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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)

MEET THY NEIGHBOURS

Every existence has its excuse, it is said. Every year taxonomists in India venture into uncharted landscape and scan every nook and corner to find out many existences and unveil the excuses. In the past year they found 523 species of animal and plants. There are a few of the Country's newest citizens to you, each of them equally contributing to the mega diversity of India.

Anamika Yadav
M.Sc., Department of Biotechnology

1. NAME: *Elachura formosa*

REPORTED BY: Per Alstrom from Swedish University of Agricultural Sciences, Uppasala

LOCATION OF FINDING: Arunachal Pradesh



6. NAME: *Nemalecium lighti*

RECORDED BY: Pooja Nagale and Deepak Apte from Bombay Natural History Society, Mumbai

LOCATION OF FINDING: Poshitra, Gujrat



2. NAME: *Evarcha flavocinta*

REPORTED BY: Tapan Kumar Roy, Dhruva Chandra Dhali and Dinendra Raychoudhury from University of Calcutta, Kolkata; Sumana Saha from Darjeeling Government College, West Bengal

LOCATION OF FINDING: Jaldapara Wildlife Sanctuary, Nepuchapur Tea Estate and Kailashpur Tea Estate, Jalpaiguri district, West Bengal



7. NAME: *Eublepharis satpuraensis*

REPORTED BY: Zeeshan Mirza and Rajesh Sanap from National Centre for Biological Sciences, Bengaluru

LOCATION OF FINDINGS: Pachmarhi, Satpura Tiger Reserve, Madhya Pradesh; Popatkhed, Amravati, Maharashtra

3. NAME: *Aborichthys cataracta*

REPORTED BY: M Arunachalam, M Raja, P Malaialamm and R L Mayden from Manonmanian Sundaranar University, Tamil Nadu

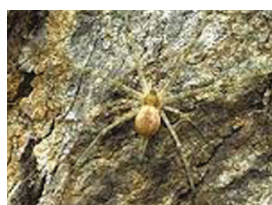
LOCATION OF FINDING: Hong village, Upper Subanshri district, Arunachal Pradesh



8. NAME: *Chromodoris aspersa*

REPORTED BY: Deepak Apte and A Vishal Bhave from Bombay Natural History Society, Mumbai

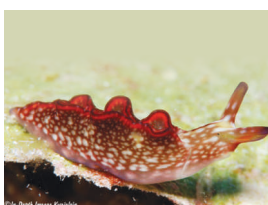
LOCATION OF FINDINGS: Kavaratti, Lakshadweep



4. NAME: *Hersilia aadi*

REPORTED BY: G B Pravalikha, Chelmala Srinivasullu and Bhargavi Srinivasullu from University College of Sciences, Osmania University, Hyderabad

LOCATION OF FINDING: Osmania University, Hyderabad, Andhra Pradesh



9. NAME: *Elysia rufescens*

REPORTED BY: Deepak Apte and A Vishal Bhave from Bombay Natural History Society, Mumbai

LOCATION OF FINDINGS: Kavaratti, Lakshadweep

5. NAME: *Ghatiana aurantiaca*

REPORTED BY: S K Pati and R M Sharma from ZSI, Pune

LOCATION OF FINDING: Phansad Wildlife Sanctuary, Raigad district, Maharashtra



10. NAME: *Calandrella branchyactyla dukhunensis*

REPORTED BY: S Rajesh kumar and C Raghunath from Zoological Survey of India (ZSI), Port Blair; G Maheshwaran and K Venkatraman from ZSI, Kolkata.

LOCATION OF FINDING: Landfall Island Wildlife Sanctuary, Andaman and Nicobar Islands.



Source: DOWN TO EARTH, Vol 24

COLORFUL BERRIES

FOR COLORFUL LIFE

Anshu Chaturvedi

Research scholar, Department of Clinical Nutrition

Do you know what is the importance of berries in our food? These berries are rich source of antioxidants, that help fight oxidation, a normal chemical process taking place in the body every day. It can be accelerated by stress, cigarette smoking and alcohol. Besides antioxidants, berries also contain anthocyanins, catechines, ellagic acid, dietary fibers, gallic acid, phytochemicals, flavonols, salicylic acid, vitamin C and vitamin K. All these nutrients have functional properties that improve immune system and reduce signs of ageing. Researches on blueberries have recognized potential benefits of their antioxidants content on the nervous system and brain health; moreover, there is exciting new evidence that blueberries can improve memory. These berries have shown to improve blood fat balances, including reduction in total cholesterol, raising of HDL cholesterol and lowering of triglycerides. The anthocyanins in blueberry protect the retina from unwanted oxygen damage and sunlight. The health benefits of strawberry include improved eyesight, proper brain function, relief from high blood pressure, arthritis, gout and various cardiovascular diseases. The impressive polyphenolic and antioxidant content of strawberries make them good for improving the immune system, preventing against various types of cancers and for reducing the signs of premature ageing. Folate is present in strawberry which is known to protect from birth defects. Raspberries are very rich in vitamin C, the micronutrient known to fight free radicals, detoxify the body and prevent from many degenerating diseases. Vitamin C along with vitamin A and E reduces the risk of hypertension and prevent



Source: www.favim.com

from cardiovascular diseases, anaemia (by absorption of iron), excessive menstrual bleeding, cancer, cataracts, night blindness, respiratory tract infection and sinusitis. Regular intake of raspberry juice during pregnancy reduces the pain during childbirth. The health benefits of Indian gooseberry, also known as Amla, can be partially attributed to its high vitamin C content, minerals and vitamins like calcium, phosphorus, iron, carotene and vitamin B complex. Amla enhances food absorption, balances stomach acid, fortifies the liver, nourishes the brain and mental functioning, supports the heart, strengthens the lungs, regulates elimination of free radicals, enhances fertility, helps the urinary system, increases skin health, promotes healthier hair, acts as a body coolant, flushes out toxins, increases vitality, strengthens eyes and improves muscle tone.

'EAT WELL, STAY WELL'

Combating Cancer through Elephants

Shivangi Goyal

Research scholar, Department of Biotechnology

Sounds surprising!!! A new research has found this paradox as an evident factor in elephants. In spite of carrying more cells than the human body, elephants are less prone to acquiring cancer. Studies given by researchers reflect the presence of tumor suppressor gene p53 having 20 copies in elephants compared to one copy in humans. Though the findings of extra p53 genes do not confirm cancer resistance but further research could lead scientists to invent novel drugs for humans that would act in a similar fashion. Cancer is a dreadful condition of uncontrolled cell division. Cancer or tumor suppressing genes present in the body aids in combating with cancer by either repair of damaged cells or self destruction after the DNA of the cell has been damaged by physical or chemical agents. Cells unable to undergo self repair or self destruction after being exposed to carcinogens develop themselves into cancerous cells.

