

JANUARY 2014 ISSUE 1

SCIENCE SPECTRUM

A PUBLICATION OF IISU CHEMICAL ASSOCIATION

THE IIS UNIVERSITY

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



It is with great pleasure that we present the new edition of Science Spectrum—a forum for promoting an understanding and awareness of science and its importance to society. A perusal of articles in this issue shows an eclectic mix of topics reflecting the diversity of scientific interest combined with an interdisciplinary approach.

The publication in hand is an endeavour in the direction towards the development of communication skills, reasoning and analysis in students, all of which are necessary to succeed in a rapidly changing technological and global environment.

The underlying philosophy is to publish a newsletter which is as much accessible as possible and caters to a wider audience of curious readers. I feel that if the learners get an insight through reading, analysis and reflections on the articles published in this issue, it will then be a mission well accomplished.

I hope that with each issue, the newsletter will bring to the fore more and more contemporary scientific ideas and thus disseminate both knowledge and information for the common good of all.

I wish the editorial team the very best of luck!

Dr. Ashok Gupta, Vice Chancellor



It is rightly said that education is not an act of acquiring knowledge but learning skills to actualize one's potentials for leading a wholesome life. It is for this reason that at the IIS University, we give our students an opportunity to flex their intellectual muscles beyond the academic work that is included in their planned curricula.

I feel a great sense of pride in the fact that our University is producing a new generation of talented young scientists who are engaging with the wonders of science and the path-breaking research taking place in this area by contributing scientific articles and creating a readership base for Science Spectrum.

I thank all the authors for their valuable contributions to the current issue and congratulate the editorial board for their efforts towards bringing out a newsletter of such high quality.

Dr. Raakhi Gupta, Registrar



I am very happy to present this issue of 'Science Spectrum' to our readers. This issue provides a glimpse of academic achievements of students and faculty members of Science Departments, along with departmental activities which took place in the year 2013, and some short write ups for everyone.

I congratulate the members of spectrum team for their commendable efforts.

Prof. Pradeep Bhatnagar
Dean, Faculty of Science



Tiny Life Saver Leaves. Some call it Miracle. Could it also be GOOD SCIENCE??

Richa Pundir, Research Scholar, Department of Biotechnology



Moringa oleifera (The Drumstick Tree)

- ❖ A handsome, multi-purpose, small legume tree, 3-8 metres tall, fast growing and drought hardy, with a shady, leaf canopy of very attractive tripinnate ferny foliage, making its presence appealing wherever it is planted.
- ❖ Trees are grown extensively in tropical, sub-tropical and warm temperature areas, including Africa, India, South East Asia and tropical islands.

Moringa oleifera has an impressive range of medicinal uses with high nutritional value. Different parts of this plant



Planting me is like growing multi vitamins at your doorstep.

2 times the protein of yogurt.

I contain 3 times the potassium of bananas.

I have 7 times the vitamin C of oranges

4 times the vitamin A of carrots

4 times the calcium of milk.

contain a profile of important minerals, and are a good source of protein, vitamins, beta-carotene, amino acids and various phenolics. The Moringa plant provides a rich and rare combination of zeatin, quercetin, beta-sitosterol, caffeoylquinic acid and kaempferol.

Moringa oleifera is very important for its medicinal value.

Various parts of this plant act as cardiac and circulatory stimulants, possess antitumor, antipyretic, antiepileptic, anti-inflammatory, antiulcer, antispasmodic, diuretic, antihypertensive, cholesterol lowering, antioxidant, antidiabetic, hepatoprotective, antibacterial and antifungal activities, and are being employed for the treatment of different ailments in the indigenous system of medicine.

Moringa leaf powder and leaves can be effectively added to or used on:

Smoothies, salad dressing, sarlic butter, muffins, pancakes, mashed potatoes, potato pancakes, bread mixes, pizza sauce, herbs teas, cooked brown rice, vegetable dip, green sauces, pulse preparation, popcorn: just sprinkle it on, after the butter, and add sea salt if desired, in pizza as a topping, oatmeal, cream of spinach soup, fruit juices.

Source: *Trees for life, The Moringa book, 2005*

THE STORY OF THE INVENTION OF VACCINATION

Prof. R. K. Bansal
Department of Chemistry

It is the story of a young boy of 19 years only, who by sheer combination of keen observation, extreme dedication and steely conviction, led humankind to win over a great scourge, which until the eighteenth century claimed million of lives, and was referred to as the speckled monster for disfiguring innocent children and beautiful women. The killer disease, **Smallpox** affected beggars and princes alike. As per an estimate, during the eighteenth century, it killed 400,000 people annually in Europe alone and left permanent scars on the faces of an innumerable survivors.

Early attempts of the prevention

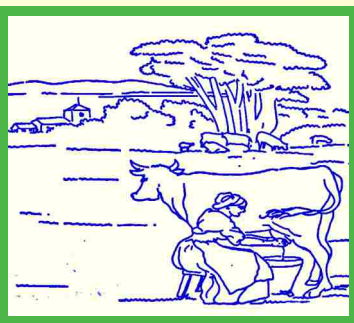
Early records showed that the survivors of the smallpox developed immunity thereafter and did not catch the disease again. Following this, attempts were made to introduce fluid of the smallpox vesicles into the scratched skin or through the nostrils of the healthy people. This method was prevalent, though on a very limited scale, in China and India around 1000 B.C. It was called Variolation or inoculation. Lady Mary Wortley Montague (1689-1762), who survived the smallpox attack, introduced "Variolation" for the first time in England in 1721 after having tried it successfully on her children.



Lady Mary Wortley Montague
Courtesy: US National
Library of Medicine.

Edward Jenner : The Inventor of Immunology

Edward Jenner Right from his school days, developed intense interest in science and nature. At the age of 13, he began his studies of medicine under Daniel Ludlow, a surgeon of Sudbury, near Bristol. It may be mentioned that it was the time when smallpox spread like an epidemic and a large number



of people were affected every year. During this period, Jenner, who had a keen observation, noticed a strange coincidence: milkmaids, who were thought to be bestowed with heavenly beauty, were not affected by the scourge of smallpox. With a keen observation blended with intelligence, he became curious to know the secret. The records show that possibly during this period, Jenner heard a milkmaid say, "I shall never have smallpox for I have had cowpox. I shall never have an ugly pockmark face." This milkmaid had rashes on her hands.

Courage is as often the outcome of despair as of hope; in the one case we have nothing to lose, in the other's everything to gain – Diane de Pointiers

After completing apprenticeship, Jenner at the age of 21 went to London to study medicine under a famous doctor, John Hunter. He brought the connection between the milkmaids and the cowpox and

between the cowpox and the smallpox to the knowledge of Dr. Hunter, but he did not show any interest in it. By 1780, Jenner found that there were two different types of cowpox, and only one form developed immunity against smallpox. After his repeated efforts to convince his fellow doctors about the possible connection between cowpox and smallpox failed, he became almost desperate and decided to go ahead.



