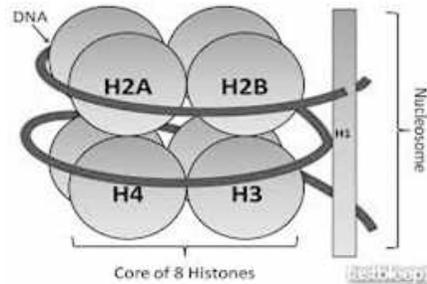
Scientists haven't been able to understand much about how this transmission of environmental memories takes place over several generations and the process behind this transmission remained a mystery. McGill researchers and their Swiss collaborators think that they have now found a key part of this molecular puzzle. They have discovered that proteins known as histones, which have attracted relatively little attention until now, may play a crucial role in the process.

In the past, most of the research in this area, which is known as epigenetics, has focused on a process involving DNA and certain molecules (known as methyl groups) that attach to DNA and act like a dimmer switch turning up or down the expression of specific genes. Epigenetic gene regulation involves changes other than to the

sequence of DNA and includes changes to histones (proteins around which DNA is wrapped) and DNA methylation.

The researchers suggest that histones might play a role in transmitting heritable information from fathers to their offspring because they are part of the content of sperm transmitted at fertilization. Histones are distinct from our DNA, although they combine with it during cell formation, acting a bit like a spool around which the DNA winds.

The study and findings conducted by McGill researchers indicate that information other than DNA i.e. through histones are involved in heritability and there is a critical role that, fathers play in the health of their children and even grand-children. Since chemical modifications on histones are susceptible to environmental exposures, the work opens new avenues of investigation for the possible prevention and treatment of diseases of various kinds, affecting health across generations.



Source: McGill University. "Environmental memories transmitted from a father to his grandchildren." *ScienceDaily*, *ScienceDaily*, 8 October 2015.

The amazing science behind animal navigation

■ Richa Pundir
Research Scholar, Department of Biotechnology

The mystery of Animal Navigation, that how these nonhumans, without benefit of maps, language or GPS, manage to find their way from place to place, often over very great distances. One of the great stories happen to be recently in 2013, the 'tale of the geolocating cat' that had been lost and found its way home after a journey of two months and 200 miles.

So how do animals manage such prodigious and precise feats of travel?

The kind of natural map any animal follows depends largely on the species. As it is reported, seabirds are believed to steer mostly by the sun and the stars, since if the animals are ever going to get lost, it tends to happen when the skies are overcast. The same is true of the unglamorous dung beetle. Many more animals navigate via magnetism, orienting themselves along the north-south lines of Earth's magnetic field. Pigeons were thought to navigate the same way, especially since they have cells in their beaks that are heavy in iron. Later studies, however, found that those cells were related to the immune system, not navigation.

Mammals, and particularly two of the species of mammals that humans love best: dogs and cats have a range of ways to get around. Dogs, no surprise, are very big on scent, and that can take them a very long way.

Cats, like other animals, might rely more on magnetic fields, a faculty that could turn out to be quite common in mammals. There are some studies that show that the ears of most mammals contain iron. That may cue them into the magnetic direction in the ground. There's work showing that cattle, deer and voles tend to orient in a north-south direction.



Actually, the methods animals use to navigate their migration routes are even more amazing than an animal that could program a GPS device. Some of their navigation methods are so weird we don't really understand them.

Source: time.com/4104980/animal-navigation-pets

CONFERENCES & WORKSHOPS

Organized at The IIS University, Jaipur



Prof. S.J.S. Flora
DRDE, Gwalior



Dr. Daniela Brunnert
Gemany

International conference on Biotechnology and Nanotechnology, (ICBN - 2016) organized by Department of Biotechnology, January 30-February 01, 2016



Dr. M. Krishna Mohan
BISR, Jaipur



Dr. Tarunkant
AFRI, Jodhpur

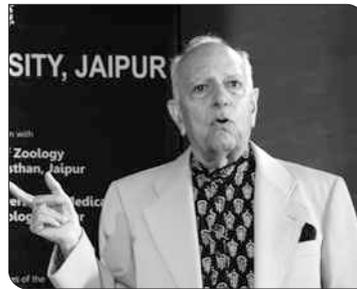


Dr. V. K. Bhalla
IMTECH. Chandigarh

National Conference on Reproductive Health Challenges: Issues and Remedies (NCRHC-2015) organised by Department of Zoology, September 11-13, 2015



