JANUARY 2017 ISSUE 7

SCIENCE SPECTRUM

A PUBLICATION OF IISU CHEMICAL ASSOCIATION

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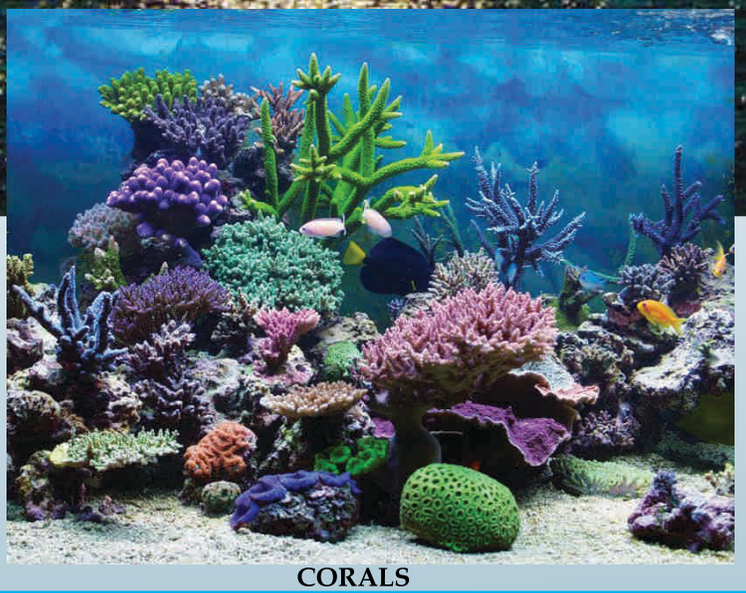


CORALS

MOON

Prof. Pradeep Bhatnagar
Dean, Faculty of Life Sciences

The moon is earth's only permanent natural satellite. It is the fifth largest natural satellite in the solar system, and the largest among planetary satellites relative to the size of the planet that it orbits. Its distance to earth is 384,400 km.

Super Moon

A super moon is a full moon that appears a few percent larger and brighter than most other full moons. Occurring in 14th November 2016, a full moon that is the biggest and brightest not only of the year, but of any years since 1948.

The full moon just triggered one of the largest mass spawning event of 2016. It's one of the most spectacular natural phenomena on earth and it only happens once a year the annual mass spawning event at the **Great Barrier Reef.** Also known as the great barrier reefs annual sex festivals. The event sees corals form all over the releasing their sperms and eggs into the water at the same time and they appear to coordinate the whole event based on full moon.

How the moon got to where it is: A new theory

The composition of moon is the same as that of the planet. So far it was believed that the reason for this was that both the earth and the moon were formed together during the "great impact", But this theory did not explain many things about the moon, such as the fact that if the moon condensed from a disk of materials rotating around earths equator, it should be in orbit over the equator. Instead, the equator the satellite's orbit is tilted five degree off the equator.

A new model explains that a high energy collision left a mass of vaporised and molten material, from which the earth and the moon formed. Both the earth and the moon condensed from the same material, and therefore, have a similar composition. The theory suggests that the angular momentum was dissipated in the course of time, the moon continued to move away from the earth, and then reached a second transition point, where the inclination of the moon dropped to about five degrees putting it more or less in its current orbit.

Source : http:Nature, October 31, 2016, NASA (2016), bbc.com

Evolution of Time Keeping Techniques

Prof. K. S. Sharma
Department of Physics

Time keeping is a necessary requirement of human being. In ancient times, people used to go to sleep soon after the sunset and getup just before the sunrise, generally by listening to the alarm given by peacock or soon after it. Techniques were devised to estimate time during daytime by using relative position of the Sun in the sky with respect to the horizon, which changes continuously due to rotation of the Earth around its own axis, taking time between sunrise on two consecutive days as 24 hours and take rough estimate of time in daytime by using position of the Sun in the sky or the shadows of objects. The positions of the planets or the stars (in particular the pole star or the moon) in the sky were used to estimate time during the night. 'Jantar- Mantar' at Jaipur is one such effort made by Sawai Jai Singh to measure time by using shadow, completed in 1734 is now a UNESCO World Heritage site.

PENDULUM CLOCKS: First systematic time measurement was made possible by Christiaan Huygens in 1656 by designing a pendulum clock, based on the investigation made by Galileo Galilei in 1583 that a pendulum with a weight suspended by a string oscillates with a definite time period, and observing that a pendulum of about 25 cm length has a time period of about 1 sec. In pendulum clock, to and fro motion of the pendulum is converted in to circular motion of its hands by using a mechanical system along with coupled wheels and gears. However, the time measured by a pendulum clock suffers from uncertainties due to variation of gravity from place to place and with height at altitudes. Also to keep the pendulum clock oscillating, potential energy is required to be given by winding up a spring coupled to it, every day, so as to compensate for damping due to air resistance, friction etc.

BALANCE WHEEL WATCHES: In a wrist watch oscillatory motion of a wheel balanced by springs is converted into circular motion of its hands. In this case also a small spring coupled with the wheel is required to wind up every day to make up for the loss of energy due to friction. Unlike the pendulum clock, the motion of balance wheel in a wrist watch does not suffer from gravity variation but their accuracy was no better than that of a pendulum clock.