Jenner inoculating James Phipps

In May 1796, he inoculated an eight year old boy, James Phipps, with the fluid from the cowpox vesicles on the hands of a milkmaid. Then in the following July, which was the period of the spread of smallpox, Jenner injected the boy carefully with the smallpox matter.

As Jenner had expected, the boy did not develop smallpox. Before making a formal announcement of his path-breaking invention, Jenner waited for a second experiment, which came two years later, as cowpox disappeared in Gloucestershire for some time.

Jenner had to face several challenges in the beginning, the most prominent being one by Dr. Henry Cline falsely claiming the credit for the invention and another by Dr. George Pearson, supplying contaminated inoculation material that caused smallpox like eruptions. Ultimately the dedication and perseverance of Dr. Edward Jenner triumphed and soon the whole world acknowledged his unparalleled contribution. Jenner's work opened the way for the development of the vaccines for a number of deadly diseases.

Louis Pasteur, another great scientist who developed vaccines for several diseases including rabies and made immunization a highly practical science, for the first time suggested the word, "vaccination" in 1881 for the general procedure of prophylactic inoculation in homage, as he put it, "to the merit and to the immense services rendered by one of the greatest of Englishmen, Jenner".

In 1967, a global campaign for the eradication of smallpox was initiated under the guardianship of World Health Organization (WHO) and finally succeeded in 1977. On May 8, 1980 the WHO announced: "Smallpox is Dead"! The most feared disease of all time had been eradicated, fulfilling a prediction that Edward Jenner had made in 1801. It has been estimated that the task he started has led to the saving of more human lives than the work of any other person.

Sources

1. R. M. Roberts, *Serendipity-Accidental Discoveries in Science*, 1989, John Willey & Sons Inc. New York.
2. *Who Invented Vaccination?* Retrieved on 02. 11. 2013 from <http://explorable.com/who-invented-vaccination>.
3. S. Riedel, *Edward Jenner and the history of smallpox and vaccination*, Baylor University of Medical Center Proceedings, 2005, 18, 21-25, Retrieved on 2.11.2013 From http://www.baylorhealth.edu/Documents/BUMC%20Proceedings/2005%20Vol%2018/No.%201/18_1_riedel_jenner.pdf
4. The Jenner Institute: *Developing Innovative Vaccines: Edward Jenner (1749-1823)*. Retrieved on 2.11.2013 from <http://www.jenner.ac.uk/edwardjenner>.

Depression in College Students

Dr. Roopa Mathur
Department of Psychology

Eighteen year old Maya has become noticeably withdrawn from both family and friends in the past three months. Her teachers have started complaining about her poor attendance in class and dropping performance in assignments and tests. She has increasingly become moody, irritable and indifferent towards her appearance. She complains of extreme tiredness, feeling of worthlessness and pessimism. Of late she has also reported thoughts about committing suicide.



Maya has now been diagnosed by a mental health professional as suffering from 'Clinical Depression'. Depression is a common but serious mental illness marked by feeling of sadness which persist over a long period of time and influence the person's everyday functioning. Depression is considered to be the common cold of psychopathology because with a life time prevalence of approximately 15%, it is one of the most prevalent disorders worldwide.

Signs and symptoms that a student might be experiencing depression during college include: (a) Feelings of sadness or unhappiness (b) Irritability or frustration, even over small matters (c) Loss of interest or pleasure in normal activities (d) Insomnia or excessive sleeping (e) Changes in appetite or weight (f) Agitation or restlessness (g) Slowed thinking, speaking or body movements (h) Indecisiveness, distractibility and decreased concentration (i) Fatigue, tiredness and loss of energy (j) Feelings of worthlessness or guilt (k) Trouble in thinking, concentrating, making decisions and remembering things (l) Frequent thoughts of death or suicide (m) Crying spells for no apparent reason

There can be different triggers for this kind of breakdown like inability to cope with the academic rigours of higher education, sudden or violent breakup in a romantic relationship, friendships gone sour, experimenting with banned substances leading to addiction, to name a few.

Start of the college life calls for a significant transition where the students experience many "firsts" like new life style, new friends, new schedule and workload, different academic culture and demands, figuring out how to belong and alternative ways of thinking. When they feel inadequate or are unable to deal with these "firsts" this un masks feelings of hopelessness, anxiety and depression.

Some of the self help measures which can help these students to deal with this crisis include maintaining a healthy and busy routine, eating nutritious and balanced diet, exercising regularly, attending classes and taking up some hobbies. However it is important that a mental health professional is consulted and treatment advised is followed strictly.



Apollo Indraprastha Hospital,
New Delhi : Home Science

World Forestry Arboretum and
Amrita Devi Garden : Botany



CSWRI, Avikanagar : Biotechnology



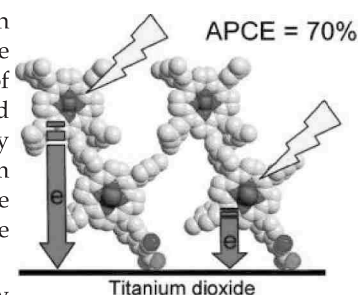
Team Testing Laboratory, Sitapura, Jaipur : Chemistry

DYE-SENSITIZED SOLAR CELLS

A New Technique: Solar to Electrical Energy conversions

Sudesh
Research Scholar, Department of Chemistry

A dye sensitized solar cells are unique in that they use separate materials for the absorption of light and the transport of electrons and holes. The light is absorbed by dye molecules which are chemically bound to a porous film of titanium dioxide. It ejects an electron into the titanium dioxide and then the dye molecule is recharged by an electrolyte.



Dye sensitized solar cells are made low cost materials and are cheaper to manufacture as compare to other semiconductor cells. Dye used in these cells can absorb diffused sunlight or fluorescent light. So it also works in cloudy weather and low -light conditions without much impact on efficiency. Unlike other thin-film cells, dye sensitized solar cells do not degrade in sunlight over time, so, they will not require frequent replacements. When the temperature rises, some electrons in semiconductors are pushed to conduction band mechanically. Hence the silicon cells require protection by covering in glass box. Such cells get heated easily and hence reduce the efficiency due to internal temperature. This situation is eliminated in the DSSCs. Because dye-sensitized solar cells are made of only a thin layer of plastic, heat radiates away easily to reduce the internal temperature. This lowering of temperature, in turn, helps in increasing the efficiency of the solar cells.