Dr. Pradeep Kumar G., RGCB, Kerala
Prof. Pradeep Bhatnagar, IISU



Dr. G.P. Talwar
TRF, New Delhi



Dr. Anil Suri
NII, New Delhi



Dr. M.A. Akbarsha
Bharathidasan Univ. Tiruchirappalli



Dr. Debabrata Ghosh
AIIMS. New Delhi



Dr. Jayasree Sengupta
New Delhi



Dr. R. R. Chaudhary
Advisor,DHFW Govt. of NCTD

VISITS



Bisalpur Dam, Tonk, (Raj.) Department of Environmental Science



Sewage Treatment Plant, Delawas, Jaipur, (Raj.) Department of Environmental Science



Kalptaru Power plant, Tonk, (Raj.) Department of Environmental Science



National Dairy Development Board (NDDB), Anand, Gujarat Department of Biotechnology

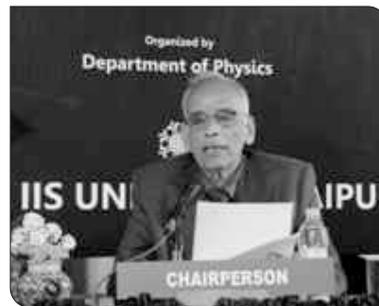
CONFERENCES & WORKSHOPS

Organized at The IIS University, Jaipur

National conference on “Recent Trends in Microwave Techniques and Optical Communication” organised by Department of Physics, February 04-05, 2015



Prof. Deepak Bhatnagar
University of Rajasthan, Jaipur



Prof. J. Behari
Amity University, Noida



Dr. K.B. Sharma
S.S. Jain Subodh P.G. College, Jaipur



Dr. R. K. Khanna
Vivekanand Global University, Jaipur



Dr. Umesh Kapil
AIIMS, New Delhi

National Conference on Future Directions in Multidisciplinary Perspective of Computer Science and Information Technology: Scope & Challenges FDMP-2015 organised by Department of CS & IT, January 30-31, 2015



Workshop on Wildlife conservation (Wildlife week celebration), organised by Department of Environmental Science, October 01-07, 2015



Saras Dairy, Jaipur
Department of Biotechnology



Waste Water Treatment plant,
Delawas, Jaipur
Department of Biotechnology



Rajasthan Agriculture Research Institute
(RARI), Jaipur
Department of Botany



Keval ramani hatcheries, Ajmer
Department of Zoology

VISITS

Intelligent clocks: A smart way to plan your day

■ Harshita Bhargava
Department of CS & IT

It is rightly said that "Either you run the day, or the day runs you" but, now you may have a smart clock that runs your day as per the information supplied from the apps, gadgets and web services. You may have a clock over the wall projecting facebook notifications ,twitter tweets ,meeting schedules from the Google calendar ,weather updates ,reminders etc .The projections may be changed as per the surroundings ,like the shape could be that of a plate in the kitchen showing recipes from your favorite food app, or that of an apple while you are having breakfast showing news updates. This avoids the need of handling your smart phone every now and then and instead, you may spend your valuable time with your family .The scientific research in manufacturing such intelligent clocks may result in handling adhoc situations such as reading a news feed about a train getting late by two hours from the scheduled time ,when the same event was added previously in your Google calendar or any such app and then updating the alarm setting by itself .This may also include a functionality where the same update is used by the connected smart coffee maker which increases its brew time by two hours or starts a few minutes before the scheduled alarm. Hence there is no doubt that such a gadget with its overwhelming features will soon occupy an important place in our lives.



Source: <http://www.digitaltrends.com/home/coolest-clock-smartphone-synched-social-media/>

How animals think

■ Pankhuri Chaturvedi
M.Sc. Microbiology

The surprising truth about bird brains, monkey minds, and more.

In recent studies, animals have shown abilities previously thought to exist only in humans.

The blue feathered scrub jays found in USA can be surprisingly devious about not only what foods they have hidden but where and how long ago and whether anyone else might have noticed. This research was conducted by Cambridge University professor Nicky Clayton. The more interesting fact is that not all birds protected their food that way - only those who had previously raided other bird's stores. "It takes a thief to know a thief" says Clayton. Another experiment was performed on monkeys that hint that they experience regret when they make a wrong choice and miss out on a treat. Their brains can suggest that these animals were having remorseful thoughts.