QUARTZ CLOCKS: The next generation of time keeping was by means of quartz clocks, which make use of the piezoelectric property of quartz crystals. They are battery powered and, because they use so little electricity, the battery can often last several years before we need to replace it. When such a crystal is compressed in one direction, an electric voltage is generated across its faces in the other direction. On the other hand if a current is passed across the crystal, it starts vibrating with a definite frequency, which depends on dimensions of the crystal. A precisely cut and shaped like a tuning fork crystal makes 32768 oscillations per sec. The electronic circuit associated with the vibrating crystal counts the number of vibrations and uses them to generate regular electric pulses, one per second. These pulses can either power an liquid crystal display (showing the time numerically) or they can drive a small electric motor, turning gear wheels that spin the clock's hands. Though vibrations of quartz crystal suffer from pressure and temperature variations, quartz clocks are more accurate than pendulum clocks.

ATOMIC CLOCKS: Global positioning systems, space navigation, satellite launching etc. need more accurate time measurement. This has become possible with the advent of Atomic clocks, which are designed to measure the precise length of a second in terms of a Caesium-133 atom oscillations, corresponding to the transition between the two hyperfine levels of its ground state, originating due to nuclear spin – 6s electron spin interaction:

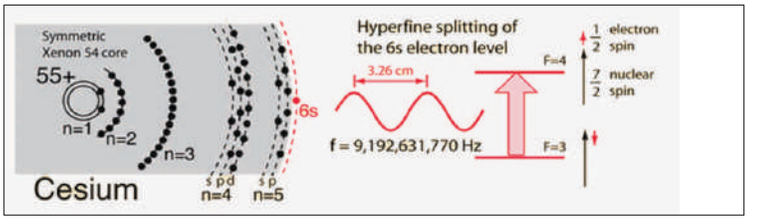


Fig 1: Hyperfine splitting in Caesium

1 sec = 9 billion, 192 million, 631 thousand, 770 oscillations of Cs-133 atom

The energy corresponding to transition between hyperfine levels = 0.000038 eV, which is about 1/100000 of the 1st ionization energy (= 3.9 eV) and 1/1000 of the thermal kinetic energy of Caesium atom at 100 K (= 0.04 eV). This energy corresponds to the energy of a photon of microwave radiation. Cs133 is a stable

Fig 2: Caesium clocks in Braunschweig, Germany

isotope of Caesium and as such Caesium clocks have demonstrated stability to 2 parts in 1014, or one second in 1,400,000 years, according to the Naval Observatory U.S.A. sources.

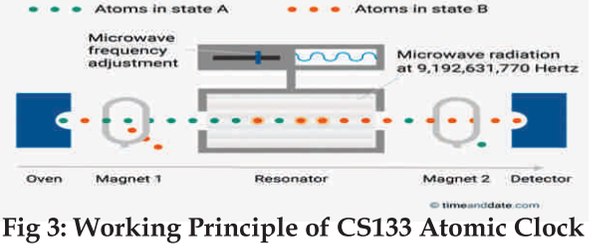


Fig 3: Working Principle of CS133 Atomic Clock

Working Principle: First, the atoms are heated in an oven and bundled into a beam. Each atom has one of two possible energy states. They are referred to as hyperfine levels, but let's call them state A and state B. A magnetic field (Magnet 1 in Fig. 3) then removes all atoms in state B from the beam, so only atoms in state A remain. The state-A atoms are sent through a resonator where they are subjected to microwave radiation, which triggers some of the atoms to change to state B. Behind the resonator, atoms that are still in state A are removed by a second magnetic field (Magnet 2 in Fig. 3). A detector then counts all atoms that have changed to state B. The percentage of atoms that change their state while passing through the resonator depends on the frequency of the microwave radiation. The more it is in synchronization with the inherent oscillation frequency of the atoms, the more atoms change their state.

The goal is to perfectly tune the microwave frequency to the oscillation of the atoms, and then measure it. After tuning is achieved, 9,192,631,770 oscillations mean a second has passed.

Accuracy: The accuracy of atomic clocks varies and is constantly improving. With an expected error of only 1 second in about 100 million years, the NIST-F1 in Boulder, Colorado, is one of the world's most precise clocks.

It is called a caesium fountain clock where lasers concentrate the atoms into a cloud, cool them down, and then toss them upwards. This method slows the atoms down, allowing for a longer measurement period and a more precise approximation of the natural frequency of the atoms.

OPTICAL CLOCKS: Scientists are currently developing a device that will be even more accurate than the current atomic clocks. The optical atomic clock uses light in the visible spectrum to measure atomic oscillations. The resonance frequency of the light rays is about 50,000 times higher than that of microwave radiation, allowing for a more precise measurement. The expected deviation of the new optical clock is 1 second in 15 billion years.

COORDINATED UNIVERSAL TIME (UTC): UTC is the common time standard across the world. It is based on: 1) International Atomic Time (TAI) - A time scale that combines the output of some 400 highly precise atomic clocks in 69 national laboratories worldwide, and provides the exact speed for our clocks to tick. In India two precise atomic clocks are maintained by NPL and ISSRO; and 2) Universal Time (UT1) - also known as astronomical time or solar time, it refers to the Earth's rotation. It is used to compare the pace provided by TAI with the actual length of a day on the Earth.

