



# SCICONSCOPE

SCIENCE FOR SHAPING THE FUTURE OF INDIA



NEWSLETTER OF 100<sup>th</sup> INDIAN SCIENCE CONGRESS 2013, KOLKATA

Saturday 5 January, 2013



Kalam Making a Point in Children Science Congress

## APJ Abdul Kalam Inaugurates Children Science Congress

AYAN CHANDA

“Dream, Dream, Dream/ Dream transforms into thoughts/ Thoughts of Results into Action” resonated the voice of Dr APJ Abdul Kalam, former President of India, on the inauguration of the Children's Science Congress. “Indian Science Congress has orbited the Sun 100 times,” he said referring to the centenary of the Indian Science Congress.

Thousands of people thronged the Pandal at Satyendra Nath Bose National Centre for Basic Sciences on the morning of 4 January where Dr Kalam was the Chief Guest at the inauguration of the Children Science Congress 2013. A people's favourite, Dr Kalam went straight to shake hands with a number of spectators waiting to hear him, before going to the dias. The rush that ensued would have given any Bollywood celebrity a tough competition. With the excitement refusing to stop, Dr Kalam calmed the crowd in his own inimitable style.

Kalam's talk revolved round the way Indian youth can become instrumental in

making India one of the five great countries in the world by 2020. The path to this glory has four conveyances – great aim in life, continuous acquisition of knowledge, hard work and perseverance. The interactive session was studded with moments where the distinguished speaker asked the audience to repeat after him words and lines of inspiration. “I will work, work and succeed” shouted everybody after him.

Science and excellence are rarely born out of accident but through a fruit of curiosity and hard work said Dr Kalam. Giving the examples of great minds like Thomas A Edison, Wright brothers, Alexander Graham Bell, C V Raman and Srinivas Ramanujan, he tried to enthuse the children. He asked the congregation to be unique just like them, to imagine the impossible and fight the hardest fight till one achieves the goal. “For that”, he claimed, “courage is needed. Courage to think different, courage to invent, courage to travel into an unexplored path, courage to discover the impossible and

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*“I will work with integrity and succeed with integrity. Whatever knowledge I gain, I will share with others”*

*APJ Abdul Kalam in Children Science Congress*

## Today's Highlights

- Plenary Lectures: Homi Bhabha Session - SNBNCBS – 9:00 to 10:30
- Women Science congress- EZCC – 10:00 to 13:15
- Symposia – CU Tech Campus – 11:15 to 13:15
- Sectional Programmes – CU Tech Campus, SNBNCBS, AIIHPH, JU – 14:00 to 17:30
- Public Outreach Sessions – SINP, NICED, BI – 14:00 to 17:30
- Vigyan Sancharak Sammelan – Techno India University Campus – 14:00 to 17:00
- Women Science Congress- EZCC – 14:15 to 18:00
- Public Lecture – SNBNCBS – 17:45 to 18:45
- Cultural Programme – EZCC – 18:00 to 20:00

*contd. from p.1*

the courage to combat problems and succeed.”

Pin drop silence prevailed in the venue as Dr Kalam spoke, only to be punctuated by thunderous applause whenever he made a point. His thoughts were accompanied by some inspirational slides. He also gave the ten Infosys Travel Awards, started in 2004-05, to deserving candidates studying in schools across the country, besides also releasing two educational CDs.

He continued his deliberation by giving some examples of the way science has moved forward. He stressed on the convergence of technology, like Biotechnology-Infotechnology-Nanotechnology. He described his experience of actually watching a nanorobot in action in South Korea. His Excellency urged to “bring down the iron curtain” so that boundaries between disciplines no longer remain and information is shared freely.

The audience was treated with a beautiful poem put up on the big screen titled “I will fly

and fly” which coupled with several anecdotes from Dr Kalam's previous interactions with students threw light on the way to raise one's confidence and achieve success. “I will work with integrity and succeed with integrity. Whatever knowledge I gain, I will share with others” called out everybody.