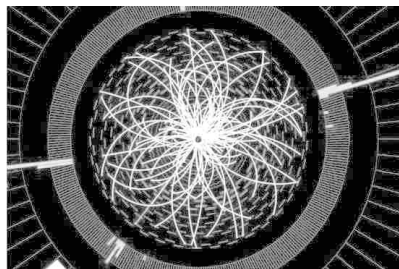
Source: 1. <http://en.wikipedia.org>. 2. The photochemistry portal principles, applications and experimentation in modern photochemistry.

Higgs Boson: the God Particle discovered

Sanjoli Mobar

Research Scholar, Department of Life Science

The Higgs boson is the subatomic particle and its discovery has been called "monumental" as it confirms the existence of the Higgs field. This has brought a Nobel Prize to Francois Englert and Peter Higgs, and this experiment took 40 years. The Higgs boson is named after Peter Higgs. On July 4 2012, physicists at the European Centre for Nuclear Research (CERN) in Switzerland announced Higgs-like particle as great scientific discovery.



The Higgs boson is often called "the God particle" because it's said to be what caused the "Big Bang" that created our universe many years ago. It gives validity to the Standard Model of Physics, which is an authoritative theory for

particle physics. In the Standard Model, the Higgs particle is a boson with no spin, electric charge, or color charge. It is also very unstable, decaying into other particles almost immediately. This model dictates how the basic pieces of matter act together and proved the presence of Higgs boson, therefore changing many of the current technological assumptions.



As yet there are no practical applications of the Higgs boson but, taking into account its pivotal role in the universe, its discovery is likely to lead to more breakthroughs.

Source: http://en.wikipedia.org/wiki/Higgs_boson <http://theamericanscholar.org/the-higgs-boson/#.UtgA1PQW09Q> <http://www.cbsnews.com/news/god-particle-why-the-higgs-boson-matters/> http://www.naturalnews.com/Higgs_Boson.html

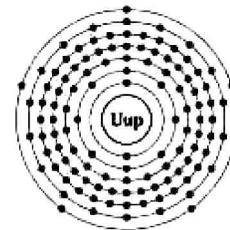
DISCOVERIES

Discovery of The Newest Element in the Periodic Table : Ununpentium

Manisha Patni

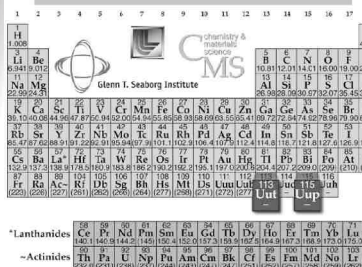
Department of Chemistry

Two superheavy elements, elements 113 and 115, were recently synthesized through a collaborative effort between scientists from the Physical and Life Sciences Directorate at the Lawrence Livermore National Laboratory and researchers from the Joint Institute for Nuclear Research at the Flerov Laboratory for Nuclear Reactions in



Dubna, Russia. Two isotopes of element 115 survived 30-80 milliseconds before decaying into isotopes of element 113 that survived approximately ten times longer prior to decaying themselves.

Periodic Table of the Elements



When Calcium-48 was fused with Americium-243, two isotopes of element 115 were produced with atomic weights of 287 and 288; these isotopes decayed in 46.6 and 19-280 milliseconds, respectively.

Temporary name for element 115 is ununpentium (Uup), the IUPAC (International Union of Pure and Applied Chemistry) will meet to discuss an official name for this.

Phase: Solid	Density (near r.t.) : 13.6 g/cm³	Melting Point 400°C, 750°C
Heat of Fusion 5.90-5.98 KJ/mol	Heat of Vaporization 138 KJ/mol	Boiling point ~1100°C, 2000°C
Atomic Radius 187 pm	Covalent Radius 156-158 pm	Oxidation State 1,3

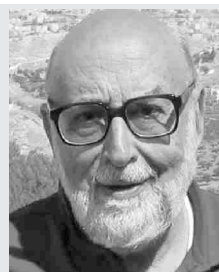
Source: <http://en.wikipedia.org>

NOBEL PRIZE 2013

Science Spectrum Team

Physics

Prize motivation: for "the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles"



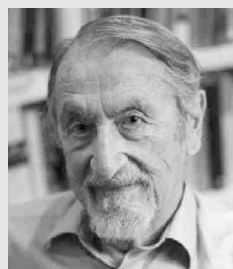
François Englert
Université Libre de Bruxelles, Brussels, Belgium



Peter W. Higgs
University of Edinburgh, Edinburgh, United Kingdom

Chemistry

Physiology or Medicine



Martin Karplus
Harvard University, Cambridge, MA, USA



Michael Levitt
Stanford University School of Medicine, Stanford, CA, USA



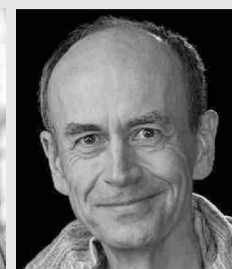
Arieh Warshel
University of Southern California, Los Angeles, CA, USA



James E. Rothman
University, New Haven, CT, USA



Randy W. Schekman
University of California, Berkeley, CA, USA,



Thomas C. Südhof
Stanford University, Stanford, CA, USA,

Prize motivation: for "the development of multiscale models for complex chemical systems"

Prize motivation: for "their discoveries of machinery regulating vesicle traffic, a major transport system in our cells"

Emotional Creativity

Dhruvata Sharma
Department of Psychology

“Creativity is more than just being different. Anybody can plan weird; that's easy. What's hard is to be as simple as Bach. Making the simple, awesomely simple, that's creativity” – Charles Mingus

As soon as I hear the word creativity a visual image of colors, designs and artistic work flashes my mind. But is that it...?? Is creativity all about new designs, art and inventions...?? Can creativity be related to other realms of our lives...?? Other domains...such as EMOTIONS...??

There is a three-fold distinction to emotions as creative products:

- ❖ First, the effective application of a pre-existing emotion.
- ❖ Second, modification of a standard emotion to better meet the needs of the individual.
- ❖ Third, development of new forms of expression, with fundamental changes in the beliefs.

To be emotionally creative means to have a new perspective for an emotional situation. It means to have a better understanding of our emotions and have the ability to modify them in a positive direction. As Einstein said- “You can never solve a problem on the level on which it was created.”

If you have ever tried to manage your anger by playing a sport and channelizing the energy rather than mostly bashing it out on someone, if you have ever written a poetry to relieve your pain and sorrows rather than just crying and being depressed, if you have ever created something innovative and useful while you were extremely happy, you have been somewhat emotionally creative.

“There are painters who transform the sun to a yellow spot, but there are others who with the help of their art, emotion and expression, transform a yellow spot into the sun”

— Pablo Picasso

CARCINOGENIC PERSONAL CARE

Abhilasha Srivastava
B.Sc. Semester VI

Have you read the ingredient label on the bottle of your shampoo, bath gel, and toothpaste or moisture cream?

We see practically an endless list of hard-to-pronounce, even harder-to-decipher chemical names.