Research was started by one of the pediatric cancer specialists at the University of Utah, namely Dr. Joshua Schiffman. Peto's paradox, which informs about the lower rate of cancer in animals like whale and elephants, led Schiffman to explore more into this field utilising



Source: www.livescience.com

elephant's blood for his research. Children suffering from Li-Fraume condition that identifies the mutated version of p53, have greater chances of developing cancer and thus were the patients of Dr. Schiffman. He along with his team compared the elephant cells with the cells of his patients and normal human cells. The rate at which elephants' cells had undergone self destruction were twice the rate of human cells and five times more than Li-Fraume patients. Another study was conducted in which necropsy data was analysed. It was found that though the life expectancy of elephants is similar to that of humans yet the data suggests that only 5% of elephants die of cancer while it is 25% for humans.

Another group of scientists studied more than 60 other species, and frozen zoo specimens also found the extra copies of cancer suppressing genes in the elephants, woolly mammoths and their extinct species. A new set of experiment was conducted wherein the mouse cell was the host for inserting p53 gene of the elephant. Interestingly mouse cells responded in the similar fashion as those of elephants' cells and underwent self destruction after being exposed to DNA damaging drugs.

Source: <http://Cancerres.aacrjournals.org/content/31/11/1649>

Upcoming Events

Conferences/Workshops/Symposium

On Campus

✍ Department of Psychology is organizing National Conference on Women, Health and Identity: Re-visioning a Multidisciplinary Perspective on 12 February, 2016

✍ Department of Biotechnology is organizing International conference on Biotechnology and Nanotechnology (ICBN-2016) on 30 January-01 February, 2016

Off Campus

✍ The 6th International Conference on Metals in Genetics, Chemical Biology and Therapeutics (ICMG 2016) to be held at the Indian Institute of Science, Bangalore, India during 17-20 February, 2016

✍ International Conference on Innovative Research in Biotechnology, Biomedical Sciences, Bioinformatics and Stem Cell Applications (BSC-2016) to be held at New Delhi, India during 30 January, 2016

✍ The 3rd India Water Forum (IWF), an international water convention to be held at The Energy and Resources Institute (TERI) in association with the Ministry of Water Resources, River Development & Ganga Rejuvenation, Government of India during 20-22 April 2016

✍ Indo-US workshop on Cell Factories to be held at IIT Bombay, Mumbai, India during 18- 20 March, 2016

✍ International Conference on Improving Quality of Life using Nanotechnology: Potential Role of Polymers (NanoSciTech 2016) to be held at Panjab University during 18-20 February, 2016.

✍ Recent advances in Biotechnology, Biosciences and Sustainable Development 2016 to be held at MLSU, Udaipur, Rajasthan during 18-19 March, 2016

✍ International Conference on IEEE technological innovations in ICT for Agriculture and rural development (TIAR-2016) to be held at Easwari Engineering college Ramapuram, Chennai, Tamilnadu, India during 15-16 JULY, 2016

✍ International Conference On New Approaches in Biotechnology and Biosciences "NABB-2016" to be held at Raja Balwant Singh Engineering Technical campus, Bichpuri, Agra, India during 18-20 FEBRUARY, 2016

✍ 3rd International Conference on Biotechnology and Bioinformatics (ICBB-2016) to be held at International centre for stem cells, Cancer and Biotechnology (ICSCCB), Pune, India during 5-7 FEBRUARY, 2016

Brilliant Greens: Cognition without brain

Dr. Anuja Joshi
Department of Botany



What is Intelligence? Can a plant be intelligent? Why not...? Plants are amazingly good in solving their problems- since they can sense, learn, remember and even react in ways that would be familiar to humans. But even mentioning the idea that plants could be intelligent is a quick way to being as crazy.

This new field of research is plant neurobiology – which is something of a misnomer, because even scientists in the field don't argue that plants have neurons or brains. "They have analogous structures. They have ways of taking all the sensory data they gather in their everyday lives ... integrate it and then behave in an appropriate way in response. And they do this without a brain, which, in a way, is what's incredible about it, because we automatically assume that one needs a brain to process information."

Plants have all the same senses as humans and in addition to this they can sense gravity, presence of water, or even feel an obstruction in the way of its roots, before coming into contact with it. How plants sense and react is still somewhat unknown. They don't have nerve cells like humans, but they do have a system for sending electrical signals and even produce neurotransmitters, like dopamine, serotonin and other chemicals that the human brain uses to send signals.

The idea that plants possess intelligence worthy of in depth exploration, is still largely scoffed at, despite the emergence of research suggesting otherwise. Mostly, this is due to the widespread belief that "intelligence" and "brain" are inextricably connected, that the two must coexist to exist at all. The problem with this is our perception of what a "brain" is. However, when looking deeper into the characteristics of plants, we begin to find they have impressively elegant mechanisms, typically reserved only for those with brains. This, of course, brings us to the regrettably too often overlooked intelligence of plants.

Concrete details beyond this remain a mystery -one that some scientists are working to unveil. Other, less humble ones, of course, label the very idea of plant consciousness and intelligence as quackery, still unaware that true science often lies in the beauty of not knowing.

The Green Medicine Series

The Tea Aficionados

Dr. Shilpi Rijhwani
Department of Botany



All tea is produced from a plant called *Camellia sinensis*. Thousands of different varieties of teas available in the world only vary by the region it is grown in, the time of year it is picked, and the processing method. Our premium teas come from all over the world and many of them fit into one of these main categories of tea: white, green, oolong, black and now purple tea.

Tea has a plethora of phytochemicals such as epigallocatechin gallate, flavonoids, tannins, caffeine, polyphenols, boheic acid, theophylline, theobromine, anthocyanins and gallic acid. The potential health benefits of tea can be attributed to effects such as reduced blood pressure; improved dyslipidemia; improved insulin sensitivity; weight loss and anti-oxidant activity.

White Tea

White tea is the purest and least processed of all teas. White tea is minimally processed and not oxidized, meaning it retains the natural antioxidants, but does not develop much flavor, color, or caffeine. It has antioxidant and anti-aging properties which help in maintaining good health and healthy skin. White tea provides relief to diabetic people from symptoms such as hypoglycaemia and polydipsia.