He concluded his deliberation in his trademark accent. He asked the audience to promise to set up a small home library consisting of quality books pertaining to one's field of interest. One should read them regularly and increase their stores of knowledge which would eventually translate into creativity, righteousness and courage. He led the gathering in the chant, “I will be known in history as a unique person in science and technology, my national flag flies in my heart, I will bring glory to my nation”. With a smile and a wave he returned to his seat leaving a hall full of people clapping all the way. ■



*When life is very bad, two things make it worth living- Mozart and quantum mechanics.*

Victor Weisskopf, Physicist

## Quantum Leap

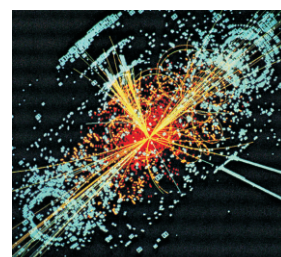
DEEPA HARIHARAN & SAMPURNA BISWAS

Dr Ajay K. Sood, an experimental physicist from IISc, Bangalore, discussed a theorem which he called a rare event. According to the theorem, which the scientists call the 'Fluctuation theorem' heat can also flow from cold to hot object. According to Dr Sood, the mechanical imitations may also help in collective understanding of behaviour in other active systems. He described his work in The S. N. Bose session of science congress. His work deals with the study of some systems that speak of current interests like green soaps.

Dr Barry Sanders, Director, Institute for Quantum Information Science, Canada, spoke on quantum computers. He stressed on the fact that these computers can be used in various fields and has many advanced features over the classical ones. Prof. J. K. Joshi in the S. N Bose Session of the Indian Science Congress on January 4. The scientists addressed the inquisitive gathering about the work they have done, in a very simplified manner.

According to him, quantum computers can help physicists solve the vast array of physics problems. Rendering tribute to S.N. Bose, Prof. Girish S. Agarwal from the Oklahoma State University briefly discussed about quantum mechanics which involves light and its interactions with matter. He also spoke about the new technology that can detect single elementary light particle.

The discovery of Higgs Boson, popularly known as God particle made a long stride in the world of science and mankind. Rohini Godbole, a physicist from IISc, Bangalore, was a part of the team and witnessed the discovery on 4<sup>th</sup> July 2012. Indeed the Higgs hunt is over, but a new journey has begun. ■



# Energy from other Planet

BY LIMA CHAUDHURI



It is possible to get energy from other planets, suggested Dr Jitenra Nath Goswami while deliberating in the M N Saha Session of the ISCA. Referring to the origin and evolution of solar system, he suggested that the energy of solar exploration can be used. Citing the exploration in moon and the recent one in Mars with the help of Chandrayaan1, which he described as one of the path-breaking examples of exploration of the solar system.

The power consumption of the entire world would increase 1.2% by 2035. This increasing demand can only be met by nuclear power, said Dr Krishnaswamy Kasturirangan in a session of science congress. He also emphasised on the use of solar power as referred to the 12<sup>th</sup> five year plan of India. India lags much behind the developed countries in the field of energy consumption. India having the fourth largest coal reserves in the world can use coal to overcome the energy

demand, he said. However, it is not an ultimate solution to meet our power demand as the coal would be exhausted through consumption after a certain time. He also advocated for use of algae to generate fuel in future.

Dr Srikumar Banerjee also spoke for the use of nuclear power instead of getting energy from other sources. "Nuclear power has sustainable advantage over coal energy," he said. Quoting Brundtland commission he mentioned some important considerations for adopting the closed fuel recycle programme. He announced the forthcoming projects for construction of many power stations all over the India by 2032.

Dr Rajagopala Chidambaram, chairperson of the session, emphasised on the non-conventional energy including solar, water and air. India would be a developed country only if it has a high percentage of both male and female literacy with a knowledge of energy consumption.

Major General (Dr) R Sivakumar, Head, Natural Resources Data Management System, Dept. of Science & Technology, Govt. of India, coordinated the session. ■

## Women's Science Congress Inaugurated

ANUSI SARKAR

"yah devi sarbabhutesu shakti rupena sangasthita- let the women be worshipped as the source of power"- Swagatalakshmi Dasgupta set the tune of the inauguration session of second Women's Science Congress, which has the focal theme "Women empowerment for the development of country", inaugurated by Mr Jaipal Reddy, honourable minister of Science Technology and Earth Science, in Satyendra Nath Bose National Centre for Basic Sciences, Kolkata. Dr Vijayalakshmi Saxena, General Secretary, ISCA (Scientific Activity) lamented the views of majority of people who still think women as traditional home maker despite the remarkable feats achieved by Kalpana Chawla and Sunita Williams. She urged all the women to meet up to their potential without waiting for help, braving all odds.