Have you ever wondered if all those chemicals are really safe?

What do these ingredients do? What kinds of reactions can they cause? What happens inside our bodies when these chemicals build up over decades of use? What happens when they interact with one another?

The truth is, the petrochemicals found in most shampoos and cosmetics can be absorbed through the scalp and skin and, over time, accumulate in the organs and tissues. This accumulation may result in mounting brain, nerve, and liver damage, according to a government study.

Here are few ingredients commonly found in daily products:

❖ **Propylene Glycol (also called Propanediol)** - A colorless, viscous, hygroscopic liquid used in anti-freeze solutions, in brake and hydraulic fluids, as a de-icer, and as a solvent. It's even found in some pet foods, processed foods and cosmetics, toothpastes, shampoos, deodorants and lotions.

It can inhibit skin cell growth in human tests, can cause gastro-intestinal disturbances, nausea, headache and vomiting, central nervous system depression and can damage cell membranes causing rashes, dry skin and surface damage (according to the Material Safety Data Sheet).

❖ **Sodium Lauryl Sulfate (SLS) or Sodium Laureth Sulfate (SLES)**- It is used in concrete floor cleaners, engine degreasers, car wash detergents, and just about every soap and shampoo in the market. And yet, according to the Journal of the American College of Toxicology; Vol. 2, No. 7, SLS is a **mutagen**. In sufficient amounts, it is capable of changing the information in genetic material found in cells! It has been used in studies to induce mutations in bacteria.

❖ SLS actually corrodes hair follicles and impairs ability to grow hair! It denatures protein, impairs proper structural formation of young eyes, creating permanent damage. SLS can damage the immune system. It can cause separation of skin layers and cause inflammation to the skin. If it interacts with other nitrogen bearing ingredients, Carcinogenic Nitrates can form as a result.


❖ **Isopropyl Alcohol** - This is a solvent and denaturant (poisonous substance that changes another substance's natural qualities). Isopropyl alcohol is found in hair color rinses, body rubs, hand lotions, after-shave lotions, fragrances and many other cosmetics. This petroleum-derived substance is also used in antifreeze and as a solvent in shellac. According to A Consumer's Dictionary of Cosmetic Ingredients, inhalation or ingestion of the vapor may cause headaches, flushed skin, dizziness, mental depression, nausea, vomiting, narcosis and coma.

And this is just the tip of an iceberg!


We expose ourselves day after day, many times hour after hour (through cosmetics and lotions), to these toxic ingredients - and then we wonder why cancer rates are soaring!

Source: www.healthline.com · Cosmetic Safety www.preventcancer.com/consumers/.../cosmetics_personal_care.htm


Workshop/ Research Activity



Animation Workshop: Anima-Tech : Computer Science and I.T.



Street-play based on interpersonal issues faced by the youth today: Psychology



Nutritious snack making : Home Science

Other Activities Book mark making, Poster making and Badges making

Bio toilets: "Disposing the disposed"

Neha Sharma

Research Scholar, Department of Biotechnology

The problem of improper sanitation, in trains has lead Indian Railways to install bio toilets which have been invented and certified by DRDO and endorsed by Government of India aimed to minimize the problem of open defecation. The concept of bio toilet is based on a microbiological process which utilizes bacteria isolated from low temperature areas referred to as psychrophiles. These psychrophiles are then mixed in different combination to form a consortium. It is the consortium which anaerobically degrades the organic waste to biogas

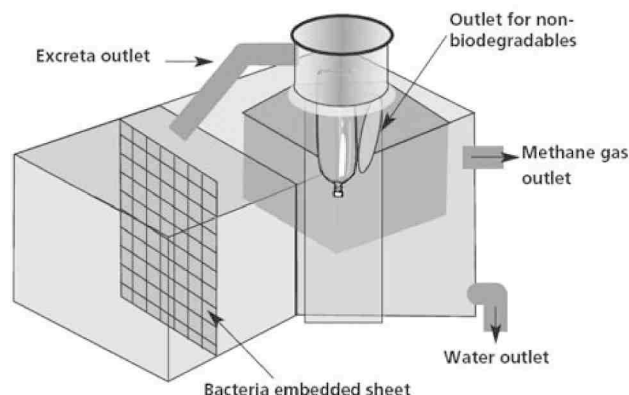


Illustration: Chaitanya Chandan

FIGURE 2: A TYPICAL ARCHITECTURE OF A BIOTOILET
(Source: Down to Earth, November 1-15 2013)

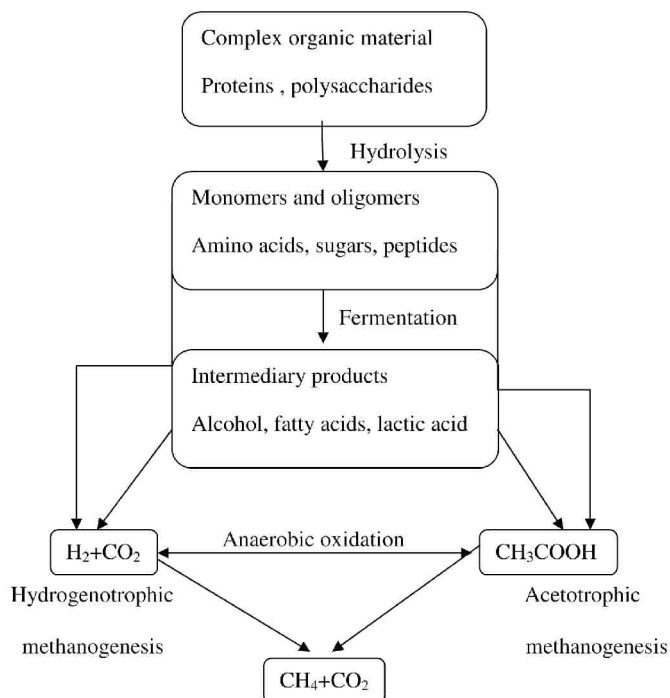


FIGURE 1: BIOCHEMICAL REACTION IN A BIOTOILET

which is primarily composed of methane and carbon dioxide. In case where the bio toilets are installed in passenger coaches, there is an inlet for the waste and an outlet for the biogas which is released directly into the atmosphere and microbiologically treated water is discharged after chlorination which does not possess potential environmental hazards. These bio toilet is not only eco friendly but also economically viable. A single unit of bio toilet costs approximately 15,000 Indian Rupees.

The stainless steel bio digester or the bio toilet is specially designed &

manufactured for installation in the trains. The bio-toilet system is fitted between the wheels of the train. The inlet of the digester connected to the toilet seat does not provide any bad smell in the toilet. The system is completely controlled by a microprocessor and necessary provisions have been made to sense and eject any plastic bottle, polythene or other waste material at the inlet to stop entering into the digester. Once the plastic bottles, polythene and other waste material are dumped out from the system the human waste is transferred to treatment chamber where bio digestion occurs. At this step all wastage is converted in water and gas (methane) through anaerobic digestion. Now, the gas is vented out or can be utilized for various purposes and treated water can be used for irrigation purpose.



