

ISSN 0409-7467



CSIR NEWS

Progress, Promise and Prospects

VOL 60 NO 21 & 22 NOVEMBER 2010

Distribution Ceremony of Shanti Swarup Bhatnagar Prizes and CSIR Award for S&T Innovations for Rural Development

C O N T E N T S



Address by the Hon'ble Prime Minister, Dr Manmohan Singh



Welcome Address by Prof. Samir. K. Brahmachari, Director General, CSIR



Address by Shri Prithviraj Chavan, the then Hon'ble Minister of State (IC) for S & T

CSIR Award for S&T Innovations for Rural Development – 2009



Shanti Swarup Bhatnagar Prizes for Science & Technology—2009



Shanti Swarup Bhatnagar Prizes for Science & Technology—2010



CSIR, India and UNIK, Malaysia Sign Agreement for R&D Collaboration



website: <http://www.csir.res.in>



PRIZE DISTRIBUTION CEREMONY

The Hon'ble Prime Minister of India, Dr Manmohan Singh, Presents Shanti Swarup Bhatnagar Prizes 2009 and 2010, and CSIR Award for S&T Innovations for Rural Development 2009



Seen on the dais during the CSIR Shanti Swarup Bhatnagar Prize Distribution Function at Vigyan Bhawan, New Delhi (*from left*) are: Prof. Samir. K. Brahmachari, Director General, CSIR; the Hon'ble Prime Minister of India and President CSIR, Dr Manmohan Singh and Shri Prithviraj Chavan, the then Hon'ble Minister of State for Science & Technology and Earth Sciences and Vice President, CSIR

The Prime Minister of India, Dr Manmohan Singh, who is also the President of the Council of Scientific & Industrial Research, gave away the Shanti Swarup Bhatnagar Prizes 2009 and 2010, and the CSIR Award for S&T Innovations for Rural Development 2009 at a glittering Function held at Vigyan Bhawan on 20 October 2010. Shri Prithviraj Chavan, the then Hon'ble Minister of State for Science & Technology (Independent Charge) and Earth Sciences and the Vice President of CSIR presided over the Function, which was attended by a galaxy of scientists, technocrats and media personnel. Prof. Samir K. Brahmachari, Director General, CSIR, extended a warm welcome to eminent personalities, the Prize-winners and their families, the distinguished invitees and the CSIR family.



Welcome Address by Prof. Samir. K. Brahmachari, Director General, CSIR

The Hon'ble Prime Minister and President, CSIR Society, Dr. Manmohan Singh, Hon'ble Shri Prithviraj Chavan, Minister for S&T and Vice President, CSIR Society, Awardees and their families, invited guests, CSIR staff, Ladies and Gentlemen. I extend you all a very warm welcome to the Bhatnagar Prize and CSIR Awards for S&T Innovations for Rural Development distribution ceremony and thank you for joining us on this special occasion.

The Hon'ble Prime Minister, Sir, your presence today is very special as it maintains a legacy, a faith of the one at the highest echelon of the governance in us. For the past more than 10 years, these Awards are being conferred by the Prime Minister of India, confirming for us your commitment and priority the Government accords to the importance of Science, Technology and Innovation. Thank you, Sir.

Science system in India, generically speaking, represented by Departments of Atomic Energy, Biotechnology, Space, Science & Technology, Scientific and Industrial research, Earth Sciences and others couldn't have been better blessed than to have Shri Prithviraj Chavanji as our Minister, himself an engineer researcher. He understands the system well and has deep empathy for the researchers working in it. We owe him a gratitude for his inspiring leadership.

Sir, we are honoring today 20 young Indians, and a 'company' who have made a difference to the path of science and innovation, which they are pursuing.

They represent the best of our science. It is very apt that they will henceforth be called "*Bhatnagar Awardees*", an Award named after a great Indian scientist, Dr. Shanti Swarup Bhatnagar, who laid the foundation of a great institution, the CSIR and was also instrumental in the setting-up and growth of many others, including Atomic Energy.

CSIR Award for S&T Innovations for Rural Development instituted in the year 2006 seeks to recognize those contributions, which bring in an innovation-centric, technology-driven change for the betterment of our rural population. It is an Award, which is complementary to CSIR's flagship programme, CSIR-800.

Sir, Bhatnagar Prizes were instituted in 1956 and were first given in 1958. So far, 463 proud Indians have got it, including the ones getting today of which 14 are women. The Awards are given to scientists, below 45 years of age, working in India in one of the seven science areas, namely Chemical, Biological, Physical, Medical, Mathematical, Engineering and Earth, Ocean, Planetary and Atmospheric sciences.