She mentioned that the involvement and engagement of women in science on an equal footing with men would directly contribute to improve the livelihood of people, making it more sustainable and thereby promoting the social and economic advancement of the country. It is because of this and to salute indomitable spirit of the women, Indian Science congress has started a unique section 'Women's Science Congress' last year.

"The unique skills of women should be fruitfully channelized to meet the demands of recent scientific challenges", said Dr Gretchen Kalonji, Assistant Director General for Natural Science, UNESCO, Paris. UNESCO in collaboration with government of India is performing a lot of activities for women welfare, she informed. She personally



Inaugural Session

invited all young scientists present on the occasion to get attached with the organization for betterment of position of women in Indian Society.

Earlier welcoming the guests Prof Suranjan Das, the Vice Chancellor of Calcutta University hailed the efforts of Shri Jaipal Reddy, Honourable Minister of Science Technology and Earth Science in his welcome address, for taking various initiatives to make several proactive steps in popularizing science by making new Science and Technology Policy. ■

## With Anguish Reddy Remembers Bravehearts in Delhi



Jaipal Reddy

### Reddy hails social network for empowerment

The spontaneous outrage of the youth against the heinous crime against the braveheart in Delhi proves beyond any doubt that social networking tools like face book, twitter, YouTube and SMS play important role in empowering people to make their voices heard,

said Jaipal Reddy, while inaugurating the Women Science Congress here today. He lauded the efforts of social media to

create positive impact. Speaking about the Government's priority to empower women, he informed about the increase of the 30% participation quota for women to 50% in *zilla panchayats* and municipalities.

A seasoned politician Sri Reddy informed about the Women's Reservation Bill in the Parliament hoping that it will be enacted with consensus. Remembering the role of the Indian women in the freedom struggle, he said about the role of the women after independence too. Reddy remembered Noble Laurate Madam Marie Curie and lauded the contributions of Ms Kiran Mazumdar Shaw, the founder CMD of India's largest biotech firm and Ms Chanda Kochar, MD, ICICI bank. Individual enterprise of women has remained the most important dimension of the new breed of women, said Sri Reddy. ■

# Not a Child's Play

ASHMITA BOSE

“Never memorize something which you can look up” said Albert Einstein, one of the greatest scientists of our time. Science is almost like magic. The only difference is while magic conceals logic, science tries to justify by logic and reasoning. The problem arises when people try to understand science by reading its assumptions. It is to be realized that science is reality and not philosophy. Practical demonstration is necessary for better understanding of science. We are fortunate to be born in a century of advanced science and technology. Mankind is confident of solving the secrets of the universe or even plunging into the depth of the sea. To keep the flag of innovation flying high we need the children to be interested in science. The need of the hour is to realize teaching science cannot be kept limited to pen and paper. Activities should be introduced to increase their curiosity, for we all know that if Newton would not have been curious of the falling of an apple then we would not have known the law of gravity.

The Indian Science Congress Association (ISCA) deserves kudos for introducing a special wing “children's Science Congress” from its 98<sup>th</sup> session in Chennai. Children participate in the science meet and enjoy the liberty to express their innovation or even dreams on the themes given to them. They are assisted by their teachers, club members and scientists. This helps in boosting the confidence of our school goers.



A participant

Not only the associations in India are aiming to popularize science among children but European Union (EU) in Europe has pledged € 1.9 million endowment to the education program EUNAWE - a division of the Universe Awareness (UNAWE) programme. It would inspire young children between 4 and 10, above all the disadvantaged ones, to appreciate science and technology. EUNAWE works to make young children aware of the Universe. It is supported under the Space Theme of the EU's Seventh Framework Programme (FP7). The EUNAWE programme will fuel kids' interest in science and encourage them to become good members of the science community earlier rather than later. EUNAWE will implement the Universe Awareness programme in Germany, Italy, the Netherlands, South Africa, Spain and the UK. Ultimately, EUNAWE will be instrumental in providing Europe with the next generation of engineers and scientists.

India on its part has been doing a lot to popularize science through INSPIRE Programme. Even various state governments are trying in various ways to create interest about science amongst the children

In UK interactive science workshops are run by Shell Education Service in Waterloo, where hundreds of children and their families from Lambeth and Southwark, over and above Shell employees and their families participate. At this fun family day organized at Shell Centre, parents and children had the opportunity to try out handy science experiments, covering investigations featuring electricity, energy transfer, forces and motion. Shell Education Service, which organizes and carries out science workshops, aims to encourage and inspire adolescent offspring to explore and question science through practical experiments. Shell Education Service brings science activities to approximately 60,000 children across UK each year.”