Alex, an African grey parrot has done the more to upend conventional notions than any other animal, it whittled away the belief that parrots were simply mimics, this 30 year research was performed by Irene Peperberg, PhD she constantly tested Alex and when Alex got tired of it, it would tell Peperberg- "Wanna go back". If the request annoyed her Alex would say "Sorry". He also showed some apparent grasp of something only humans and few apes could understand.

Peperberg had a tray of different coloured balls; she wanted Alex to count each group. She asked "What colour six?" "What colour two?" bored Alex threw the balls on the floor instead and said 'Five' and repeated it 'Five. Five.'

There were no five of anything on the tray, so peperberg asked "Okay smarty, what colour five?" Alex said 'None'. Not only had the bird figured out an abstract mathematical concept, it had manipulated the researcher into asking the question, so he could prove it. "I nearly dropped the tray." Peperberg says.



The African grey parrot

STEM CELL GEL HEALS BRAIN INJURIES

■ Priynshi Goswami
M.Sc. Microbiology

Brain injuries are particularly hard to repair, since injured tissues swell up and can cause additional damage to the cells. So far, treatments have tried to limit this secondary damage by lowering the temperature or relieving the pressure at the site of injury. However, these techniques are often not very effective. More recently, scientists have considered transplanting donor brain cells into the wound to repair damaged tissue. This method has so far had limited results when treating brain injuries. The donor cells often fail to grow or stimulate repair at the injury site, possibly because of the inflammation and scarring present there. The injury site also typically has very limited blood supply and connective tissue, which might prevent donor cells from getting the nutrients they require. Scientists have developed a gel that helps brains recover from traumatic injuries. It has the potential to treat head injuries suffered in combat, car accidents, falls, or gunshot wounds. Developed by Dr. Ning Zhang at Clemson University in South Carolina, the gel is injection in liquid form at the site of injury and stimulates the growth of stem cells there.

Dr. Zhang's gel, however, can be loaded with different chemicals to stimulate various biological processes at the site of injury. In previous research done on rats, she was able to use the gel to help re-establish full blood supply at the site of brain injury. This could help create a better environment for donor cells. When rats with severe brain injuries were treated with this mixture for eight weeks, they showed signs of significant recovery. The new gel could treat patients at vaccine stages following injury, and is expected to be ready for testing in humans in about three years.

Reference: <http://www.popsci.com/scitech/article/2009-09/squirt-stem-cell-gel-heals-brain-injuries>

Reference: Michael Rosenwald; pg:112, *The reader's digest*; September 2014.
Source: animalfacts.com

DNA DOUBLE HELIX: THE REAL LIFE VERSION

■ Parikshana Mathur
M.Sc. Biotechnology

DNA Double Helix, the very basic thing every biologist, and even the non biologists have read about. The article published in Nature bought worldwide fame to Watson and Crick; indeed it not only changed the future of science but settled many doubts of the past. "DNA strands are anti parallel, joined by Hydrogen bonds..." well you have read this sentence multiple times in various literatures but here I am trying to draw your attention to the real life version of it. For me DNA double helix solves many mysteries of life and teaches many lessons. I see the strands of DNA as individuals who are nothing if apart and single but as they unite with others, they bring life! We cannot live and survive in a society if we remain individuals. To bring meaning to life we have to socialize and work in collaboration with others and those others need not necessarily have to have same beliefs or customs and even may be opposite to what you are; hence elaborating the anti parallel structure of DNA. The bonding could never have been so strong if purine had to face a purine, purine has to face a pyrimidine such that the bases can be

complimentary otherwise it could never be stable and strongly bonded. Likewise in life you will meet different kinds of people but you cannot gel with everyone unless you find someone who fills that hydrogen bond for you by being complimentary. In your friend circle you will have multiple types of friends but the best one is always the one who has a nature complimentary as yours. As we progress in life we start analyzing things, what to keep and what not to. We get many advices from many people, certain things we learn from others but the rest; life has its own way of teaching and as we experience more we become firm about some decisions but at the same time flexible regarding other aspects of life. Yes, I am talking about the semi conservative mode of replication; take the half from others and create your own other half. Throughout your life you will have many slippage errors which can be corrected but some are just lethal... So choose wisely, make better decisions because you cannot undo all errors. Indeed nature has all the answers if you start seeing things differently.