Green Tea

Green tea is the most popular type of tea, mainly because it is the beverage of choice in Asia. Green tea has a minimal amount of oxidation, halted by additional pan-frying (Chinese teas) or steaming (Japanese) steps. A new research published in the journal 'Psychopharmacology' suggests green tea can enhance our brain's cognitive functions, particularly the working memory.

Oolong Tea

Oolong tea, also known as wu long tea, is full-bodied with a sweet aroma. Oolong tea gets partial fermentation, and often an additional

shaking/bruising step that release distinct flowery & earthy flavors. Health benefits of oolong tea include the reduction of chronic health conditions such as heart disease, inflammatory disorders, and high cholesterol levels, while providing vital antioxidants, promoting superior bone structure, robust skin and good dental health.

Black Tea

The method of black tea production makes it different from the other varieties of tea. After being plucked, the tea leaves are withered in order to release the moisture from them. After that the leaves are rolled through exposure to high temperature. Black tea is fully fermented, which blackens the leaves and causes the formation of caffeine and tannins. It generally possesses the most robust flavor and highest level of caffeine, but the least antioxidants. Black tea has been shown to reduce levels of the stress hormone cortisol.

Purple Tea

The anthocyanin-rich purple tea or 'ox-blood' as it is known is also found in Assam and wild purple tea was recently discovered in the Karbi Anglong district of the North East state. Purple tea contains anthocyanin, which has many medicinal properties and is particularly known to be beneficial against cardiovascular diseases. Purple tea's high antioxidant effects provide anticancer benefits, and improve vision, cholesterol and blood sugar metabolism.

Source: <http://www.teaboard.gov.in>, www.teavana.com

Farm dust can help protect kids against allergies and asthma

Swati Chaudhary

M.Sc., Department of Biotechnology

It is commonly known that drinking cow's raw milk can provide protection against allergies. In similar context, researchers found that the farm dust helps to protect kids against asthmas and allergies. This came up as a breakthrough that might be helpful in the development of an asthma vaccine.

Many years ago, it was found that children growing up on farms are far better protected against allergies and asthmas but at that time scientists were unable to find the reason behind. To prove this a team of researchers exposed a mice to farm dust extract from Germany and Switzerland. These tests revealed that the mice were fully protected against house dust mite allergy, the most common cause for allergies in human. The mechanism that the farm dust makes the mucous membrane inside the respiratory tracts react less severely to allergens such as house dust mite was discovered.

This effect is due to the A20 protein, which the body produces upon



contact with farm dust. When A20 protein in the mucous membrane of the lungs is inactivated; the farm dust is no longer able to produce an allergic or asthmatic reaction.

The findings were then tested in patients. The results showed that people suffering from allergies and asthma have a deficiency in the protective protein A20. It explains why they react to allergens so severely. Also a test group of 2,000 children growing up on farms were assessed and it was found that most of them were protected. Those who are not protected and still develop allergies have a genetic variant of the A20 gene which causes the A20 protein to malfunction. The researchers are now trying to identify the active substance in farm dust that is responsible for providing protection for the development of a preventive medicine against asthma.

To some extent, the answer lies in the endotoxins, which form part of the cell wall of specific bacteria.

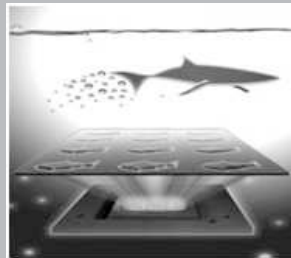
Researchers think that discovering how farm dust provides this type of protection has certainly put us on the right track towards developing an asthma vaccine and new allergy therapies.

Source: Times Of India

SMART MICROROBOTS

Dr. Pratibha Mittal
Department of Chemistry

In the University of California, nanoengineer San Diego and his team have developed 3D printing technology to manufacture multipurpose fish-shaped microrobots called microfish, that swim around efficiently in liquids. They are chemically powered by hydrogen peroxide and magnetically controlled. This microfish will motivate a new generation of 'smart' microrobots that have diverse applications such as detoxification, sensing and directed drug delivery.



The technique used to fabricate the microfish provides numerous improvements over other methods traditionally employed to create microrobots with various locomotion mechanisms, such as microjet engines, microdrillers and microrockets. Due to spherical or cylindrical structures, they can't be used for performing various tasks. In this new study, researchers demonstrated a simple way to create more complex microrobots.

How this new 3D printing technology works?

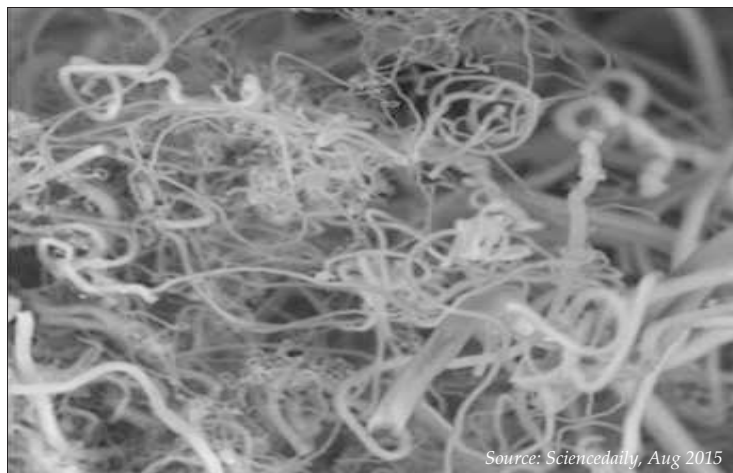
The new microfish fabrication method is based on a rapid, high-resolution 3D printing technology called Microscale Continuous Optical Printing (μ COP), which was developed in Chen's lab. Some of the benefits of the μ COP technology are speed, scalability, precision and flexibility. Within seconds, the researchers can print an array containing hundreds of microfish, each measuring 120 microns long and 30 microns thick. This process also does not require the use of harsh chemicals. Because the μ COP technology is digitized, the researchers could easily experiment with different designs for their microfish, including shark and manta ray shapes.

The key component of the μ COP technology is a Digital Micromirror array Device (DMD) chip, which contains approximately two million micromirrors. Each micromirror is individually controlled to project UV light in the desired pattern (in this case, a fish shape) onto a photosensitive material, which solidifies upon exposure to UV light. The microfish are built using a photosensitive material and are constructed one layer at a time, allowing each set of functional nanoparticles to be "printed" into specific parts of the fish bodies.