FIGURE 3: BIO TOILET INSTALLED IN A TRAIN

Source: <http://www.wockhardtoundation.org/pro-bio-toilet.aspx>
A community guide to environmental health,2008

Research Publications: International & National (2013)

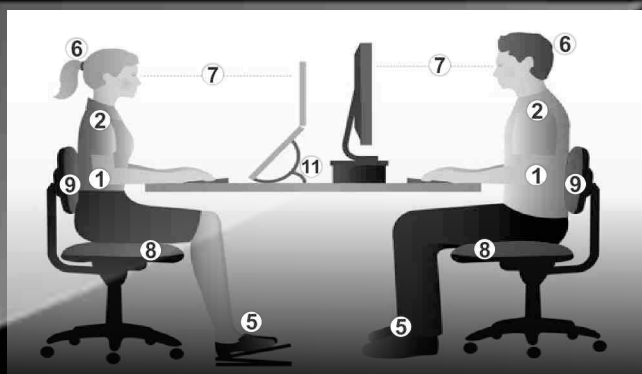
Department	Total No. of Publications	Cumulative Impact Factor
Biotechnology	17	15.37
Chemistry	15	16.117
Computer Science & I.T.	06	0.537
Home Science	11	2.087
Psychology	03	-
Zoology	14	7.277



Computer Ergonomics

Shveta Parnami
Department of CS & IT

Today, almost every one of us interacts with computers on a daily basis. Many people spend many hours in a day in front of a computer without thinking about the impact on their bodies. Along with the expanding use of this technology have come reports about adverse health changes for computer users. They physically stress their bodies daily without realizing it by extending their wrists; slouching, sitting without foot support and straining to look at poorly placed monitors. These practices can lead to cumulative trauma disorders or repetitive stress injuries, which create a life-long impact on health. Symptoms may include pain, muscle fatigue, loss of sensation, tingling and reduced performance. There are 11 ergonomic points (mentioned in picture) to keep in mind, to improve upon health and performance while using a computer. Most important physical fitness can avoid and treat problems related to computer use, build stamina with exercises for strength, flexibility, and cardiovascular health.



- 1 **Elbows**
Above the desk, at 90-110 degrees
- 2 **Shoulders**
Relaxed as opposed to hunched
- 3 **Wrists**
In line with forearms
- 4 **Hips, Knees, Ankles**
At 90 degrees whilst seated
- 5 **Feet**
Flat on the ground or footrest
For prolonged standing, consider a mat
- 6 **Head**
Upright with ears aligned with shoulders
- 7 **Eyes**
Looking at the top third of the screen.
Consider the use of a laptop raiser with your laptop
- 8 **Seat length**
Should be long enough to provide support beneath thighs
- 9 **Backrest**
Angled at 90-110 degrees with adequate lumbar support in line with lower back
- 10 **Keyboard and Mouse**
G and H of keyboard aligned with your nose. Mouse gripped loosely
- 11 **Laptop**
Used with a riser, external keyboard and external mouse

Source: (1) *Computer Ergonomics: How to Protect Yourself from Strain and Pain*, University Health Service, University of Michigan, USA. (2) *Safety and Health, Computer workstation ergonomics*, The University of Western Australia.

Do You Know?

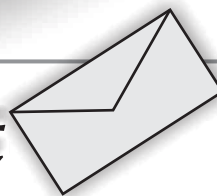
Pooja Maheshwari

Research Scholar, Department of Chemistry

- ❖ Lemons contain more sugar than strawberries, for the same mass.
- ❖ Mosquitoes like the scent of Estrogen, hence, women get bitten by mosquitoes more often than men do.
- ❖ Fish scales are a common lipstick ingredient. Some lipstick contains lead acetate or sugar of lead. This toxic lead compound makes the lipstick taste sweet.
- ❖ Neither Diamond nor Platinum, the element Californium is often called the most expensive substance in the world.
- ❖ Watson and Crick, the ground breakers of the DNA double helix never ran any experiments on themselves, but rather researched into the work of others and deduced the structure.
- ❖ Discrimination takes place everywhere. Be it in life or even in the periodic table where the letter J is the only letter that doesn't appear.
- ❖ One of the very interesting facts about Chemistry is that the metal Gallium (Ga, atomic no. 31) can melt in your hands!
- ❖ Temperature of Mercury is 430°C during day-time and decrease down to ~180°C during night-time.

Source: <http://chemistry.about.com/od/generalchemistry/a/10-Basic-Chemistry-Facts.htm>
<http://chemistry.about.com/od/weirdscience/a/Did-You-Know.htm>

Ask an Expert



Q: I wish to know about more avenues in the stream of science and technology, also the best career options in the same field after graduation. Guide me about the college/laboratories for Post graduation in zoology and research and how to apply to such college/laboratories. At last I wish to know more about medical colleges offering post graduation in physiology/anatomy and career after that.

Abhilasha Srivastava

B.Sc. semester VI

A.: There are many good universities which provide studies in zoology at PG level and also research in same. You can select universities in following preference.

Banaras Hindu University, Varanasi, University of Delhi, University of Calcutta, University of Hyderabad, Jadavpur university of Kolkata, University of Madras, Chennai, Jawaharlal Nehru University (Life Science), New Delhi, University of Pune, BITS (Life Science), Pilani.

For the admission in Ph.D courses all the universities conduct their entrance tests, preference is given to the students who have cleared NET (JRF).

Some medical institutes like AIIMS (Delhi), PG institute of medical education and research (Chandigarh), Sree Chitra Tirunal institute for medical science and technology (Thiruvanthapuram), Sanjay Gandhi PG institute of medical sciences (Lucknow), King George medical University (Lucknow), Jawaharlal Nehru Institute of PG medical education and research (Pondicherry) and NIPER (Mohali) provide PG courses in Biochemistry, physiology and medical microbiology.

To apply in above universities/institutes you should see their websites regularly.

Dean, Faculty of Science

I am NOW

Nidhi Sharma
Department of Economics

I am NOW! You can call me the PRESENT, this very moment as you read on. You will be flattered to know that I crave for your attention all the time. No matter how hard I try you constantly dwell in the thoughts about your past or future. You are never where you are supposed to be. You are never in me, in the NOW. Past and future do not actually exist but you refuse to leave that illusionary abode of yours. NOW is real, NOW is what you have right here, NOW is precious, you cannot afford to lose me. You can easily shrug my invitation, but my dear to your own peril. Have you ever observed that if there is an emergency, for example, you or anyone who is very dear to you is in a life threatening situation, you act immediately without losing any time? At that moment you are intensely in the NOW. If you can train yourself to be in the NOW all the time, you will realize how the quality of your life improves.