Sir, when I said that these awardees represent the best of our science for these years, this is a confirmation of the stringent, transparent and globally equitable selection criteria followed by the selection panels. It is for this reason alone that for the year 2010, no scientist has been recommended for the areas of Mathematical and Earth, Ocean,



DG CSIR, Prof. Samir. K. Brahmachari
delivering the Welcome Address

Planetary and Atmospheric sciences. Yet the bar of performance is no barrier for those who give their best.

Today, we have also achieved a landmark. Of all the 14 women scientists, who are recipients of this prestigious Award since 1956, 30 per cent are being honoured today. It is a very positive reflection of more and more women adopting science as a career. This trend is quite visible in the young girl engineers who have joined in 2009 and 2010 CSIR's most innovative programme, the Post-Graduate Research Programme in Engineering (PGRPE). It is a programme meant to prepare engineer researchers, like our own Minister, whom we need to further strengthen the manufacturing base of our nation.

It is also symbolic of the rising women power in India as has been proven by our women athletes in the recent Commonwealth Games. Sir, I, representing the scientists of India, thank you and the Hon'ble Minister for creating enabling policies and systems.



Setting-up of Academy of Scientific and Innovative Research; National Innovation Council; opening of several new S&T institutions and bio-clusters, IISERs, IITs are adequate pointers to your support. These institutions would provide us manpower to create a translational or solution science base as well as increasing our competitive manufacturing capabilities. It is this sound base which will help us to overcome any technology denial in future.

Sir, in extending you and the Hon'ble Minister for S&T and all those present, a warm welcome again, I must mention a historic development, which has happened recently. It is the Nobel Prize for Physics to two Russia born scientists but now living in UK. The honour is for the science which they did, but at what age, while Dr. Andre Geim is 42 years old, Dr. Konstantin Novoselov is just 36. Truly remarkable! This is what we have to create in India. Our hope is our young breed of focused and motivated researchers. Let us give them an enabling environment.

I welcome again and thank you all.

Address by the Hon'ble Prime Minister, Dr Manmohan Singh, at the Distribution Ceremony of Shanti Swarup Bhatnagar Prizes and CSIR Award for S&T Innovations for Rural Development

I am very happy to be here today at the prize distribution ceremony to honour some of the brightest young scientists in our country. I congratulate all the winners of the prestigious Shanti Swarup Bhatnagar Prize for the years 2009 and 2010. These Awards are a tribute not only to the individual brilliance of these scientists, but also a tribute to the institutions that have created the right environment to nurture their exceptional talents.

The Shanti Swarup Bhatnagar Prizes are awarded to scientists who are below the age of 45. The Awards recognize not just the excellence of the work already done by the scientists but the promise they hold for greater achievement in years to come. So to the award winners I wish to say: our nation is proud of your achievements but expects much more from you in the coming years.

Yesterday, in Hyderabad I said at the opening ceremony of the new Campus of the Tata Institute of Fundamental Research, that we cannot afford to rest upon past glories. If we aspire to straddle the heights of the scientific world, if we wish to sustain a high growth rate of 9-10% per annum and if we aspire to vanish poverty, ignorance, disease and hunger through innovation and creativity in science and technology, then our systems and methods will have to change fundamentally.

I sincerely believe that we need to make a break with the past. We need to create new systems, new structures and new ways



The Hon'ble Prime Minister of India and President CSIR, Dr Manmohan Singh addressing the gathering

of doing things that not just encourage individual excellence but also harness it effectively into socially productive multiplier outputs. This is a major challenge before our government but more particularly before our scientific community. We need to think boldly about how to go forward. If the leaders of the scientific community can build a consensus on what needs to be done and what the new rules of the game should be, it will be a powerful impetus for the government to act. It is time, therefore, that the new generation of Indian scientists takes on the responsibility of thinking about the future of Indian science and take the mantle of leadership in their own hands.

The Government of India has declared the present decade to be the 'Decade of Innovation'. Our government has set up the National Innovation Council to help evolve a road map for the future. The Council will



develop an Indian model of innovations that will go beyond formal R&D based systems. It will focus on creating an appropriate ecosystem conducive to fostering innovation across diverse sectors of our economy. It will use enabling technologies to develop not only new products, new processes and new services but also improve existing production and delivery systems. The Council will identify policy changes that may be required to spur and promote the cause of innovation. While encouraging all important sectors of our economy to innovate, it will make special efforts to facilitate innovation in the micro, small and medium enterprises sector and in the delivery of public services.