'Diamonds from the sky'

Approach turns CO₂ into valuable products

Jyoti Choudhary
M.Sc., Department of Biotechnology



Source: Sciencedaily, Aug 2015

A team of chemists have recently developed a technology to economically convert atmospheric CO₂ directly into highly valued carbon nanofibers for industrial and consumer products. Stuart Litch who discovered this says that such nanofibers are used to make strong carbon composites, such as those used in the Boeing dreamliner, as well as in high end sports equipments, wind turbine blades and a host of other products. Litch called this approach "Diamond from the sky" as it refers to carbon being the material that diamonds are made of, and also hints at the high value of the products. Carbon nanofibers are electrolytically synthesized from atmospheric carbon and oxygen, this low energy process can be run using only a few volts of electricity, sunlight and a whole lot of carbon dioxide. In this process, CO₂ is broken down in a high temperature electrolytic bath of molten carbonates at 7500C. Once the CO₂ is dissolved and subjected to the heat and direct current through electrolyte of nickel and steel, the carbon nanofibers build up to steel electrodes.

It was found that this process could remove enough CO₂ to decrease atmospheric levels to those of the pre-industrial revolution within 10 years. This research could shift CO₂ from a global warming problem to a feed stock for the manufacture of carbon nanofibers in demand.

EINSTEIN - ROSEN BRIDGE

Priyanka Yadav
M.Sc., Department of Biotechnology

How many of you have watched the movie Thor? Do you remember the pathway by which Asgardians entered earth - that was the bifrost? It is interesting to know that the pathway mentioned in the Greek mythology has been given a theory by one of the very renowned scientists that ever lived Einstein. In 1916 Einstein introduced General Relativity to the world which still remains the core theory for gravitation. In his theory he stated that every object, no matter how tiny or how large bends the space around it as an object bends the cloth or fabric it is placed upon. But the theory had still some amazing and revolutionary concepts to be undertaken. Einstein reunited with his long time collaborator, Nathan Rosen, and published a paper showing that implicit in the general relativity formalism is a



curved - space structure that can join two distant regions of space - time through a tunnel - like curved spatial shortcut. This led to the existence of the black holes but the formulation of black holes deter the theory of Einstein and he went to work with Nathan Rosen and in 1935 they produced a paper that produced evidence for a bridge between a black hole and white hole. This was called the Einstein - Rosen Bridge. The purpose of the paper of Einstein and Rosen was not to promote faster - than - light or inter - universal travel, but to attempt to explain fundamental particles like electrons as space - tunnels threaded by electric lines of force. However science fiction took the idea of Einstein - Rosen Bridges and applied it to moving spaceship faster than the speed of light through what was now being called wormholes'.

Unfortunately, wormholes are currently more science fiction than they are science fact, but it is certainly testing to think about possibilities their existence might create.

Source: www.webmd.com, www.joybauer.com

Bt cotton- The reason behind suicide in the rain fed areas

Pankhuri Chaturvedi

M.Sc., Department of Biotechnology

It is really saddening and a matter of concern that 'annadata' of a country who's more than 65 percent of economy is agriculture dependent is facing the plight of life and death.

The report of 'The Hindu' states that 3013 farmers committed suicide in the past 3 years.

According to a research of California-based agricultural scientists published in the "Journal Environmental Sciences", Europe. The cultivation of Bt cotton, a genetically modified, insect-resistant cotton variety, is a risky affair for Indian farmers practicing rain-fed agriculture and is one of the major reason behind the increasing suicide rates in these areas.

The raw annual suicide data for Andhra Pradesh, Gujarat, Karnataka, and Maharashtra during the period 2001-2010 is found to be 86,607 of 549,414 suicides were by farmers, and 87% were males with the numbers peaking in the 30-44 age class. Total suicides per year per state were regressed singly on states averages of proportion of area seeded to rainfed cotton, average farm size, cotton growing area, area of Bt cotton, proportion of area with Bt cotton, and simulated average yield/ha that includes the effects of weather. Excluding the proportion of area seeded to rainfed cotton, linear multiple regression shows suicides decrease with increasing farm size and yield but increase with the area under Bt cotton, according to the study.

The study also challenges the common assumption in economic analysis that cotton pests must be controlled to prevent monetary losses, thus encouraging Bt cotton adoption. The annual emergence of the key cotton pest pink bollworm in spring is poorly timed to attack rain-fed cotton and large populations of the pest fails to develop in non-Bt rain-fed cotton, the authors note. This reduces and usually prevents the need for Bt cotton and disruptive insecticides. The report recommend that high-density short-season cottons could increase yields and reduce input costs in irrigated and rain-fed cotton.

Agricultural expert M.S. Swaminathan said, "the merits of Bt cotton adoption remain debatable as some have approved it for giving better yield, while some question the claim. However, I support the adoption of higher yielding crop varieties as most of our cotton farmers are small farmers who need better yields to earn profits. Back in 2004, I had advised seed companies selling hybrid cotton to farmers to also sell insurance schemes alongside, so that if crops fail for reasons beyond the farmer's control, they can recover losses. But these recommendations remain to be adopted widely."

Amidst all the discussions and different point of views the one common conclusion that can be drawn is that the Bt cotton may be economic in irrigated cotton, whereas costs of Bt seed and insecticide increase the risk of farmer bankruptcy in low-yield rainfed cotton. Inability to use saved seed and inadequate agronomic information trap cotton farmers on biotechnology and insecticide treadmills. Annual suicide rates in rainfed areas are inversely related to farm size and yield, and directly related to increases in Bt cotton adoption (i.e., costs). High-density short-season cottons could increase yields and reduce input costs in irrigated and rainfed cotton. Policy makers need holistic analysis before new technologies are implemented in agricultural development.



Source: muxinternational.com

Science Updates

Dr. Lata Shahani

Department of Zoology

□ Earthworms commonly known as 'Gardener's best friend' enrich the soil and return the carbon locked inside dead plant material back into the ground. Scientists at Imperial College, London have discovered that earthworms produce molecules called drilodefensins in their gut which counteract the plant's natural defense. Plants produce toxins such as polyphenols which act as an antioxidant for them but prevent herbivores from consuming them. These polyphenols are effective even after the leaves fall on the ground. Earthworms digest the fallen plant material in their gut with the help of drilodefensins and their castings return concentrated nutrients and carbon to the soil.