LEAP SECOND: TAI does not take into account the slowing of Earth's rotation, which determines the length of a day. For this reason, TAI is constantly compared with UT1. Before the difference between the two scales reaches 0.9 seconds, a leap second is added to UTC, so as to synchronize Atomic Clock ticks with the Earth's rotation.

LOCAL TIME: The local time within a time zone is defined by its offset (difference) from Coordinated Universal Time (UTC), which depends on latitude of the zone. This offset is expressed as either UTC– or UTC+ and the number of hours and/or minutes. With 82.58°E latitude, Indian Standard Time (IST) = UTC + 5.30 hrs.

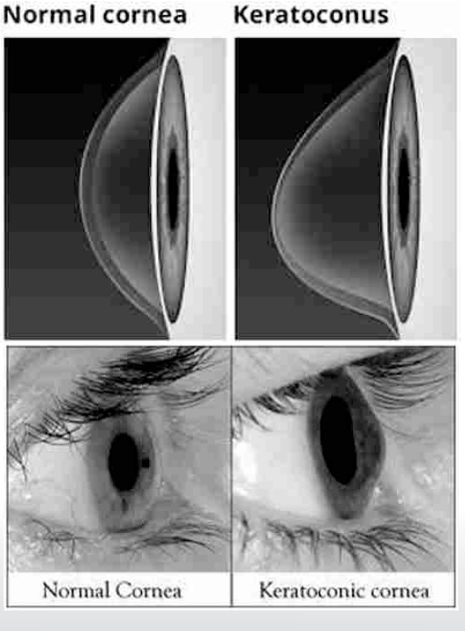
References:
1.hyperphysics.phy-astr.gsu.edu/hbase/acloc.html
2. https://www.timeanddate.com/time/how-do/atomic-clocks-work.html
3. https://www.timeanddate.com/time/internation-atomic-time.html
4. https://www.timeanddate.com/time/abouttube.html
5. https://www.explainthatstuff.com/quartzclockwatch.html

KEEP EYE PEELED ON KERATOCONUS

Meenal Verma
B.Sc. Sem VI

Generally we all do not pay attention towards some disorders and diseases until and unless it affects us or our family or relatives. Keratoconus is one of them. It is the eye disorder which causes progressive thinning of the cornea. This results into the bulging out of the eye cornea from the center in the form of a cone. Keras in Greek means cornea and conus in Latin means cone. Previously, when this disorder was not such common among people, it was believed that it may be occurring due to any modification either in genetic, environmental or hormonal factors. New researches divulge that enzyme imbalance within the cornea cause weakening of the corneal tissue which leads to the oxidative damage of the cornea by free radicals. Keratoconus can also caused by the overexposure to U V rays of the sun. It is known to affect about 1 person in every 2000 peoples. Asian decent is frequently prone to Keratoconus. It mostly occurs in early adulthood or late childhood (Wikipedia Keratoconus). Its symptoms include gradual loss of sight, astigmatism, blurred eyesight, peculate watering of eyes etc. In most severe cases scarring may be seen within the cornea. Various treatments for Keratoconus are now available such as Custom soft contact lenses, Intacs, Corneal transplant etc but the most acceptable is Corneal cross linking treatmen (William Trattler MD). In Keratoconus, usually both eyes are affected hence, it is better if it is diagnose and cure in early stages.

Source: www.corneatransplant.net, www.webmd.com
Clear vision eye center-Keratoplasty, Cornea



TWO GENES RESPONSIBLE FOR SLEEP AND DREAM IDENTIFIED

Dr. Payal Mehtani
Department of Biotechnology

According to National Sleep Foundation (NSF), USA, sleep is essential for a persons' health and wellbeing as it helps our brain and body to function properly by stimulating healing and growth. Sleep allows our brain to form new pathways to help us learn and remember information by healing injuries and maintaining hormonal balance. But stress, working longer hours and addiction to technology like excessive use of smartphones can cause sleep problems. The common symptoms being fatigue, lack of concentration, general weakness and depression.

On an average, a person spends one-third of his life, sleeping but the complete process and neurophysiology that regulates sleep was unknown until researchers identified the first two core genes that control the amount of deep sleep and dreaming namely, Sik3and Nalcn.

Normal sleep patterns include short durations of Rapid Eye Movement (REM) sleep surrounded by longer stretches of non-REM sleep and account for about a quarter of a night's rest in most young adults. The REM stage of sleep involves creation of emotional memories and managing negative experiences. Thus, a lack of REM sleep may contribute to conditions such as posttraumatic stress disorder (PTSD).

Researchers used a forward-genetic approach in which they screened sleep disorders in 8,000 mice using electroencephalogy (EEG) to monitor brain waves. They used two distinct mice mutants:

- A mutant mouse called *Sleepy* with a mutation in the Salt-*Inducible Kinase 3 Sik3 (Sik3)* gene exhibited 50% more non-REM sleep than normal mice.
- The other mouse called *Dreamless* that had a mutation in the *Sodium Leak Channel Non-selective (Nalcn)* gene was severely deficient in the amount of REM sleep, a stage of rest characterized by rapid eye movements and vivid dreams.