One of the best ways to bring complex ideas to life for children is through live performance of scientific experiments. Our nation's biggest challenges lie on people with science skills to find solutions, getting children interested and enjoying science at an early age. They are the future navigators of Science. APJ Abdul Kalam is right when he says to children, “give wing to your imagination.” □

## Quirky Moments

### Food ran out very fast

I used to go regularly to my student life but lately have become an irregular visitor though I never miss it if organised in Kolkata. Science over the years has become interdisciplinary. Although I am a chemist, I attend different sections. I particularly enjoy lectures on Physical Sciences and Geology. [Number of people attending has increased with rising interest in science over years. Thrust area of the conference has shifted from pure science to applied science with environmental awareness increasing.] I have some sweet memories with it. I was the member of the Cultural committee, the year Nikhil Ranjan Sen played the sitar. I was excited while preparing the stage for the great musician. And I remember there was a day, when the Mayor gave a banquet. For some reason or other, the food ran out very fast. Only God knows how that situation was managed.



**D. C. Mukherjee**

*Retired Professor, University of Calcutta*

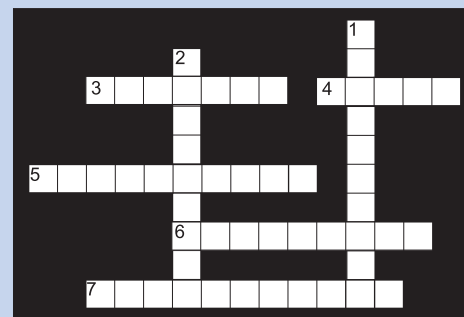
### Missed the bus

This is the seventh time I am attending the Indian Science Congress. As the conference is not specific to a particular subject, people from all disciplines come here. I really enjoy meeting them. Also, it is a time to catch up with old acquaintances from all over India. Over the years, I found the number of student-delegates has increased which is quite interesting. I remember, in 2003, when I attended the Congress for the first time at Bangalore, I missed my connecting train and had to travel quite a distance on road in a public bus. Panicked and tired, I reached the venue late in the night. But the organisers were extremely friendly and helpful and from then on, my stay was very enjoyable.

**Soma Banerjee**

*Assistant Professor,  
Heritage Institute of Technology*

## CROSSWORD



### Across

3. A thin layer covering the outside of cells (two words).
5. A kind of fungus.
6. A process in plants that uses carbon dioxide, water and sunlight to make sugar, oxygen and energy.

### Down

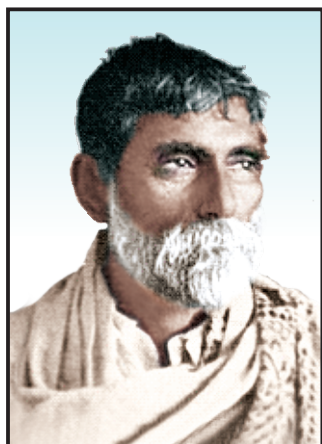
1. The green colouring that plants use in photosynthesis.
2. A reaction in living things that turns sugar and oxygen into carbon dioxide, energy and water.
4. The movement of water from an area with lots of water into an area with less water.



- 1 Peas showed me the way... who am I?
- 2 I was the Swedish Academy's first lady muse... who am I?

*Compiled By  
Ayan Chanda & Sangita Bhattacharya  
See Solution on page 8*

# Passion for Molecules



P. C. Roy

In 1895, a chemist in the laboratory of the Presidency College, Kolkata, (then Calcutta) was trying to prepare mercurous nitrate. He mixed cold dilute nitric acid and mercury. He obtained yellow crystals of mercurous nitrite instead the nitrate. "The discovery of mercurous nitrite opened a new chapter in my life", wrote, the chemist Acharya Prafulla Chandra Ray, in his autobiography. The discovery of mercurous nitrite was published in the *Journal of Asiatic Society of Bengal*. That was immediately

noticed by the editors of *Nature* and a series of new investigation in this area got started.