How trees suck water

■ Dr. Reenu Agarwal
Department of Botany

Water is often most limiting factor to plant growth. Therefore, plants have developed an effective system to absorb, translocate, store and utilize water. Plants contain a vast network of conduits, which consists of xylem and phloem tissues. This pathway of water and nutrient transport can be compared with the vascular system that transports blood throughout the human body. Like the vascular system in people, the xylem and phloem tissues extend throughout the plant. Xylem is composed of elongated cells. Once the cells are formed, they die. But the cell walls still remain intact, and serve as an excellent pipeline to transport water from the roots to the leaves.



A single tree will have many xylem tissues, or elements, extending up through the tree. Each typical xylem vessel may only be several microns in diameter.

The physiology of water uptake and transport is not so complex either. The main driving force of water uptake and transport into a plant is transpiration of water from leaves. Transpiration is the process of water evaporation through specialized openings in the leaves, called stomata's. The evaporation creates a negative water vapor pressure develops in the surrounding cells of the leaf. Once this happens, water is pulled into the leaf from the vascular tissue, the xylem, to replace the water that has transpired from the leaf. This pulling of water, or tension, that occurs in the xylem of the leaf, will extend all the way down through the rest of the xylem column of the

tree and into the xylem of the roots due to the cohesive forces holding together the water molecules along the sides of the xylem tubing.

(Remember, the xylem is a continuous water column that extends from the leaf to the roots.) Finally, the negative water pressure that occurs in the roots will result in an increase of water uptake from the soil.

To maintain a continuous column, the water molecules must also have a strong affinity for one other. This idea is called the cohesion theory. Water does, in fact, exhibit tremendous cohesive strength. But a greater force is needed to

overcome the resistance to flow and the resistance to uptake by the roots. Even so, many researchers have demonstrated that the cohesive force of water is more than sufficient to do so, especially when it is aided by the capillary action within tracheids and vessels. The redwoods of northern California, *Sequoia sempervirens*, are the tallest trees in the world and carry water up to heights of more than 110 m.

In conclusion, trees have placed themselves in the cycle known as SPAC (Soil Plant Atmosphere Continuum) that circulates water from the soil to clouds and back. They are able to maintain water in the liquid phase up to their total height by maintaining a column of water in small hollow tubes using root pressure, capillary action and the cohesive force of water.

Source: <https://www.scientificamerican.com>

A new weapon against ebola: Giant Fullerenes

■ Angelina Mary
M.Sc. Chemistry

Ebola virus disease (EVD), formerly known as Ebola hemorrhagic fever, is a severe, often fatal illness in humans. It is transmitted to people from wild animals and spreads in the human population through human-to-human transmission via direct contact with the blood, secretions, organs or other bodily fluids of infected people, and with surfaces and materials contaminated with these fluids. People remain infectious as long as their blood contains the virus.

Using an artificial Ebola virus model, medical researchers have demonstrated how a supramolecule - constituted by 13 fullerenes - has been able of inhibiting the virus infection by blocking a receptor implied in its expansion. The model was tested in vitro to eradicate the infection where the protein covering a false virus is able of cell infection but not of replication.

"Fullerenes are hollow cages exclusively formed by carbon atoms," explains Nazario Martín, Professor of Organic Chemistry in the UCM and main author of the study. They are a family of carbon allotropes, composed entirely of carbon, in the form of a hollow sphere, ellipsoid, or tube. They are notoriously insoluble and adding a suitable group enhances its solubility. In this work, dendrimers were introduced to the fullerene molecules which are artificial macromolecules having tree-like structure, hyper branched three-dimensional molecules where fullerenes were attached on their surface by covalent conjugation. This not only favored solubilization of fullerene but also its interconnection with other fullerenes in this study.

Different studies demonstrated that the ebola virus infection process starts when the virus reaches the cellular DC-SIGN receptor to infect the dendritic cells (of the immune system). European researchers designed a "giant" molecule formed by thirteen fullerenes covered by carbohydrates which, by blocking this receptor, are able to inhibit the cell infection by an artificial ebola virus model.

Scientists employed C_{60} fullerene, decorated with specific

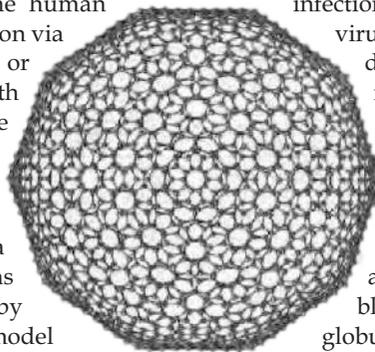
carbohydrates (sugars) present affinity by the receptor used as an entry point to infect the cell and act blocking it, thus inhibiting the infection. By blocking this receptor and inhibiting the virus infection, dissemination of the virus would decrease and the immune response would increase.