Researchers introduced these same mutations into the two genes of normal mice and saw their sleep behaviors changed accordingly. It is now believed that this key development will lead to the discovery of a network of related genes controlling sleep and cure sleep related disorders.

Source:http: Funato, H. et al. (2016) Forward-Genetics Analysis of Sleep in Randomly Mutagenized Mice, Nature; 539:378–383. doi:10.1038/nature20142

ESSENTIAL OILS- A NATURAL ALTERNATIVE TO ANTIBIOTIC

Barkha Gupta
B.Sc Sem VI

Antibiotic resistance is rapidly reaching the scale of a global health crisis. This antibiotic resistant crisis may lead to the end of modern medicine.

The greatest misuse of antibiotics is that doctors prescribe them for viral problems such as cold, flu or even for minor infections that might get cleared up of its own. Every time a person takes antibiotic, sensitive bacteria are killed, but resistant germs may be left to grow and multiply. Repeated and improper uses of antibiotics are primary causes of the increase in drug-resistant bacteria.

Nature can provide everything we need to live and stay healthy. Almost every traditional drug was originally manufactured with a natural ingredient that was then modified chemically to create the drug.

Essential oils often evoke thoughts of scented candles and day spas, but their benefits beyond relaxation are less well-known. Essential oils are ultimately just plant extracts—and those are used in countless cleaning and personal-care products, and are the main ingredient in some pest-control products and some over-the-counter medications, like 'Vicks VapoRub and some lice sprays.

They're used in the food industry because of their preservative potency against food-borne pathogens—thanks to their antimicrobial, antibacterial, and antifungal properties. Various oils have also been shown to effectively treat a wide range of common health issues such as nausea and migraines, and a rapidly growing body of research is finding that they are powerful enough to kill human cancer cells of the breast, colon, mouth, skin, and more.

They can be the great natural alternative to the antibiotics and stop those stubborn bugs which are antibiotic resistant. Essential oils have numerous benefits over antibiotics. They do not contribute to the evolution of drug resistance, preserving antibiotics for their life saving uses. They do not destroy our body's good microbes the way antibiotics do. Antibiotic use is increasingly being linked with a variety of systemic health problems, probably due to disruption of the many subtle processes that our microbiomes perform for our bodies. Even taking probiotics after antibiotics is not enough to undo this damage.

Studies have shown the antimicrobial essential oils to be as effective as antibiotics and in some cases more so.

Some of the top antimicrobial essential oils are- tea tree oil, lavender oil, eucalyptus oil, lemon grass oil, bergamot, peppermint oil.

Source: http://www.naturalnews.com/053033_essential_oils_bacterial_infections_superbugs.html

Antibody based cancer treatment: A game changer

Dr. Sreemoyee Chatterjee
Department of Biotechnology

Metastasis is the most deadly phenomenon related to cancer and makes successful treatment much more difficult. Scientists around the globe are therefore trying to understand how the process occurs and develop new ways to stop it.

Recently a protein is linked to the deadly disease and the breakthrough research has been published in Nature. Professor Benitah's team found the presence of CD36 protein in different tumors including oral tumors, melanoma skin cancer, ovarian, bladder, lung and breast cancer. To reconfirm the essential role of CD36 in cancer spread, they added CD36 to non-metastatic cancer cells which then caused the cells to become metastatic.

What is CD 36? It is an integral membrane protein found on the surface of many cell types in vertebrates. CD36 imports fatty acids inside cells and is a member of the class B scavenger receptor family of cell surface proteins. So it is also known as FAT (fatty acid translocase). To validate the potential of CD36 as an anti-metastasis treatment, researchers looked at the role of fat intake on cancer spread. They provided mice with a high fat diet then injected them with a type of human oral cancer. The high fat diet caused 50% more mice to have larger and more frequent metastases. For this they selected palmitic acid -- a major component of animal and vegetable fats, present at high levels in palm oil which is used in many house hold products from peanut butter and processed food to toothpaste. When they treated human oral tumors with palmitic acid for two days and then injected the cells into mice fed with a standard diet, all the mice with CD36 developed cancer spread compared to the group not treated with palmitic acid. In the later only half of the mice had metastasis.

So there appears to be a direct link between fat intake and an increase in metastatic potential through a specific marker i.e CD36.Urbanization and globalization has caused a tremendous increase in the consumption of junk foods which are nothing but saturated fats and sugars. According to Professor Benitah "Fat is necessary for the function of the body, but uncontrolled intake can have an effect on health, as already shown for some tumors such as colon cancer, and in metastasis."

Using mice with human oral cancer, the researchers were able to show that blocking CD36 completely prevented metastasis. In mice with cancer cells that had already metastasised, CD36 blocking antibodies led to the complete removal of metastases in 20% of the mice, whilst in the others it caused a dramatic reduction of 80-90% of metastases and reduced the size. Importantly, this was all achieved with no serious side effects.

The researchers are now developing new antibody-based therapeutics against CD36 that could potentially be suitable to treat a range of cancers in patients in the future.