Ray was born in 1861 in Raruli, in Jessore district (now in Khulna, Bangladesh). While studying B.A with Chemistry in the Metropolitan College, Calcutta (now known as Vidyasagar College), he met Prof. Alexander Peddler, and this became a turning point in his career. He received Gilchrist Scholarship even before obtaining his degree. He joined the Edinburgh University from where he received B.Sc and D.Sc degrees in 1885 and 1887 respectively.

Returning to India Ray joined the Presidency College. He got a brilliant group of students and carried out his research. Retiring from this college in 1916 he joined the University College of Sciences of Calcutta University as the Palit-Professor of Chemistry on the request of the Vice-Chancellor Sir Asutosh Mookerjee. He made a vibrant group of students in both the places he taught. P. Neogi, A.C. Ghosh, P. Ray, H.K. Sen, N.R. Dhar, R.L. Dey, M.L. Dey, N.B Adhikari, B.C. Guha, N. Roy, P.B. Sarkar, J.C. Ghosh, J.N. Mukherjee, N.N. Ghosh were some of them who later occupied



B. C. Guha

important positions all over the country. In 1936, he retired from his regular service in Calcutta University but continued as an Emeritus Professor till his death on June 16, 1944.

Ray established the Bengal Chemical and Pharmaceutical Works in 1892 which fulfilled his dream of employment generation and poverty alleviation. Possibly this is the first entrepreneurial venture of an Indian scientist. Ray established the Indian Chemical Society in 1924 as the founder President with some of his pupils, J.N. Mukherjee, S.S. Bhatnagar, J.C. Ghosh, N.R. Dhar, to name a few.

Ray would be remembered for his scholastic book *The History of Hindu Chemistry*. In the book, Ray projected before the world the development of chemical science in ancient India. He was inspired by the French Chemist, Professor Berthelot to undertake this patriotic task. In the preface of the second volume of the *History of Hindu Chemistry*, he wrote, "The Hindu Nation with its glorious past and vast latent potentialities may yet look forward to still more glorious future and if the perusal of these pages will have its effects in stimulating my countrymen to strive for regaining their old positions in the intellectual hierarchy of nations, I shall not have laboured in vain."

His autobiography *Life and Experience of a Bengali Chemist* also reflects his patriotism and also brings out the aspiration of the nation. He wrote in the book, "While a student at Edinburgh, I

found to my regret that every civilised country including Japan was adding to the world's stock of knowledge, but that unhappy India was lagging behind. I dreamt a dream that, God willing, a time would come when she too would contribute her quota. Half a century has since then rolled by. My dream, I have now the gratification of finding, fairly materialised. A new era has evidently dawned upon India. Her sons have taken kindly to the zealous pursuit of different branches of science. May the torch thus kindled burn with greater brilliance from generation to generation."



Ashima Chatterjee

His was a good command on English, Bengali, Sanskrit, French, German, Greek and Latin. Ray used to spend about 90 per cent of his income, creating endowment as fellowship for students. Ray received worldwide admiration for his simplicity, knowledge, wisdom and patriotism.

**Biresch Chandra Guha**, popularly known as the 'Father of Biochemistry in India', started his research under P.C. Ray in Calcutta University. He did Ph.D. and D.Sc. from London University. In 1936, he was appointed the Ghosh Professor and the head of the department of applied chemistry in the University of Calcutta. Being a visionary, Guha could perceive the growth of biochemistry in India. He founded the department of biochemistry in Calcutta University. He would be remembered his research on vitamin C.

“ I found to my regret that every civilised country was adding to the world's stock of knowledge, but that unhappy India was lagging behind. I dreamt a dream that, a time would come when she too would contribute her quota.

P.C. Ray”

**Ashima Chatterjee**, a pioneer in natural product chemistry research, passed M.Sc. in Chemistry from the University of Calcutta in 1938. She was the first woman to receive a D.Sc. Degree from an Indian university. She developed and patented anti-epileptic and anti-malarial drugs from plants which were marketed by several companies. She edited the *Bhartiya Banoushodhi*, published in six volumes, and the *Treatise of Indian Medicinal plants* published by CSIR. Chatterjee received Padma Bhushan in 1975 and the Bhatnagar award in 1961. She was elected the Fellow of Indian National Science Academy (INSA). She was the General President of the 11<sup>th</sup> Indian Science Congress, the first woman scientist elected for the post. She established the Regional Research Institute for conducting research on medicinal plants in the Salt Lake City. □

Dulal Chandra Mukherjee

## Chemistry Counts

ADITYO PAUL



Dr Bimal Banik

Prafulla Chandra Ray Session on the Frontiers of Chemistry featured three eminent chemists including the Nobel laureate Dr Ei-Chi Negeshi. Dr Negishi discussed the magic power of

some metals, which the chemists call transition metal, in making new compounds. He discussed how palladium with its special properties catalyze reactions and join molecules that do not react. He advised the youngsters to follow their dreams and to work hard to make them real.