The use of multivalent carbohydrate compounds to block cell-surface lectin receptors is a promising strategy to inhibit the entry of pathogens into cells and could lead to the discovery of novel antiviral agents. Hexakis adducts of [60]fullerene are useful building blocks in this regard because they maintain a globular shape at the same time as allowing control over the size and multivalency.

Water-soluble tridecafullerenes were decorated with 120 peripheral carbohydrate subunits, so-called 'superballs', that was synthesized efficiently from hexakis adducts of fullerene in one step by using copper-catalysed azide-alkyne cycloaddition click chemistry.

The system designed by the chemists, based on carbon nanostructures developed in the UCM, mimic the presentation of carbohydrates surrounding virus like ebola or VIH.

The team achieved an unprecedented success in fullerene chemistry and dendritic growth: connecting in one synthetic step twelve fullerene units, each with ten sugars, to other central fullerene, creating a globular superstructure with 120 sugar moieties on its surface, "this is the fastest dendrimeric growth developed in a laboratory up to now" says Beatriz Illescas, Professor in the UCM and coauthor of the work. According to scientists, the results highlight the potential of these giant molecules as antiviral agents. "This work open the door to the design and preparation of new systems to inhibit the pathogens infection in cases where the current therapies are not effective or are inexistent, as occurs with the ebola virus," clarifies Martín.



Source:

1. World Health Organization. <http://www.who.int/mediacentre/factsheets/fs103/en/> (accessed March 2016)

2. Yiyun, C.; Zhenhua, X.; Minglu, M.; Tongwen, X. Dendrimers as Drug Carriers: Applications in Different Routes of Drug Administration. *J. Pharm. Sci.* 2007, 97(1), 4-5

3. Antonio, M. et al; Synthesis of giant globular multivalent glycofullerenes as potent inhibitors in a model of Ebola virus infection. *J. Nat. Chem.* 2015

Research Publications 2015

S.No.	Department	No. of Publications	Cumulative Impact Factor
1	Chemistry	13	13.15
2	Environmental Science	5	06.34
3	CS & IT	16	09.07
4	Botany	1	02.56
5	Zoology	9	09.783
6	Biotechnology	7	08.84

ONE'S WASTE CAN BE ANOTHER'S TREASURE

■ Disha Pamecha
M.Sc. Microbiology

On the roads of becoming technologically advanced, we leave behind incredible tonnes of waste both biodegradable and non-biodegradable. According to World Bank, current MSW generation levels are approximately 1.3 billion tonnes per year which are expected to double by 2025. Only 10-20% of the waste is recycled in eco-friendly manner and the rest is allowed to rot in landfills. Such pits being scavenged by hawks and pigs is a common site and many-a-times hazardous chemicals leach out to water bodies eventually leading to biomagnifications and extinctions. Looking at such huge quantities of waste, there is a tremendous scope for devising strategies to Reduce, Reuse and Recycle.

Waste is an indispensable part of our lives but how would it be if it could be used anew.

Nudge the creator in you and carve out teapot covers from rags, veggie bags from jute sacks, envelopes from wedding cards, vase from broken glass, plantings in empty jars and water holders from broken pots.

Ralph Waldo Emerson described a weed as a plant whose virtues have not yet been discovered."

Old silica gel packets can protect your papery items from moisture and mildew. Cozy mittens of ugly sweaters and cool pajamas from rugged jeans could be your style statement. Peels of papaya and powdered citrus rinds prove to be the best face scrubs. Saris can be made into cushions and soft toys to be sold. Such practices will bring you even closer to nature.

"Shop to save money".

Look for things that will last, things that are not just durable and well-made, but useful and beautiful enough to please you for a longer time. Look for stars while buying electronics and appliances and buy products made from post-consumer recycled materials, especially paper and bathroom tissues. PVC pipes can be replaced with jute strings for watering using capillary action saving not only money but also prevents plants from being overwatered. Check out for On-Pack Recycling Labeling (or OPRL) on the items:

MOBIUS LOOP indicates that the object is capable of being recycled.