Journal Reference: Gloria Pascual, Alexandra Avgustinova, Stefania Mejetta, Mercè Martín, Andrés Castellanos, Camille Stephan-Otto Attolini, Antoni Berenguer, Neus Prats, Agustí Toll, Juan Antonio Hueto, Coro Bescós, Luciano Di Croce, Salvador Aznar Benitah. Targeting metastasis-initiating cells through the fatty acid receptor CD36. Nature, 2016; DOI: 10.1038/nature20791

Ants 'Talk' By Swapping Spit

Sushmita Aswal
Research Scholar, Department of Biotechnology

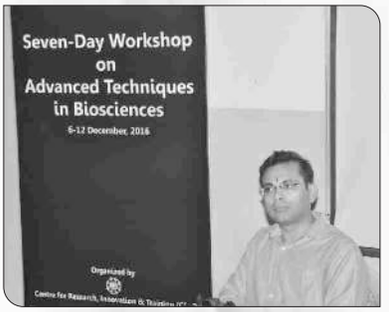
Oral fluid exchanged between ants contains molecules that the insects might use to communicate.

Ants were generally thought to share only nutrients and enzymes through a mouth-to-mouth feeding process called trophallaxis. But when Adria LeBoeuf at the University of Lausanne in Switzerland and her co-workers analysed the oral liquid of the species Camponotus floridanus, they found 64 microRNAs, 49 long-chained hydrocarbons, a hormone that regulates growth and more than 50 proteins involved in development, digestion and immunity.

The hydrocarbons could contribute to a characteristic colony odour, and the hormone may influence larval growth and development. When the team added the hormone to the food of worker ants, more than twice as many of the larvae they reared reached adulthood, compared with those that were not exposed. The findings suggest that trophallaxis facilitates communication and helps the colony to develop, the authors say.

eLife5,e20375(2016)

Seven-Day Workshop on "Advanced Techniques in Biosciences" on 6-12 Dec. 2016



Dr. Biswarup Basu, Amity, Noida

Dr. Vivekanand, MNIT, Jaipur

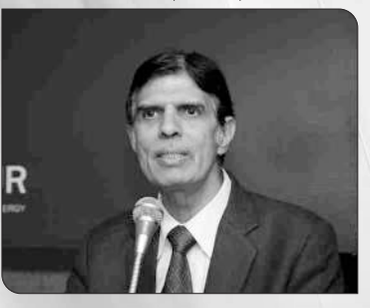
Prof Shobha Bhargava, Pune University, Pune

National Conference on "Prevention and Management of Non-Communicable Diseases" on 8-9 Jan. 2016

Inaugural Session

Dr. V.M. Katoch
Former Director, ICMR, New Delhi

Dr. S. K. Sharma
Diabetologist
SMS Hospital, Jaipur



Dr. Virendra Singh
Director
Asthma Bhawan, Jaipur

Prof Meenakshi Mehan
Public Health Nutrition Coordinator
MS University, Baroda

Three Days National Workshop on "LATEX" on 13-15 Oct. 2016

Participants

Dr. Praveen Garg
Assistant Professor
University of Rajasthan

Dr. Harsh Vardhan Harsh
Associate Professor
AMITY School of Engineering, Jaipur

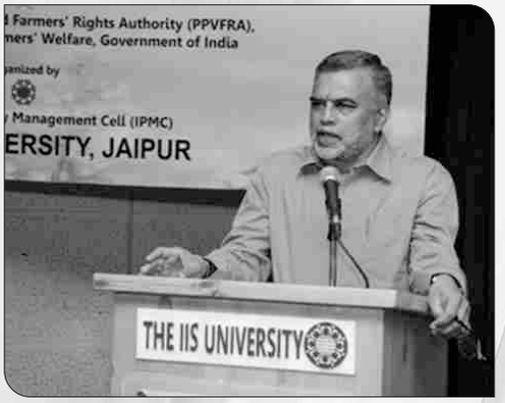
Dr. Ritu Agarwal
Associate Professor, MNIT, Jaipur

National Conference on "Women, Health and Identity-re-visioning a Multidisciplinary Perspective" on 12-13 Feb. 2016

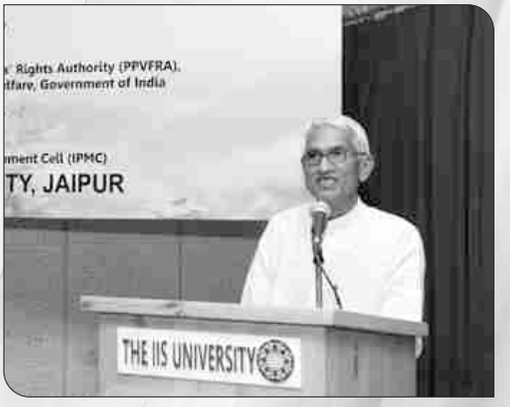
Prof. Aruna Broota
Delhi University, Delhi