Penicillin, in a modified form, can be used for treatment of cancer, said Dr Bimal Banik. He explained how the unique ring present in penicillin can help fight cancer. Certain chemical changes of those rings give them the special property. Those changes help them inhibit growth of cancer cells. The drug is most effective against pancreatic, oral and ovarian cancer. Although, the research is still in the process, the field is hopefully heading towards a cure for cancer.

Dr R.A. Mashelkar, former Director General, CSIR, chaired the session. He mentioned the role of Acharya Prafulla Chandra Ray and his contributions. Dr Animesh Chakravorty, took up the task of telling the life-story of Dr P.C. Ray as a legendary figure of chemistry and how under his direction chemistry developed from just a science subject to an industrial science in India. □

## Only one Earth

SURUCHI PODDAR



Prof. Jagadish Shukla

Four distinguished scientists spoke in the D.N.Wadia session on Earth System Sciences. Prof. Harsh K. Gupta, chaired the session and introduced it by saying, "Dr D.N. Wadia provided an important input in agricultural sciences and he was the first person to work with the soils of the country". For special information to the readers, Prof Gupta is known for his work on Tsunami warning system. He

also talked about the measures to cope with earthquakes. Furthermore, Prof Gupta has also taken an initiative to setup a permanent base of India at Antarctica.

Dr V.K.Dadhwal, Director, NRS Centre, Department of Space, Hyderabad, followed the Chairman. Focusing on the terrestrial carbon cycle of India Dr Dadhwal discussed the impact of increased carbon dioxide concentration on the ecosystem. He illustrated his speech using the earth's observation and field data taken by satellites. He informed about the installation of flux-towers in Sunderbans of West Bengal for measuring the carbon dioxide concentration along with methane. He concluded his speech with a statement that, "the moment forest conservation was started carbon dioxide concentration dropped significantly".

Prof. Jagadish Shukla, University Professor, George Mason University, USA, spoke on predictability and prediction of monsoons in the present and future climate. "For last fifty years weather prediction skill has constantly improved", said Prof. Shukla.

Dr Ronald Prinn, Director, Centre for Global Change Science, MIT, USA, spoke on the different aspects of development and application of integrated earth system models. Dr Prinn identified the earth system models as critical tools for environment and economic development for future food, energy and water resources. "We do not have another earth to serve as a reserve", said Dr Prinn explaining the need of complex Integrated Earth System Model's (IESMs). Dr Shailesh Nayak, Secretary, Ministry of Earth sciences, Government of India, delivered the concluding lecture of the session. □

## Translate Science

The second day of the centenary session of Indian Science Congress witnessed a meet where the eminent scientists shared their concerns about popularizing scientific concepts among the common Indians. Science Communicators' Meet held at Techno India University campus brought forth the fact that even in this 21<sup>st</sup> century there remains a distance between the common people and the scientific community. In her welcome address, Dr Vijay Lakshmi Saxena, General Secretary (scientific activities), 100<sup>th</sup> Science Congress, said that science communicators have the very important duty of helping the common men to overcome their misconceptions about scientific facts and principles. Going in tune with her, Dr Shekhar Bhattacharjee, Chairman of the meet, mentioned in his speech that methods invented in laboratory, must be made available to various sections of society in a way so that they are understandable and beneficial to the under-privileged people.

The inaugural address by Dr K Kasturirangan, Member, Planning Commission, Government of India, highlighted the young generation to get more involved with the thoughts and



Dr Moni Bhawmik

procedures of scientific activities. According to him, as the scientific community of India has an unavoidable responsibility to spread awareness about different scientific discoveries among every cross section of society, the language of speaking science with common people has to be void of, as far as possible, technical jargons. Connection of society with the scientists is also very important so that the benefits from nuclear power, genetically modified crops and organisms can be well received, as these are very much important for raising the standard of living of the people.