TIDY MAN reminds the owner of the object to dispose it in the most appropriate manner.



This identifies the resin used to make the item by providing a 'Resin Identification Code'. The number between the chasing arrows defines the kind of resin.



Electrical items with this symbol can be recycled.



The seedling is the registered trademark of the European Bioplastics.



To be given the NATIONAL ASSOCIATION OF PAPER MERCHANT's mark, paper or board must be made from minimum of 50%, 75% or 100% genuine waste paper and/or board fiber, no part of which should contain mill produced waste fiber.



This symbol indicated that the object is made up of recyclable steel.



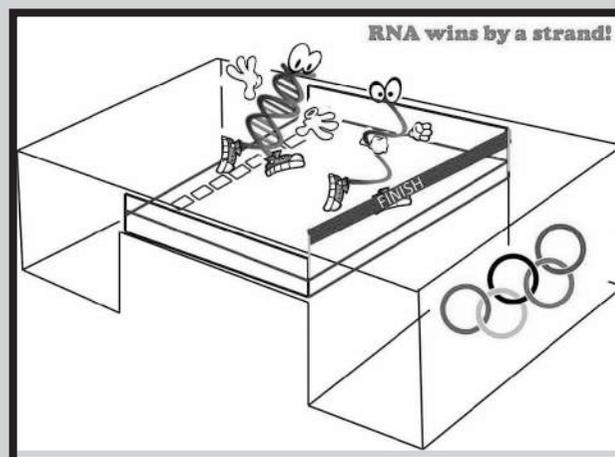
This symbol indicated that the object is made up of recyclable aluminum.

The 3 R's policy come hand-in-hand with loads of benefits. Recycling not only saves money but also creates employment. Every ton of paper recycled saves 17 trees ensuring rains and healthier environment for our future generations. Producing recycled steel saves 60%, recycled newspaper 40%, recycled plastics 70% and recycled glass 40% of energy. As per the 2013, UK recycling is estimated to save more than 18 million tonnes of CO₂ which is equivalent to taking 5 million cars off road.

So why not step in and alter the situation!!!

Source: <https://www.recyclenow.com> · <https://www.nrdc.org>

WHY NOT SOME DNA JOKES ?



■ Science Spectrum Team

FELLOWSHIPS

■ Science Spectrum Team

This column of the science spectrum will have information about the various types of National and International Fellowships available for higher study. We are starting this column with a very prestigious Fellowship available for Indian students.

FULBRIGHT

This educational exchange program is established by the US Congress in 1946. The program offers grant to non U.S. citizens to study, research and teach at colleges and universities in U.S and to U.S to do the same in India or other countries. Ful bright exchange between the U.S and India began in 1950. In 2008 the program expanded and awards were renamed Ful bright- Nehru Fellowships. This is administered by the United state-India Educational Foundation (USIEF).

Indian nationals at various stages of graduate study and professional work are eligible to apply for the programme. The type of awards includes Master's fellowships, doctoral and professional research fellowships, post-doctoral scholars-in-Residence grant and the "Distinguished Awards in Teaching" programme.

Although the variety of opportunities and eligibility qualifications can be overwhelming, the USIEF website offers details on each programme and they host informative sessions for interested applicants. They also help students connect with Ful Bright alumni for more information. Contacting academic institutions in US is also recommended.

One of the grants is Ful Bright-Nehru Maters Fellowship designed for Indians interested in pursuing a master's degree at selected US academic institutions; the programme offers study in one of the following fields: arts and culture, management including heritage conservation and museum studies, environmental studies, public health, and women studies/gender studies. The program looks for highly motivated leaders who have completed the equivalent of U.S bachelor's degree. The grant includes J-1 visa support, round trip to the United States, tuition and fees and living and related expenses.

Applicants to the United States proposes specific project to research (for post degree also) but if they are accepted in the programme they receive exposure to a broad range of topics during the fellowship.

Ful Brighters build academic friendships and contacts that will serve them a lifetime.

For details visit:

The Ful Bright programme

<http://eca.state.gov/fulbright/about-fulbright>

Fulbright-Nehru Fellowship

<http://www.usief.org.in/us-fulbright-nehrufellowship.aspx>



R & D Centre IIS University, Jaipur

■ Dr. Priyanka Mathur
Department of Zoology



R & D Labs is the institute were established in 2010 with the purpose to initiate research in Life Sciences, Physical Sciences, chemical Sciences and Home Science. It's a matter of great pride that R & D centre of the institute is recognized as a scientific and industrial research organization (SIRO) by the Department of Scientific and Industrial Research under the scheme on Recognition of SIRP's 1988.