What you call problems, I call situations. The fact is that you love your problems, no matter if you believe otherwise. You waste yourself thinking why all that happened to you and what will happen. You distort the situation (read problem) and extract pain out of it. The pain is created by the anxiety about future. For God sake, have mercy on yourself; do not create any more pain. Pain cannot exist in the NOW. This very moment you can try it. Be profusely in the NOW. Concentrate on your breathing and feel this moment. Get rid of the psychological time of past and present. Live moment by moment and see your so called problems disappearing.

I am not saying this will come to you just like that. You will have to practice it every moment. When you falter and wander away from NOW, remind yourself and come back to NOW. The moment you see it clearly that past and future exist only in your mind and NOW is all that you have, you will enjoy this practice more. The more you are in NOW, the more you live.

WHY WE SHOULD NOT EAT JUNK FOOD?



Prof. Pradeep Bhatnagar
Dean, Faculty of Science

There are number of reasons for not eating the junk food, some of obvious ones:

- ❖ They are high in calories and low in nutrition: Junk food is low in fibre, high in sugar in liquid form and high in fat. So there is lots of calories, but almost no nutrition. Nutrition less diet slows growth, decays teeth,

promotes obesity, and saw seeds of infirmity leading to incurable diseases when you are older. Food with low nutrition value tends to reduce the IQ level of children.

- ❖ The fatty acids in junk food influence with the hormones released by the brain. These hormones –leptin and insulin regulate the body weight by telling you that you are full with junk food. The body doesn't get that signaled, so you keep eating and eating.

- ❖ Candies and cakes, chocolates and bakes contain lots of sugar which is an empty calorie, fructose can trigger processes that lead to liver toxicity and other chronic diseases.

- ❖ Energy drinks provide no energy: Except for sugar, the other ingredients in these drinks like caffeine, taurine, sweetness and supplements give no energy. Many people get short bouts of energy from gigantic amount of sugar in it. There are approximately 13 teaspoons in a 500ml can.

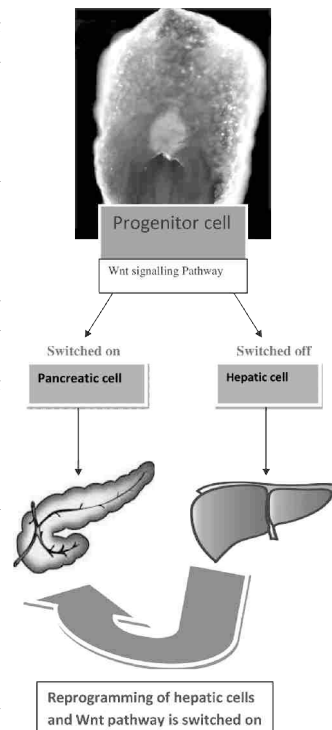
So remove burgers and colas from your diet and change to a healthy balanced diet.

Source: "Down to Earth" December 1-15, 2013

Non-Canonical Wnt- Pathway: Fate of Liver or Pancreas

Dr. Sreemoyee Chatterjee
Department of Biotechnology

Understanding how distinct cell types arise from multipotent progenitor cells is a major quest in stem cell biology. Both liver and pancreas share many common aspects of their early development which leads to believe that they have originated from a common progenitor. But how and when that commonness is switched to differential development remains elusive till date. A recent gene expression study revealed mutually exclusive signalling signatures in hepatic and pancreatic progenitors. The non canonical Wnt-signalling pathway acts as a potential developmental regulator for this fate determination and is responsible for inducing pancreatic programme in endoderm and liver cells. Thirty years after the identification of Wnts, understanding of their signal transduction pathways continues to expand. The experiments revealed that prior to specialization; cells in the endoderm activate genes involved in the noncanonical Wnt pathway, which is expressed in pancreatic cells, but not in those of the liver. Additionally, the researchers were able to stimulate the pathway in liver progenitors and partially reprogram them to assume the properties of pancreatic tissue.



Researchers have found a ray of hope in the treatment of type I diabetes which is caused by a loss of the insulin-producing cells in the pancreas, called beta cells, with this breakthrough discovery. So a lineage reprogramming strategy to convert adult hepatic cells and other healthy cells in pancreatic cells will solve the problem by the stimulation of the noncanonical Wnt pathway and will eventually replace the beta cells that have been lost from the diseased pancreas.

Source: Rodriguez-Seguel E, Mah N, Naumann H, Pongrac IM, Cerdá-Esteban N, Fontaine JF, Wang Y, Chen W, Andrade-Navarro MA, Spagnoli FM. Mutually exclusive signaling signatures define the hepatic and pancreatic progenitor cell lineage divergence. *Genes Dev.* 2013 Sep 1;27(17):1932-46

Life After Death

Science Spectrum Team

White dwarfs or dead stars can be surrounded by planets teeming with life. James Webb Space Telescope to be launched by NASA in 2018, can help us find evidence of life-supporting systems on these planets, especially the presence of biomarkers such as oxygen and methane. Previous research has found that white dwarfs have high levels of heavy elements and have rocky planets. At least one of the 500 closest white dwarfs could have a planet that can support life.



Source: Monthly Notices Of The Royal Astronomical Society

Daughter Deficit in India - A Cause of Concern

Dr. Anima Vaish
Department of Economics

The 2011 Census report reveals an improvement in the sex ratio across India from 934 in 2001 to 940 in 2011; however the child sex ratio in India has fallen from 927 in 2001 to 914 in 2011. This clearly shows the disappearing girl child in India's population. National daily, Hindu, recognized this sharp decline in child sex ratio as a national emergency. Sex Ratio is a tool to determine the gender equity of the population. In India, sex ratio measures the number of females per thousand males. Child sex ratio, on the other hand, measures the number of girl children per thousand boy, in the age group 0-6 years of age. Child sex ratio reflects the underlying socio, economic and cultural patterns of society, especially the perception towards the girl child.

Growth of religious fundamentalism, complete absence of political intervention, strong preference for sons, economic considerations associated with daughters, lack of gender sensitivity in planning and failure to launch any social reform movement are some of the major factors which have contributed to the inability in ensuring a dignified life to a girl child in India. Technology, in the guise of prenatal diagnostic tests, is being blamed for the decline in the child sex ratio and is thus targeted for its redress.