□ Most frogs secrete poisonous compounds from glands in their skin to protect themselves from the catch of predators. Two species of Brazilian frogs *Corythomantis greening* (Greening's frog) and *Aparasphenodon brunoi* (Bruno's casque-headed frog) has been discovered



Aparasphenodon brunoi (Bruno's Casque-headed Frog)

by the scientists. Both the species have killer spines on their head that deliver the venom which is more potent than the dangerous snakes (pit Vipers) in the world. Spines grow out of frog skull and ends in glands that secrete toxic mucus. These secretions contain a hyaluronidase, a protein usually found in venomous snakes. One gm of toxin can kill more than 300,000 mice or about 80 humans.

Source: <http://news.discovery.com>

Vitamin C: The Exercise Replacement

Priyanshi Goswami

M.Sc., Department of Biotechnology

Overweight and obese adults are advised to exercise to improve their health, but more than 50 percent do not do so. New research to be presented at the 14th International Conference on "Endothelin: Physiology, Pathophysiology and Therapeutics" suggests that taking vitamin C supplements daily can have similar cardiovascular benefits as regular exercise in these adults.

The blood vessels of overweight and obese adults have elevated activity of the small vessel-constricting protein endothelin (ET)-1. Because of the high ET-1 activity, these vessels are more prone to constricting, becoming less responsive to blood flow demand and increasing risk of developing vascular disease. Exercise has been shown to reduce ET-1 activity, but incorporating an exercise regimen into a daily routine can be challenging. This study, conducted at the University of Colorado, Boulder, examined whether vitamin C supplements, which have been reported to improve vessel function, can also lower ET-1 activity. The researchers found that daily supplementation of vitamin C (500 mg/day, time-released) reduced ET-1-related vessel constriction as much as walking for exercise did. Vitamin C supplementation represents an effective lifestyle strategy for reducing ET-1-mediated vessel constriction in overweight and obese adults, the researchers wrote.



Source: www.guidesglobal.com

Source: www.sciencedaily.com

Facts on the Nobel Prize in Science (1901-2014)

Dr. Manisha Patni
Department of Chemistry

	Physics	Chemistry	Physiology or Medicine
Number of Nobel Prizes	108	106	105
Number of Nobel Laureates	199 (John Bardeen has been awarded twice, 198 individuals)	169 (Frederick Sanger has been awarded twice, 168 individuals)	207
Unshared prizes	47	63	38
Shared prizes	31 (by two) and 30 (by three)	23 (by two) and 20 (by three)	32 (by two) and 35 (by three)
Average age of Nobel Laureates	55yrs	58 yrs	58 yrs
Youngest Laureate	Lawrence Bragg, 25 yrs.	Frédéric Joliot, 35 yrs.	Frederick G. Banting, 32 yrs.
Oldest Laureate	Raymond Davis Jr., 88 yrs.	John B. Fenn, 85 yrs.	Peyton Rous, 87 yrs.
Female Nobel Laureates	2	4	11
	<ul style="list-style-type: none"> • 1903 - Marie Curie • 1963 - Maria Goeppert-Mayer 	<ul style="list-style-type: none"> • 1911 - Marie Curie • 1935 - Irène Joliot-Curie • 1964 - Dorothy Crowfoot Hodgkin • 2009 - Ada Yonath 	<ul style="list-style-type: none"> • 1947 - Gerty Cori • 1977 - Rosalyn Yalow • 1983 - Barbara McClintock • 1986 - Rita Levi-Montalcini • 1988 - Gertrude B. Elion • 1995 - Christiane Nüsslein-Volhard • 2004 - Linda B. Buck • 2008 - Françoise Barré-Sinoussi • 2009 - Elizabeth H. Blackburn and Carol W. Greider • 2014 - May-Britt Moser
Family Nobel Laureates	Married couples-	Married couples-	Married couples-
	<p>Marie Curie (Chemistry) and Pierre Curie (Physics) -1903.</p> <p>Father & son- William Bragg and Lawrence Bragg- 1915</p> <p>Niels Bohr, 1922 and Aage N. Bohr, 1975</p> <p>Manne Siegbahn, 1924 and Kai M. Siegbahn, 1981</p> <p>J. J. Thomson, 1906 and George Paget Thomson, 1937</p>	<p>Marie Curie (Chemistry) and Pierre Curie (Physics) -1903.</p> <p>Irène Joliot-Curie and Frédéric Joliot- 1935</p>	<p>Gerty Cori and Carl Cori- 1947</p> <p>May-Britt Moser and Edvard I. Moser- 2014</p> <p>Father & son: Hans von Euler-Chelpin (Chemistry), 1929 and Ulf von Euler (Physiology), 1970</p> <p>Arthur Kornberg (Physiology), 1959 and Roger D. Kornberg (Chemistry), 2006</p> <p>Brothers: Jan Tinbergen (Economics), 1969 and Nikolaas</p>

Teach people, not content

Dr. Reeteka Sud

Department of Environment & Life Sciences

From preparing for a lecture to teaching in the class to grading papers, the lion's share of what goes on in the classroom falls with the teacher. A lot of the times, we don't find out how much of all that was taught, and in what form, was internalised by students. Pretty much all evaluation is summative – teachers and students find out after the exams how they performed, what and how much they learned, and inadequacies in both teaching and learning. At that point, there's no going back and fixing the problems!

Scott Freeman and colleagues evaluated findings from 225 research studies that compared active learning vs traditional lecturing in science, engineering and mathematics. They documented that active learning leads to increase in examination performance – raising student grades by half a letter on average. What's even more incredible, failure rates under traditional lecturing increased by 55% over the rates observed under active learning. Could it be that our sincere efforts as teachers are hurting students more than helping them?

This issue of Spectrum is dedicated to Dr. APJ Abdul Kalam, an eminent scientist and people's President, whose commitment to education is known to all. Among his many quotes on the subject available on the web, one goes as such "Thinking is progress." Non-thinking is stagnation of the individual, organisation and the country. Thinking leads to action. Knowledge without action is useless and irrelevant. Knowledge with action, converts adversity into prosperity.

It is in this vein that Collaborative Undergraduate Biology Education (CUBE) initiative was set up three years ago, out of Homi Bhabha Centre for Science Education, TIFR, Mumbai. The brains behind it, Dr. M.C. Arunan and Dr. G.N. Nagarjuna, have since brought together 27 colleges in 10 cities across India.

The goal is to enable students to put textbook knowledge in context, to bridge the gap between science taught in the teaching labs and what is actually done in the research labs: Biology we teach must authentically reflect the Biology we do. CUBE aims for practical labs for undergraduates to be "open-ended, interactive, inquiry-driven, collaborative and contextbound". In an effort to link concepts students are taught in classrooms, with their application in real-world, CUBE is teaming up with researchers at scientific conferences, starting with Indian Academy of Neuroscience's annual meeting in November 2015, at Punjab University, Chandigarh.