In this endeavor the centre has developed research facilities in the field of General Toxicology, Reproductive Toxicology, Developmental Toxicology, Pesticide Toxicology, Animal Cell Culture, Plant Tissue Culture, Molecular Biology, Environmental Monitoring (water and air pollution), Microbiology bioassays and Synthesis of new chemical molecule etc.

For this purpose the labs are equipped with sophisticated equipments like nano drop spectrophotometer, PCR, Phase contrast microscope.

besides this, a well established animal house is maintained which is registered by CPCSEA, Ministry of forest and animal welfare, Govt. of India. (Reg# 1689/PO/a/13/CPCSEA dt: 29.5.14). Every year 25-30 candidates are registered for pursuing research under PhD programme in subjects like Botany, biotechnology, microbiology, zoology, chemistry and physical sciences and more than 100 students in PG programmes undertake dissertation in various areas, wherein they learn the various scientific basic techniques and acquaint with research methodology, research writing, result compilation and its statistical evaluation. During the short span of 5 years approximately 250 research papers have been published from labs associated with R&D in reputed journals. The students from other institutes are also entertained to perform for their dissertation in our labs.

The research laboratories of the university has collaborated with thr organization like DRDO (Defence Research Development Organization), Govt. of India, Kummurappa handmade paper Industry to name a few.

Faculty Achievements 2015

Ph. D Awards



Dr Swati Vyas
First Prize

Oral presentation in a two day national Seminar organized by Department of Home Science, University of Rajasthan



Dr Gargi Saxena
First Prize

Poster presentation in a two day national Seminar organized by Department of Home Science, University of Rajasthan



Dr Priyanka Mathur
Best Poster

Poster presentation in a National conference organised by Department of Physics University of Rajasthan



Nidhi Bhargava
Supervisor: Prof. K.S. Sharma
Physics, The IIS University



Third Prize- Chemistry Olympiad 2015



Department of CS & IT
Star Company Award
3rd E-Bazaar on Campus, 2015



Manisha Patni
Supervisor: Prof. Raakhi Gupta
Chemistry, University of Rajasthan



Chanchal Sinha
Supervisor: Dr. Charu Vyas
Home Science, Banasthali Vidyapith



Release of Science Spectrum 4th issue during the inaugural session of "International Conference on Biotechnology and Nanotechnology" ICBN-2016



Department of Chemistry, Star Udhyaami Award , Company Campus Award
4th E-Bazaar on Campus, 2015



Dr. Payal Mehtani

Best Performance in Quiz of American Society for Microbiology Virtual Workshop on "Scientific Writing and Publishing" on 6 December, 2015

Department of Biotechnology, The IIS University



Dr. Charu Sharma

Students Achievements 2015

Ph. D Awards



Komal Jangid
Supervisor: Dr. Ila Joshi
Home Science, The IIS University



Deepika Sharma
Supervisor: Prof. Raakhi Gupta
Chemistry, University of Rajasthan



Megha Mathur
Supervisor: Dr. Pallavi Kaushik
Zoology, The IIS University

Research Scholars



Pooja Maheshwari
Chemistry, The IIS University

- Significant Achievement in Research



Ruchi Middha
Environmental Science, The IIS University

- National winner (Gold medalist) RIO+22 UN Sustainable Energy for All India Programme 2015
- Selected for the award of ICSSR doctoral fellowship for the year 2015-16



Sushmita Aswal
Biotechnology, The IIS University

- First prize in Poster presentation in conference BIOCON-2015, Biyani Girls College, Jaipur

Students



Shweta Soni, Gunjan Khadria, Gunjan Sharma
BSc Sem V, Department of Biotechnology, The IIS University

- Third prize in BioQuiz in Biochrome 2015 held at Dr. B. Lal Institute of Biotechnology.



Shivani Panwar
BCA Sem VI

Department of CS&IT, The IIS University

- Second Prize in Power Point presentation held at Maharani College Jaipur



Srishti Choudhary
BCA Sem II

Richa Pundir

Research Scholar, Department of Biotechnology

Think About it !



Articles for next issue of Science spectrum may be submitted for publication at sciencespectrum@iisuniv.ac.in. The guidelines for writing the paper may be downloaded from the IISU website.