SUMEDHA MUKHERJEE

The Guest of Honour of the session, Dr Mathur, spoke about the increasing need of science journals and journalism. An earnest effort from print media can have an impeccable effect on the public minds helping them to understand science. "Science can act as an engine to take the country to the highest point"- said Dr B P Singh, Head, NCST, Department of Science and Technology in his presidential address. The Science Communicators' Meet demonstrated that releasing of scientific knowledge to the mass will act positively towards the growth of science as well as the people of our country. Dr Moni Bhawmik graced the occasion as the chairman of a technical session. □

### Kasturirangan speaks to Scionscope

**Q. What is India's advancement in the field of mars and moon expedition?**

**A.** Expedition to moon is still in initial stages. In futuristic mission to moon, process can be set up to analyze a sample there itself or bringing it back. Expedition to mars can be a 300-400 days thing. It is quite challenging due to trajectory, possibility of permafrost and wild storms.

# The Bondmaker

SRABANTI BASU



Dr Ei-ichi Negishi

When some researchers think it is time to go back to the nature for survival of the civilization Dr Ei-ichi Negishi thinks otherwise. "Look at my shirt; it is 50 per cent cotton and 50 per cent polyester. My coat is 100 per cent synthetic," said Dr Negishi while speaking to the *Sciconscope*. Negishi, winner of the Nobel Prize in chemistry in 2010, believes in a synthetic world. He does not rule out the hazards, but at the same time reminds, civilization will come to an end if we say a complete no to plastics and polymers. While addressing delegates in the science congress Negishi discussed his own concept of 'green chemistry', a recent buzz word in chemistry research. "The term 'green chemistry' is often misinterpreted. Green chemistry doesn't

mean a total rejection of synthetic materials and making 100 per cent natural," he said. To him, 'green chemistry' means the way of making compounds, especially the organic ones, with high yield. The process must be economic, safe and should give a pure compound. In his lecture, Negishi discussed how the metal palladium can play a trick in fixing two carbon atoms of a molecule.

Negishi chose palladium to make bonds between carbon atoms which is otherwise difficult. Palladium takes away the metals and halogens linked with carbon atoms. The carbon atoms then come close and make a bond. Palladium can be reused for several times. The process, known as Negishi coupling, is highly popular to industrialists who use it for making medicines, food packets, television screen, to name a few.

Negishi, a graduate of the University of Tokyo, joined a chemical company Teijin when he received the Fulbright-Smith-Mund All-Expense Scholarship. He joined the University of Pennsylvania as a doctoral student with the scholarship. Negishi started his post doctoral work at the Purdue University in the laboratory of Prof. H.C. Brown, which he considered a turning point in his career. Brown, a Nobel Prize winner in chemistry in 1979, was a researcher with a no-compromise attitude. "He wanted to ensure that negative results are really negative," said Negishi. Brown, whom Negishi considers his 'true mentor', became a change-maker in his life.



Make the bond: Dr Negishi with a delegate

Negishi joined the Purdue University as an assistant professor and began his pioneering work with metal catalysts. He moved to the Syracuse University and was invited back to the Purdue University after few years.

Negishi believes in making bonds. Oliver Sacks, a neurosurgeon and the author of the book *Uncle Tungsten* was fascinated by the colourful world of chemistry in his childhood and wanted to be a chemist. He lost his interest in the subject when quantum theory came in. To him, it became more physics than chemistry, as he commented in his book. Negishi, however, does not agree with Sacks. He does not believe in such boundaries. "Chemistry often sits on physics and the vice versa," he told *Scieconscope*. Instead of saying physics or chemistry, he prefers to say physics and chemistry. "It is a world of science. I like to break the boundaries and make bonds," he added.

Negishi loves playing piano. He loves golf too. Which one is more interesting, chemistry, golf or piano? "All of them," mused the scientist. "I need my family, I need my profession and I need my hobbies to give a complete shape to my life," he said.

Negishi indeed loves making bonds; bonds between molecules, between physics and chemistry, between sports and music. □

To be happy there is no need to win a Noble Prize. Being attached to something you love gives real happiness. A good mentor is capable of deleting all fear and doubt regarding a subject from his student's mind. If needed one to one mentoring should be given as well.

*Dr Negishi in an interactive session at the Heritage Institute of Technology*

**Life exists in the Universe only because the carbon atom possesses certain exceptional properties.**

*James Jeans, Astrophysicist.*