Inaugural Session

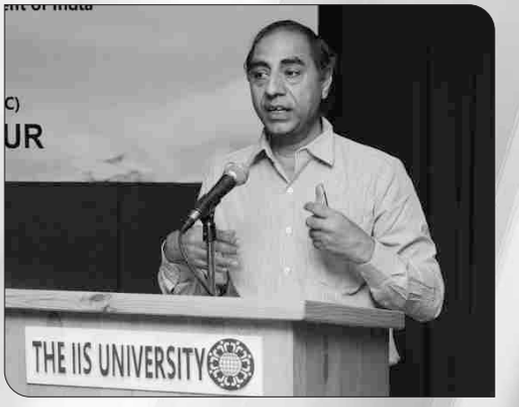
National Seminar on "Protection of Plant Varieties and Farmer's Right" on 10 March 2016



Dr. G. V. Reddy
Chief Wildlife Warden, Govt. of Rajasthan



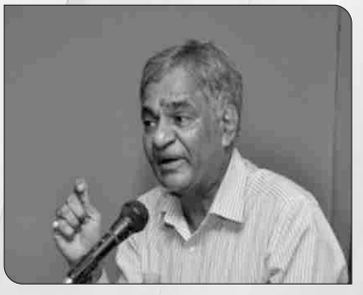
Mr. SundaramVerma
Farmer and Plant Breeder, Village Danta, Sikar



Prof. E.V. Divakara Sastry
Rajasthan Agricultural Research Institute (RARI)
Durgapura, Jaipur

GUEST SPEAKERS

Prof. Manuel J. Rodriguez
Centre for Research on Planning and Development, Universite Laval, Quebec, Canada



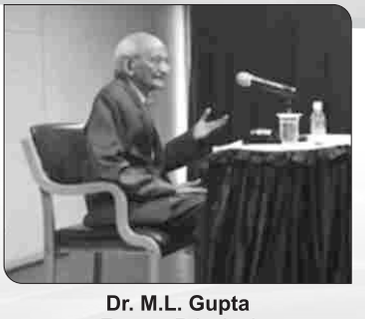
Prof. P. C.Trivedi
Former Vice Chancellor, DDU University, Gorakhpur

Dr. M. S. Malhotra
Consultant and former Deputy Director NIMR, New Delhi

Dr. Nupur Hooja
Unit Head, SMS College, jaipur

Ms. Meenakshi Singh
Specialist at UNICEF

Ms. Tusha Sharma
University College of Medical Sciences & G.T.B. Hospital, University of Delhi



Dr. M.L. Gupta
Former Principal, MSJ Post Graduate College, Bharatpur

Mr. Jacob Shetty
Director, International Centre for Culture and Education, Mumbai

FIRST CHIKUNGUNYA VACCINE

Himani Tripathi
B.Sc. Sem IV

US researchers use virus that only hit insects, has no effect on humans.

Scientists have developed the first vaccine for chikungunya fever, made from an insect-specific virus that does not have any effect on people and is thus safe and effective.

The vaccine quickly produces a strong immune defence and completely protects mice and nonhuman primates from the disease when exposed to chikungunya virus.Chikungunya is a mosquito-borne virus that causes a disease characterised by fever and severe joint pain , and may trigger headaches, muscle pain and joint swelling. Some patients feel better within a week but many develop longer term joint pain. Death is rare but can occur.

Traditionally, vaccine development involves trade-offs between how quickly the vaccine works and its safety. Live-attenuated vaccines that are made from weakened versions of a live pathogen typically offer rapid and durable immunity but reduced safety. On the other hand, the inability of inactivated vaccines to replicate enhances safety at the expense of effectiveness, often requiring several doses and boosters to work properly. There may be a risk of disease with both types of vaccines.

To overcome these trade-offs, the researchers used the Eilat virus as a vaccine platform since it only infects insects. The UTMB (University of Texas Medical Branch) researchers used Eilat virus clone to design a hybrid vaccine containing chikungunya structural proteins. The vaccine was found to be structurally identical to the natural chikungunya virus. The difference is that although the hybrid virus replicates very well in mosquito cells, it cannot replicate in mammals.

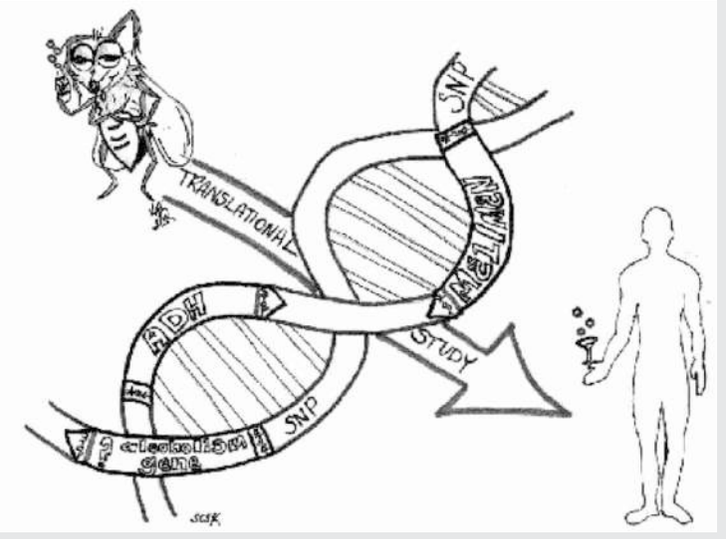
Source:The Times of India, December , 20,2016

Drosophila (fruit flies): An invertebrate model to study hematopoietic stem cells.