To meet the challenges of the declining child sex ratio, firstly females' right to life has to be valued by the society which means combating male child preference and its associated legitimacy. This will further help to tackle the violation of right to birth by checking misuse of technology through legal measures. This would only be effective once the community supports these measures. There is a need to introduce bilateral kinship, give autonomy to young women, target social evils like dowry, introduce social policing and social fencing to curtail female foeticide and infanticide, form community patrols to check health centres and clinics from performing female foeticide and recognize the economic contribution of women. There is an urgent requirement to sensitize people on gender issues and productive worth of girl child along with undermining the norms, values and practices that have historically promoted male child preference, which shall act as guarantee for effective implementation of law.

Source: Census 2001 & Census 2011

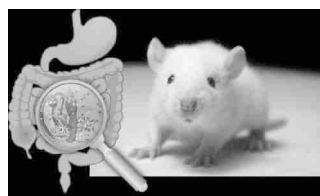


Gut commensal microbiota may determine cancer treatment outcome

Nandini Goswami

Research Scholar, Department of Biotechnology

Gut commensal microbiota are microorganisms that live in the gut and thrive but do not affect their host. Study conducted by scientists at the National Cancer Institute (NCI) on mice revealed an intact population of microorganisms living in the intestine, which were required for optimal response to cancer therapy. NCI scientists found that tumors of germ-free mice, or mice treated with antibiotics to deplete the gut of bacteria, were largely impaired in their ability to respond to immunotherapy that slows cancer growth and prolongs survival (Science, Nov. 22, 2013).



These findings in mice may underscore the importance of microorganisms in optimal cancer treatment outcomes in humans as they also harbor gut commensal microbiota that can influence local and body-wide inflammation as well as modify the tumor microenvironment, which consists of cells, signaling molecules and mechanisms that may support tumor growth and also cause drug resistance.

In an independent co-submitted study that will appear in the same issue of Science, Laurence Zitvogel and colleagues found that a different type of chemotherapy drug, cyclophosphamide, altered the composition of the intestinal microbiota and damaged the intestinal wall, thereby affecting optimal anti-tumor immune response and the therapeutic effectiveness of cyclophosphamide.

Hence, their findings also raised the possibility that the frequent use of antibiotics during a patient's lifetime or to treat infections related to cancer and its side-effects may affect the success of anti-cancer therapy.

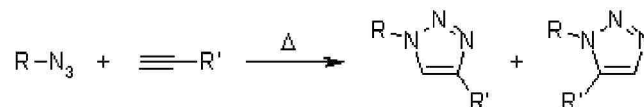
Source: Science, November 22, 2013.

Click Chemistry : A "Click" Away From Discovery



Dr. Pragya Sinha
Department of Chemistry

Click chemistry is a newer approach to the synthesis of drug-like molecules that can accelerate the drug discovery process by utilizing a few practical and reliable reactions. Sharpless and Coworkers defined what makes a click reaction as one that is wide in scope and easy to perform, uses only readily available reagents, and is insensitive to oxygen and water. In fact, in several instances water is the ideal reaction solvent, providing the best yields and highest rates. Reaction work-up and purification uses benign solvents and avoids chromatography. The most successful click example is the Huisgen cyclo-addition reaction which results in the formation of a five-membered ring with three adjacent nitrogen atoms.



Click chemistry is finding application in two main areas: the life sciences and the material sciences. An example of the former is the addition of a labeling group to a biomolecule, a configuration that has potential for diagnostic applications. In materials, click chemistry is permitting the formation of things like polymers and surface coatings with unusual properties.

Safer Mobile Phone: Way To Go

Priyanka Raghuvanshi
Department of Zoology



A decade old technological invention of mobile phone has impacted the lives of people in so many ways. It has provided the global

connectivity, and within no time this gadget has become a necessary evil. Mobile is defined by its SAR values (Specific Absorption Rate) value. SAR (specific absorption rate) is an indication of the amount of radiation that is absorbed into a head whilst using a cellular phone, the higher the SAR rating the more radiation that is absorbed into the head. A SAR value is a measure of the maximum energy absorbed by a unit of mass of exposed tissue of a person using a mobile phone,

over a given time or more simply the power absorbed per unit mass. Excessive usage of cell phone leads to several unprecedented health hazards like ear warming, hearing loss, headache, sleep disorders, memory loss, infertility and in long run cancer. It does not imply that cell phones should not be used, but for sure it should be moderately used. There are certain do's and don'ts that ought to be kept in mind while using mobile.

Do's	Don'ts
<ul style="list-style-type: none"> • Limit the use of cell phones. • Restrict your calls to shorter duration. • Prefer SMS to voice call. • Choose mobile with lower SAR values. • Try to keep it at least 1 foot away while using Bluetooth and headphones. • Use landline wheresoever's it is possible. • Keep it away from your body while at work /home. • Switch off mobile data package when not in use. • Use your mobile phone only when necessary 	<ul style="list-style-type: none"> • Don't keep it in pocket for long. • Don't keep it below pillow while sleeping. • Don't keep it near chest area while using headphones. • Don't talk for several hours on cell phones. • Don't permit children to use mobile phones, since children's skulls are thinner than adults and have more fluids. • Don't permit pregnant females to overuse mobile phones. • Don't use cell phones in metal enclosures like lifts, as the radiation is reflected.

Life with(out) Plastics???

Dr. Priyanka Mathur
Department of Zoology



Plastics are everywhere, from the most remote oceans to the tissues inside our bodies, from cell phones, computers, hospital bags to water bottles and baby feeding bottles, plastic has molded society in many ways that has made life

both easier and comfortable. It is because plastics are long-lived, light weight and inexpensive products and can potentially serve for decades. In many instances it is used as single-used item that goes to the garbage dump within a year, where they persist for centuries, many of which ends up littering the environment. Studies document the pervasive impact of this most common consumer material as it has chemicals that harm people and the environment.

Studies reveal that the chemical that build blocks and make plastics so versatile are the same components that harm people and the environment; its production and disposal contribute to an array of environmental problems viz:

1. Chemicals added to plastics are absorbed by human bodies and alter hormones or have other potential human health effects.
2. Plastic debris, laced with chemicals and often ingested by marine animals, can injure or poison wildlife.
3. Plastic buried deep in landfills can leach harmful chemicals that spread into groundwater.
4. Around 4 percent of world oil production is used as a feedstock to make plastics, and a similar amount is consumed as energy in the process.

People are exposed to chemicals from plastic multiple times per day through the air, dust, water, food and use of consumer products. For example, phthalates are used as plasticizers in the manufacture of vinyl flooring and wall coverings, food packaging and medical devices. Eight out of every ten babies, and nearly all adults, have measurable levels of phthalates in their bodies.

In addition, Bisphenol A (BPA), found in polycarbonate bottles and the linings of food and beverage cans, can leach into food and drinks. People with the highest exposure to BPA have an increased rate of heart disease and diabetes in adults as well as brain and hormone development problems in fetuses and young children, also BPA is considered as an endocrine disruptor because it mimics estrogen, a natural hormone, and may fool the body by stimulating reactions that are unnecessary and potentially harmful. It can promote human breast cancer cell growth, decrease sperm counts and other reproductive abnormalities.