CUBE's session aims to bring together motivated teachers who recognize the need to enhance quality of science/biology education in colleges across India and are willing to contribute their ideas, efforts and time towards this end. Our goal is to draft out a working plan to transform at least one traditional lab course into an inquiry based lab experience and a theory course-based research experience for students. We hope the participants come away with active learning strategies, and practical goals for their classrooms.

A Rewarding Career: Indian Forest Service

Dr. Priyanka Raghuvanshi

Department of Zoology

All India services has many services under it one of those is Indian Forest services (IFS). These services were created in 1966 under the All India Service Act, 1951. The formal training of IFS officers is held at Indira Gandhi National Forest Academy, Dehradun. At present there are about 2700 IFS officers serving 31 Forest Departments in State and Union Territories. Their major duty is to manage natural resources of the country, beside that they cater to different work of ministries and institutions both in State and Central Government.

Recruitments are made by competitive examination conducted by Union Public Service Commission (UPSC) for science graduates. The Government has changed the pattern of Indian Forest Service Examination from 2013. Government has introduced a component of screening mechanism through Civil Services (Preliminary) Examination. Candidates applying for Indian Forest Service Examination have to appear for Civil Services (Preliminary) Examination and after qualifying the same they would enter second stage of Indian Forest Service (Main)

After the main examination is fixed by the Commission, candidates shall be summoned by them for an interview for a Personality Test. The interview carries 300 marks (with no minimum qualifying marks).

Marks of Mains and Interview determine the final rank of the candidate.

List of Optionals:

Agriculture	Chemistry	Geology	Statistics
Agricultural Engineering	Chemical Engineering	Mathematics	Zoology
Animal Husbandary & Veterinary Science	Civil Engineering	Mechanical Engineering	
Botany	Forestry	Physics	

Notification of Examination	February/ March
Conduction of Examination	July
Age Limits	21-32 years on July 1 of the year of Examination for General Candidates
Educational Qualification	<ul style="list-style-type: none"> Bachelor's degree with at least one of the subjects namely, Animal Husbandry & Veterinary Science, Botany, Chemistry, Geology, Mathematics, Physics, Statistics and Zoology or a Bachelor's degree in Agriculture or Forestry or Engineering of a recognised university or equivalent. Candidates appearing for final year examination (with prescribed subjects) are also eligible to compete. Candidates will be required to submit proof of passing the requisite examination after the written exams filled up at that stage.
Number of attempts	Six for General Candidates

Source:
www.upsc.gov.in/exams/notifications/2015/IFS_2015/IFS_2015_eng.pdf
ifs.nic.in/
www.ignfa.gov.in/IndianForestService/tabid/56/language/en-US/Default.aspx

ANTIBIOTIC ADDICTION: A GLOBAL THREAT

Disha Pamecha

M.Sc., Department of Biotechnology

Whether it's cold or body ache, due to the lack of time to be sick, majority of patients demand for antibiotics. Despite of the known fact that antibiotics do not cure viral infections doctors still write the drugs unnecessarily for ailments they cannot treat. This has led to the evolution of drug resistant bacteria and has also raised the addiction to antibiotics. "For some reason, faith in the body's natural ability to heal itself has waned and everyone believes that an antibiotic is the only possible cure that could help."

-Dr. Anna Julien

Antibiotic resistance is an emerging threat to the globe and has been aggravated by smooth availability of the same with pronounced growth in β -lactam antibacterial. These are easily accessible in India through prescriptions written by non-allopathic doctors as well as outdated prescriptions.

The infamous MNDY i.e. MUKHYAMANTRI NISHULK DAVA YOJNA started across the state in order to distribute most commonly used drugs (antibiotics containing salts such as ciprofloxacin, cephalosporin, tetracycline and penicillin) free of cost to all patients visiting government hospitals has been more disastrous than beneficial. This scheme has not only made the drug availability easier but has also elevated the cases of self-medication. Unknowingly people medicate themselves with incorrect doses and then dispose the leftovers in soil and water thereby introducing the native pathogenic microbes to the drugs and enhancing the resistance in them. According to a survey conducted by International Nosocomial Infection Control Consortium in 7 hospitals of 7 cities of India which included 10,835 patients (2004-2007) found that out of 476 nosocomial infections observed 46% were caused by Enterobacteriaceae, 27% were caused by Pseudomonas spp., 8% were caused by Candida spp., 6% were caused by Acinetobacter, and 3% were caused by *Staphylococcus aureus*. Of this majority of causal organisms showed resistance to the antibiotics obviously prescribed in such cases such as Ciprofloxacin, Ampicillin, second and third generation cephalosporin and penicillin respectively. Currently, the availability of the drug, Bedaquiline, at selected

government-run health care centres in Delhi, Chennai, Mumbai and Guwahati has emerged as a breakthrough for patients suffering from XDR-TB (extensively drug resistant -tuberculosis). This invention will act as a saviour not only for 1000's of XDR-TB and pre-XDR-TB survivors but also prove beneficial for MDR-TB (multi drug resistant-tuberculosis) patients depending upon its procurement. Access to the new drug will be conditional and highly under control to monitor its dispensation and curtail the misuse of the same. Looking at this, it's certain to know that



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"Preservation of current antibiotics is less costlier than discovering new ones."

The above data focuses majorly on the present scenario of antibiotics use and its resistance in India. This requires the need for governmental and non-governmental interventions to curb the emergence and spread of the same. Hence, a few means have been devised to do so such as

- ❑ Vaccines for antibiotic treatable diseases
- ❑ Universal immunization program
- ❑ Infection control intervention
- ❑ Educational intervention
- ❑ Changes in prescribing practices

These approaches only along with our intelligence and awareness can save us from any further detrimental repercussions. As it's rightly said; "Prevention is better than cure."

Source: www.healthline.com

"Why We Eat Junk Food in Stress"

Dr. Ameeta Sharma

Department of Biotechnology

Occasionally it happens, once one gets a fuming email from boss or, maybe because one is sort of sod off and in grumpy mood as recently connected new pal has gone MIA. So, whatever the dilemma, one tends to cue hand in the pack of Lay's or a visit to the kitchen for whatever's available. "I feel like chomping a double cheese burst pizza, right now!" How numerous times have you told yourself this? Now it's no more a secret that whenever we are stressed, we tend to eat unhealthy or junk food. But have you ever speculated what makes us do that?