Dr. Lata Shahani
Department of Zoology

Many diseases such as Leukemia and Franconia anemia in humans are linked to the development of blood cells and take root at an early embryonic stage.

Hematopoietic stem cells are the stem cells give rise to all the blood cells. As the early hematopoietic stem cell development take place in a six week old embryo, it is difficult to study in humans how the development of blood cells leads to these diseases. In addition, this would involve sacrificing the embryos or culturing in the plate the signal produced might not be identical to the ones produced by cells inside the organism. So an animal model is needed to study how this development takes place in the embryo.



.Drosophila are the fruit flies already in use for genetic research can also act as the good invertebrate model to study the pathway and mechanism involved in the developmental biology related studies.

According to the scientists from the Indian Institute of Science Education and Research (IISER), Mohali, the fruit fly model provides a very good model for complex eukaryotic research.

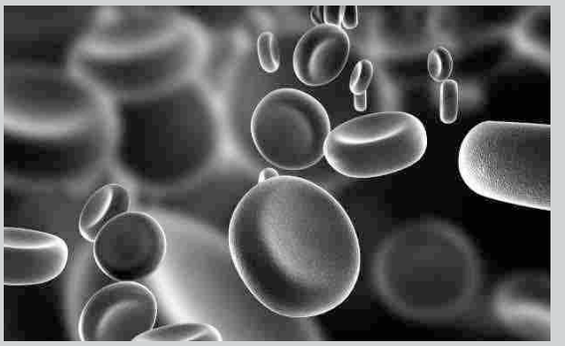
The signaling pathways and lot of molecules and processes are similar in humans and fruit fly so fruit fly can be considered as a model for studying hematopoietic stem cells. The way hematopoietic stem cells are generated and early process of blood cell development are also similar in fruit flies and in vertebrates.

In vivo imaging of the fruit fly model will allow researchers to gain the genetic information required for normal development and the diseased condition. This discovery of stem cell will help in studying the early pathogenesis, which has not been possible so far.

Source: www.thehindu.com/sci-tech

Path towards gene therapy for sickle cell disease

Dr. Sanjoli Mobar
Department of Zoology



Sickle-cell disease (SCD) is a group of blood disorders typically inherited from a person's parents. The most common type is known as sickle-cell anaemia (SCA). It results in an abnormality in the oxygen-carrying protein haemoglobin found in red blood cells. The disease results from a single mutation in the gene that code for one of the protein chains that make up the haemoglobin molecule. The sickle mutation causes the red cell to transform to sickle shape which is more rigid and sticky than normal cell. In addition, sickle cells die faster than normal red blood cells, often leading to anaemia, which can also damage organs.

Researchers at Stanford repaired genes causing sickle cell disease, using the CRISPR gene-editing technique in stem cells. CRISPR repair the gene causing sickle cell disease in human stem cells. CRISPR is a combination of an enzyme that can cut a selected DNA sequence and a "guide RNA" that takes the enzyme exactly where you want to make the cut — in this case, at the sickle cell mutation. Once the mutated DNA sequence has been removed, other tools can help paste in a copy of the normal sequence.The researchers say the study represents a proof of concept for the repair of blood-borne genetic diseases, such as sickle cell disease and thalassemia. This technique raises hopes for the permanent cure of this genetic disease.

Source: www.technologyworks.com

White revolution in India

Nandini Sharma
B.Sc. Sem III

Operation flood was launched in 1970 – termed as **white revolution** in India

It was the world's largest ruler development programme that helped the farmers to direct their own development and to have control on their own resources which was headed by Dr. Verghese Kurien who also led the cooperative movement for farmers and was honored by Padma Bhushan, Krishi Ratna and many national and international awards. He was honored as *Milkman of India.*

Main objective of operation flood were:

- Increase in milk production
- Reasonable price for consumer

As a result *India becomes self sufficient in milk* which was achieved through cooperative structure, high praise and admiration.

Facts related to operation flood:

- Production of 20 million litre Milk a day by 12 million farmers in almost 22 states who owned 250 dairy plants.
- In 1955, butter imports were 500 tons per year; today, more than 12,000 tons are in the cooperative alone and baby food were raised to 38,000 tons from 3000 tons.
- Indian dairy corporation(IDC) is the agency was created to receive grants of food aid headed by Dr. kurien during the period of which, milk powder production was raised to 1,40,000 by 1989 which was only 22,000 tons in pre-operation flood.
- By 1998, world bank report shows the India's rural economy of dairy development in which 200 crore was invested and a return of 24,000 crore per year over a period of 10 years was received.
- Dr.kurien headed Anand on 13 may,1949 and kaira district cooperative milk production union pvt.ltd.(KDCMPU) known as Amul.
- Gujarat cooperative milk marketing producer federation ltd. and National Dairy Development Board were established as the replication of Amul to cooperative dairy.

This leads to the milk deficient country to become the milk largest producer country.

Do Hair and Nails Keep Growing After a Person Dies?

Ronak Chetani
B.Sc. Sem VI

After the death, even the most long-lasting cells of a corpse will only be living for a few days. Although there is growth beyond the point of death, the actual amount of growth would be very negligible.