Numerous studies have shown that BPA leaches from plastics and resins when they are exposed to hard use or high temperatures (as in microwave ovens and dishwashers). Because Bisphenol A is used in so many common products that we use every day—such as baby bottles, reusable water bottles, microwaveable containers, and the protective coating inside most food and beverage cans—most people are exposed almost continuously to some level of BPA.

The reports say that the high exposure of premature infants in neonatal intensive care units to both BPA and phthalates is of "great concern." as exposure to phthalates alters genital development in young boys. Yet the effects on human health remain largely unknown. To help shed more light on the issue, there is a need to have more sophisticated studies on humans are required.



Source: Charboneau, J.P. and Koger, S.M. 2008: Plastics, pesticides and PBDEs: Endocrine Disruption and Developmental Disabilities. *J. Dev Phys Disabil.* 20:115-128

Ph. D Awards 2013

Faculty



Radhika Sharma
Biotechnology
Supervisor: Prof. Madhu Kumar
University of Rajasthan, Jaipur



Neha Batra
Biotechnology
Supervisor: Prof. Vinay Sharma
Banasthali University, Banasthali



Deepak Singh Rajawat
Chemistry
Supervisor: Prof. Soami P. Satrangee
D.E.I., Deemed University, Agra



Mani G Singh
Home Science
Supervisor: Dr. Ila Joshi
International College for Girls, Jaipur

Students



Nitu Bhaskar
Zoology
Supervisor: Dr. Lata Shahani
The IIS University, Jaipur



Nandini Taparia
Zoology
Supervisor: Dr. Priyanka Mathur
The IIS University, Jaipur



Tanu Tiwari
Home Science
Supervisor: Dr. Ila Joshi
International College for Girls, Jaipur



Nitin Tandon
Chemistry
Supervisor: Dr. Raakhi Gupta
International College for Girls, Jaipur



Runjhun Tandon
Chemistry
Supervisor: Dr. Raakhi Gupta
International College for Girls, Jaipur

ACHIEVEMENTS

Faculty

Best Paper Presenters

Research Scholars



Navneet Sharma
CS & IT
National Seminar on contemporary issues in accounting, MLSU, Udaipur



Payal Mehtani
Biotechnology
National conference on NPBP, University of Rajasthan, Jaipur



Priyanka Verma
CS & IT
International Conference on BICON, Biyani Girls College, Jaipur



Pooja Maheshwari
Chemistry
International Conference on NETC The IIS University, Jaipur, Researcher of the Year, Annual Function 2013



Deepika Singh
Chemistry
International Conference on NETC The IIS University, Jaipur



Sanjoli Mobar
Zoology
II prize, National Conference on Biodiversity Conservation, The IIS University, Jaipur



Urvashi vijay
Zoology
II prize, XXXIII Annual Conference of STOX, DUVASU, Mathura



Sudesh
Chemistry
National Conference on EITES, Agrawal P.G. College, Jaipur

Students



Anushree Vijay, Rimika Mathur, Anupriya Jain, Divya Agarwal, B. Sc. Sem V, First Prize at Chemistry Olympiad, University Maharani's College, Jaipur



Devika Thirani
BA (H) Psychology Sem III
First Prize at Inter-college Dance competition -Razzenmatezz Jaipur National University, Jaipur



Chetna K. Rathore
BA (H) Psychology Sem V



Shiromi Chaturvedi
BA (H)
Psychology Sem I, First Prize at Inter-college Debate 'Verbal-Due' J.K. Lakshmiapat University, Jaipur



Pragya Chakravarthy
BA (H) Psychology Sem I, First Prize at Solo Song Inter-college Fest Apex Institute of Management and Science, Jaipur



Arushi Shrivastava, Radhika Mehandiratta
BA (H)
Psychology Sem V, First Prize at Mock Parliament in Synergy, St. Xavier's College, Jaipur

Lectures at a Glance



Dr. SJS Floora
Dy. Director, DRDE
Gwalior

Dr. Indu Ravi
Asst. Regional Director
IGNOU

Prof. K. D. Broota
Former Head
Dept. of Psychology, DU

Ms. Garima Srivastav
Director
Approach Autism (NGO)

Mr. Govind Sharma
Head, IPR, P & A, NDRC,
New Delhi

Prof. Aruna Broota
Retd. Prof.
Dept. of Psychology, DU

Conferences at a Glance

- ❖ International Conference on "New Emerging Trends in Chemistry", a satellite conference of 3rd Indo-German Conference on Modeling Chemical and Biological (Re) activity on 3-4 march, 2013
- ❖ National Conference on "Biodiversity Conservation: Embracing our Future, Preserving our Past" on 27-28 Sept., 2013
- ❖ National conference on "Mobile Phones & Electromagnetic Pollution Hazards: Challenges and Solutions" on 20-21 Dec., 2013



Padam Shri Prof. Goverdhan Mehta
National Research Prof.,
University of Hyderabad, Hyderabad



Dr. R.C. Upadhyay
Principal Scientist, Directorate of
Mushroom Research, Solan



Prof. Hendrik Zipse
LM University, Munich
Germany



Prof. Girish Kumar
Electrical Engineering Department,
IIT, Bombay



Dr. Vinod B. Mathur
Dean, Wildlife Institute of India
Dehradun



Prof. Ganesh Pandey
Director, Sanjay Gandhi PG Institute
of Medical Sciences, Lucknow



Dr. R. S. Sharma
Dy. Director General (SG) & Scientist
ICMR, New Delhi



Dr. V. Bhaskar Ramana Murthy
Additional Director, Andhra Pradesh
Forest Academy, Hyderabad



Prof. V. K. Singh
Director
IISER, Bhopal



Dr. G.V. Reddy
Additional Principal Chief Conservator
of Forests, Rajasthan



Prof. E. D. Jemmis
Director
IISER, Thiruvananthapuram



Prof. Gernot Frenking
Philipps University, Marburg
Germany



Dr. S.C. Jain
Ex. Additional Director, CFFES
Delhi



Prof. Sneha Anand
Centre For Biomedical Engineering
IIT, Delhi



Prof. Peter Comba
University of Heidelberg
Germany

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,
Dr. Raakhi Gupta, Registrar

Faculty Coordinators: Ms. Manisha Patni, Dr. Sreemoyee Chatterjee,
Ms. Shveta Parnami, Dr. Vandana
Student Coordinators: Ms. Pooja Maheshwari, Ms. Nandini Goswami, Ms. Harshita
Kaushik, Ms. Meeshal Wadhvani, Ms. Jagrati Gangal
Composer: Mr. Vijay Chaturvedi
Published by: Faculty of Science, The IIS University, Jaipur