The dictionary meaning of the 'junk' is useless, extra or something that is not required. We all are well-aware with the fact that it's unhealthy for us to eat it, but junk food is made in such a beguiling way to kindle our taste buds and makes us want it more badly especially when we are stressed. It not only harms one's health but it also makes a craving for more junk later. Melissa McCreery, researcher, psychologist and the emotional eating expert says that stress activates one's adrenal gland to release cortisol increasing one's appetite. So the question arises that why do we eat more and that's too junk, when we are stressed. Research studies from the University of California, showed that how consuming sugar in solid and liquid form has the power to lower stress levels, as contrasting to the artificial sweeteners like aspartame, and

ultimately "strengthen its consistent overconsumption." One cannot fool the brain when it is about sugar and of course, now a day's sugar is present into 80 percent of processed food items sold in grocery stores. Thus consumers find it a grand stress reliever. In a study published in a reputed journal - Journal of Clinical Endocrinology and Metabolism, it was found that the level of cortisol, a stress hormone lowered in women after drinking table sugar, sucrose for two weeks. After consuming sugar, an MRI scan on women's brains showed that sugar could disrupt stress bustle in the hippocampus, an organ which regulates thirst, sleep, hunger, mood, temperature of body, hormones etc. in human body. Sugar is processed through human body rapidly as it's a simple carbohydrate, and leaves the person with a desire for wanting more. According to a research study done, this treacherous stress-sugar cycle goes on till it forms a dire, customary eating prototype.

There are some easy tricks to get free from anxiety stress eating/drinking habits and bring back one's regular healthy habits. It starts with the focus on the real issue and tries to figure out what's really getting under your skin. One should be aware to identify personal feelings, accept the unpleasant ones and focus on your breathing so you can fight the involuntary push to reach for a snack. Self-compassion, self-kindness and self-understanding are keys to resist the desire to stress eating.

Source: 1. <http://www.dianecarbonell.com>, www.pressreader.com, <http://dailyburn.com>

Yoga for body and soul

Non-Physical Benefits of Yoga

Kirti Shekhawat

Research Scholar, Department of Biotechnology

The physical benefits of yoga, which include greater strength, balance, flexibility, and developing a slimmer, toned physique, are well known. However, did you know that the benefits of yoga practice extend beyond the realm of the physical and into the psychological, emotional, and spiritual? Many people who start practicing yoga for the physical benefits end up sticking with the practice reasons other than the physical benefits. Here are some of the most powerful non-physical benefits of yoga:

1) Yoga improves mental wellness.

Practicing yoga requires intense concentration on the breath and body, which means that during yoga, unhealthy thought patterns are stopped or redirected. As a result, thoughts and worries are relieved and soothed. Furthermore, yoga postures and breathing release tension from the body, and a relaxed body makes a relaxed mind possible. So if you always feel stressed and tense, with the help of yoga, you can definitely work through and lessen those unhealthy feelings.

2) Yoga improves memory and concentration.

If you find yourself remembering things better and focusing more powerfully after starting a yoga practice, that's because yoga can improve both memory and concentration. Yoga improves concentration through the yogic practice of Dharana, which is the practice of focusing the mind on one point, and Drishti, which is keeping your gaze fixated on one point. The practices of Dharana and Drishti work to remove external distractions so you're better able to recollect things and concentrate.

3) Yoga teaches us to be patient.

Yoga teaches us that everything is constantly changing. We may have been able to touch our toes last week, but today it feels impossible. We may experience amazing changes in our body over a short period of time, only to feel like we're progressing at a slow rate again. In yoga and life, things rarely happen quickly. More often than not, we have to be patient. Yoga teaches us that nothing is static, and that there's no point in getting frustrated or aggravated because over time, things always change.

4) Yoga teaches you to face your fears and challenge yourself. We will never improve ourselves if we do the same thing day after day, afraid of making a change or trying something new. It is so easy to avoid learning new things based on self-imposed limits or the fear of failing. Yoga teaches us to try something different, challenge our bodies and minds, and step outside of our comfort zones. By being brave enough to try new postures in a yoga class, we meet our fears head-on, and prepare ourselves to accept challenges that may arise in our day-to-day lives.

Source: www.yoga.com

DNA DOUBLE HELIX : THE REAL LIFE VERSION

DNA Double Helix, the very basic thing every biologist, and even the non biologists have read about. The article published in Nature brought 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.



Parikshana Mathur

M.Sc., Department of Biotechnology

Medical Secrets in our Scriptures: Still Unseen

Nandini goswami

Research scholar, Department of Biotechnology

Rightly said, it takes an old solution to crack an even older problem. Three scientists reached back into nature and traditional remedies to develop therapies to fight parasites which cause malaria, filariasis and river blindness- all diseases as old as humankind. They have been awarded with Nobel prize this year for their work.

India possess rich diversity of herbs, metals, minerals that are used in natural remedies documented in ancient scriptures. It's just that less scientific techniques have been applied to test their efficacy and develop medicines. There is enormous potential in India to develop herb based medicines but it is a long process and needs institutionalized programmes, as stated by Delhi based cardiologists Deepak natrajan.

There is a gap in the dissemination of India's catalogue of herbs. The data is primitive with no research development on it. The current government's moves to promote traditional system of medicine- Ayurveda, Unani, Siddha and Homeopathy (Ayush) have brought a ray of hope. More efforts are being focused on documenting data through clinical trials and cohort studies.

Herbal medicines or those based on natural products can help bring down the cost of treatment. For instance, Neem and its bark have tremendous medicinal value and can be used to treat many tropical diseases but unfortunately we are neither using these herbs nor promoting them.



Source: www.iran-daily.com

Experts says, many of these therapies are not just cheaper but also don't have the side effects. In fact many pharmaceutical companies have started manufacturing herb based medicines.

Source: timesofindia

Here is the new super food: *Moringa*

Richa Pundir

Research Scholar, Department of Biotechnology

First it was spinach, then it was kale. And now it's moringa - a tree native to South Asia that goes by the name of the 'miracle tree.' So why is moringa being hailed the new superfood...

1. Nutrition

Redefining nutritional, this tree comprises over 90 nutrients including calcium, **Vitamin C and Vitamin A**. 100 grams of dried moringa leaves contains:

- 9 times the protein of yogurt
- 10 times the vitamin A of carrots
- 15 times the potassium of banana
- 17 times the calcium of milk
- 12 times the vitamin C of oranges
- 25 times the iron of spinach

2. Humanitarian help

For diets in developing countries that lack nutrition, moringa has it all. Humanitarian organisations are actively encouraging the use of moringa to first alleviate, and then combat world hunger. Remarkably, even during droughts in West Africa, moringa still grows, and it also purifies water.