The skin begins to retract and degrade. The result of this degradation causes the hairs and nails to appear much longer after death. This is the actual reason why it appears that the hair continues to grow after death. Dr. Doris Day, a dermatologist in New York City and an attending physician at Lenox Hill Hospital, also in New York had also demonstrated this phenomenon in his study. Typically, fingernails grow about 0.1 millimetres (0.004 inches) a day and in order to grow, they need glucose. Different body cells have completely different life spans. As soon as the heart stops beating, the oxygen supply to the brain is cut off. With no glucose store to rely on, nerve cell dies within three to seven minutes. On the contrary, skin cells have a long life span. Grafting can still be successful if taken 12 hours after death. For the growth of fingernails, new cells need to be produced which in turn is impossible without glucose. Daily average growth of fingernails is almost 0.1mm and this rate further degrades with the ageing process. A layer of tissue which is known as the germinal matrix is present beneath the base of the nail and is actually responsible for producing the vast majority of the cells which forms the newest-growing part of the fingernail. This new cell pushes the older ones forward, making the nail appear to lengthen from the tip. Death suppresses the supply of glucose, and therefore the fingernail's growth.

Similar process occurs for hairs too. Each hair resides within a follicle which drives its growth. At the base of the follicle resides the hair matrix, a group of cells which divides to produce new cells and makes the hair strands longer. These cells divide very rapidly, when these are supplied with energy. This energy is generated from the burning of glucose in the presence of oxygen.

Now as soon as the heart stops pumping oxygen round the body in the blood, the energy supply dries up, and so does the cell division that drives hair growth.

Quite interesting ...isn't it!!

Source: www.livescience.com

EXCURSIONS

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1. World Forestry Arboratum, Jaipur, **2.** Tinai Eco Film Festival, Dr. K.N. Modi University, Newai
3. Mayur Uniquoters, Dhodsar, **4.** Research Centre of Parvatibai Chowgule College, Goa
5. Ranthambore National Park, Sawai Madhopur **6.** School of Hotel Management, Manipal University, Jaipur **7.** Fortis Hospital , Jaipur **8.** Keoladeo National Park, Bharatpur
9. Nahargarh Biological Park, Jaipur
10. B. M Birla Planetarium, Jaipur

Research Publications: International & National (2016)

Department	Total No. of Publications	Cumulative Impact Factor
Biotechnology	7	33.667
Physics	6	11.398
Chemistry	8	8.4795
Computer Science & I.T.	12	0.715
Environmental Sciences	2	3.772
Home Science	20	62.8565
Psychology	4	4.175
Zoology	1	1.096
Maths	1	1.69

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.

Achievements 2016

Faculty

Prof. Raakhi Gupta
Chemistry

Prof. Ila Joshi
Home Science

Prof. Roopa Mathur
Psychology

Certificate of Appreciation by SIMPLY JAIPUR **"5th Principals & Teachers Award 2016"**

Dr. Amita Sharma
Computer Science & I.T.
"Best Performer in Over all category" in UGC-Sponsored Refresher Course in Computer Applications, JNV Jodhpur University and Kota University

Dr. Manisha Patni
Chemistry
Certificate of Appreciation by
All India Welfare Society (Kurza 7)

Dr Radhika Sharma
Biotechnology
Best Oral Presentation
6th International Science Congress (ISC 2016), Pune

Dr. Ameeta Sharma
Biotechnology
First prize poster presentation NCEP 2016

Ms. Alka Kataria
Environmental Science
Best Oral Presentation

Dr. Garima Sharma
Zoology (Faculty)
Best Poster Presentation

Ms. Krishna Nagar, Dr. Priyanka Mathur, Dr. Lata Shahani and Ms.Vidhi Kumawat
Zoology (Students)
Best Poster Presentation

National Conference on Environmental Challenges, Human Health And Society, University of Rajasthan

Students

Faculty/Students Cleared NET

Chetna Yadav
Physics
Cleared NET

Mona Khera
Physics
Cleared NET, JRF, GATE, JEST

Durga Jangir
Physics
Cleared NET, BARC, GATE, JEST

Ms. Nisha Rathore
Asstt. Prof. (Zoology)
Qualified CSIR UGC NET June 2016 ,(AIR-75) in Life Sciences

Megha Shaktawat
Maths
Completed Laddakh Marathan

Purva Sharma
Physics
Second Prize in working model category on celebration of National Science day 2016 organized by S. S. Jain Subhodh PG College, Jaipur

Release of 6th Issue of Science Spectrum

Achievements 2016

Ph. D Awards (The IISU)

Gayatri Jeph
Biotechnology
(Dr. Shruti Mathur)

Sanjoli Mobar
Biotechnology
(Prof. Pradeep Bhatnagar)

Shruti Shukla
Biotechnology
(Prof. Pradeep Bhatnagar)

Tanushree Saxena
Biotechnology
(Dr. Krishna Mohan)

Kirti Shekhawat
Biotechnology
(Dr. Sreemoyee Chatterjee)

Kamakshi Tomar
Botany
(Dr. Shilpi Rijhwani)

Nidhi Sogani
Chemistry
(Prof. R.K. Bansal)

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Chemistry
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