3. Cholesterol

It's a word we have all come to dread. Cholesterol: nasty fatty deposits floating around in our blood. Well, Moringa has been scientifically proven to lower cholesterol by blocking its absorption.

4. Anytime! Anywhere!

There's little to no wastage too, as the pods, leaves and seeds can all be eaten or used. What's more, it's as versatile as you like. Sold



photo by Richa Pundir



as dietary supplements in powder and capsule form and on their own, try adding the latter to your signature dish to notch up some health foodie points.

5. So Far, So Good

There have been no recorded adverse reactions to moringa and it has no known impurities.

Expect to start seeing this ingredient on every smoothie board around, it's the stuff of superfood dreams.

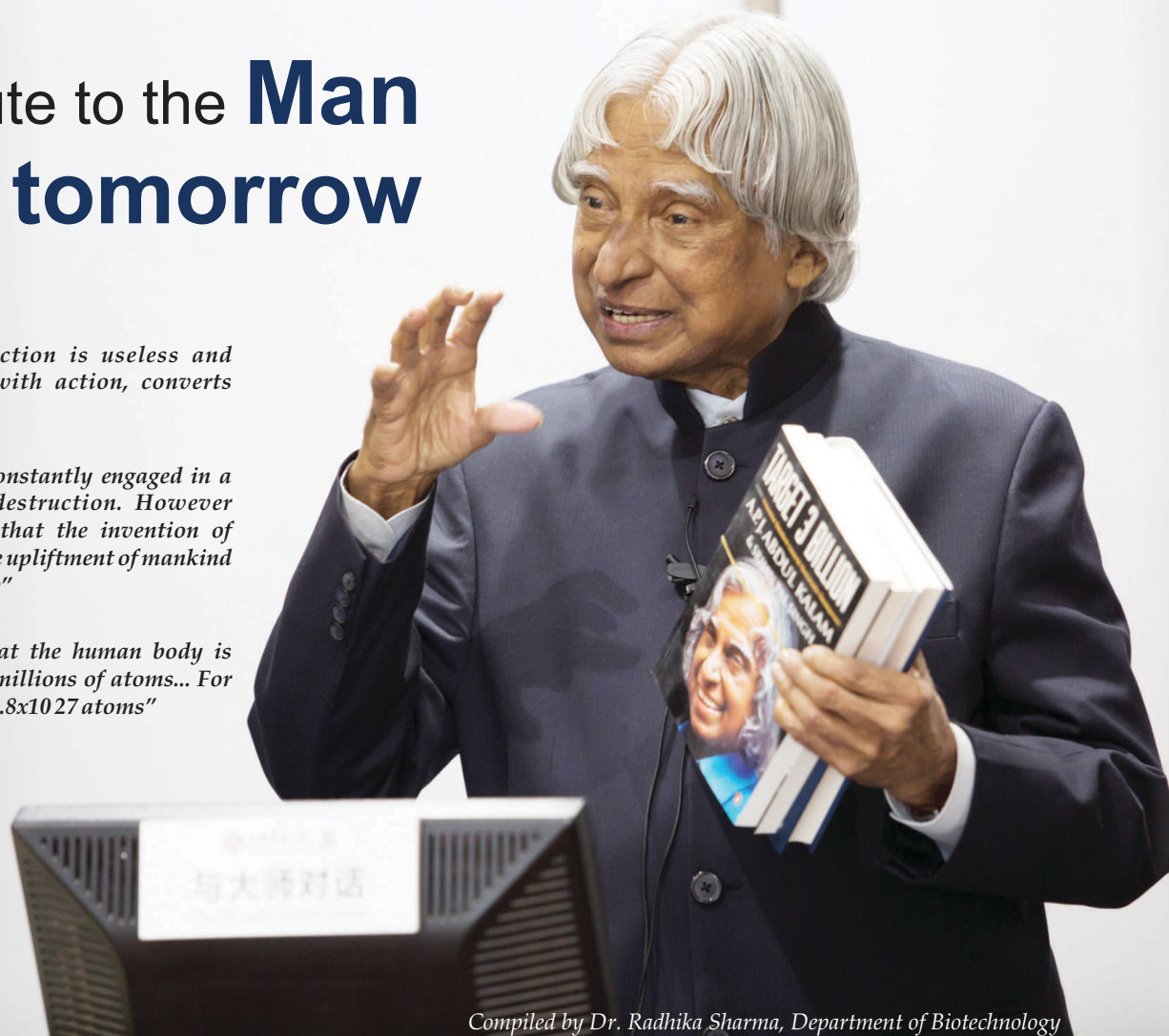
Source: www.grazia.co.uk

A Tribute to the **Man** who saw **tomorrow**

"Knowledge without action is useless and irrelevant. Knowledge with action, converts adversity into prosperity"

"The whole universe is constantly engaged in a cycle of creation and destruction. However mankind has to ensure that the invention of technologies is used for the upliftment of mankind without destroying nature"

"Science has revealed that the human body is made up of millions and millions of atoms... For example, I am made up of 5.8×10^{27} atoms"



Compiled by Dr. Radhika Sharma, Department of Biotechnology

"When you look at the light bulb above you, you remember Thomas Alva Edison. When the telephone bell rings, you remember Alexander Graham Bell. Marie Curie was the first woman to win the Nobel Prize. When you see the blue sky, you think of Sir C.V. Raman"

"Science is global. Einstein's equation, $E=mc^2$, has to reach everywhere. Science is a beautiful gift to humanity, we should not distort it"

"We must get rid of fossil fuels by developing injection systems for automobiles, which can run on bio-fuel"

"All the scientists and technologists should work in appropriate region, specifically the rural technologies, to transform Indian rural sector"



- Dr. A.P.J. Abdul Kalam

Fellowships

Students Availing Fellowship From The IIS University, Jaipur and External Agencies



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UGC (RGNF for SC)



Ruchi Middha
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Patron: Dr. Ashok Gupta, Vice-Chancellor, The IIS University, SFS, Gurukul Marg, Mansarovar, Jaipur-302020 Ph: 0141-2397906, 2400160
Fax: 0141-2395494 Email: icg@iisuniv.ac.in Web: www.iisuniv.ac.in
Editorial Advisor: Prof. Pradeep Bhatnagar, Dean, Faculty of Science,
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Faculty Coordinators: Dr. Manisha Patni, Dr. Sreemoyee Chatterjee,
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