In this context, I am happy that emphasis of research is on problems facing our rural sector and this has received recognition from the CSIR. I commend this initiative of the CSIR wholeheartedly. Innovation is a key to solving the critical challenges our nation faces in providing food, water and energy security for our people. In India we have lived with the idea of

being a resource rich land, taking for granted the limitless bounty of mother Nature. In fact, the reality is that as a nation we are not well endowed with natural resources when measured on a per capita basis. We should, therefore, inculcate the traditional values of thrift embedded in our culture and our civilization and saving in the use of our scarce natural resources.

Scientific innovation should be harnessed to the needs for conservation. We have to extract “more from less”. We have to be able to develop technologies that create “wealth from waste”, thereby tackling the depletion and degradation of our environment while conserving our rich biodiversity and finite resources. I believe that Institutions like the CSIR have to play a catalytic role in this area.

Our government is establishing an Academy of Scientific and Innovative Research, which will use the infrastructure of the CSIR to impart cutting-edge research training in frontier areas of science and engineering that are not ordinarily

taught elsewhere. If we are to give meaning to our search for new frontiers in Indian Science, then a much larger participation of the private sector is also essential. We have to leverage the private sector's strengths by creating high i m p a c t collaborations. Let

private enterprise partner public S&T institutions in their translation and transformational efforts. Let them join hands with our public institutions in creating new manufacturing strategies for both strategic and non-strategic applications. Let there be publicly owned and privately operated world-class R&D facilities.

In this context, I congratulate the Indian Oil Corporation's R&D Centre at Faridabad for developing an environment-friendly, non-toxic, biodegradable “agrospray oil” to control plant pests. The Centre, therefore, richly deserves the “CSIR Award for S&T Innovations for Rural Development” for the year 2009.

In conclusion, I wish to say that we are in a period of transition in Indian science. There is a huge expansion in our higher education infrastructure. It is in these new institutions that we have to sow seeds of a new work ethics, a new work culture, a new orientation and a bold new vision of where Indian science can be and should be in the next few decades. We have to build infrastructural assets but also knowledge bases. We need to generate knowledge but also know how to put to good use. We need to encourage individual excellence but also solid teamwork. I am very optimistic about the future of our country and the future of science in our country. I am confident that the spark I see in many of the young faces in front of me will power the engine of Indian science powerfully in this 21st century. With these words, I once again congratulate all the distinguished awardees and I wish them still greater success in the service of the people of our great country.



The Hon'ble Minister Shri Prithviraj Chavan, presenting a shawl to the Hon'ble Prime Minister Dr Manmohan Singh at the SSB Prize Distribution Function. DG CSIR is also seen in the picture



Address by Shri Prithviraj Chavan, the then Hon'ble Minister of State (IC) for Science & Technology and Earth Sciences

Hon'ble Pradhan Mantri Ji and President CSIR Society Dr. Manmohan Singh Ji, DG CSIR Dr. Samir Brahmachari, Awardees and their families, Secretaries and officials of the Government, Guests from academia and other institutions, Members of my CSIR family, Ladies and Gentlemen. I extend you all a very warm welcome to this Prize distribution ceremony, being held to recognize and honour the winners of the Bhatnagar Prize for the years 2009 and 2010 and CSIR Award for S&T Innovations for Rural Development 2009.

Bhatnagar Prizes represent the best of best. They honour not only the most brilliant but the legacy of a great son of India, Sir Shanti Swarup Bhatnagar, who laid the foundation of CSIR or to say the base of modern Indian Science and technology. It was from CSIR that grew most of India's science departments and institutions.

Sir, today's ceremony is very special. Never in the history of Bhatnagar prizes so many women scientists have been bestowed with this honour of receiving this prestigious Award. While one of them gets it for the year 2009, three are being honoured for the year 2010 out of a total of 14 honoured with this Prize since its

inception in 1956. We hope this is the beginning of the empowerment of and recognition of our women scientists. This complements very well a stupendous show put up by our Women sportsperson in Commonwealth games. I compliment all the winners for the most creative work done by them.

We are also pleased to honour today, the Indian Oil Corporation's R&D Centre at Faridabad with "CSIR Award for S&T Innovations for Rural Development" for the year 2009 for developing an environment-friendly, non-toxic, biodegradable 'agrospray oil' for agricultural crops. I am pleased to say that this oil would greatly help our farmers and agro ecosystem to effectively control plant pests and certain diseases of agricultural crops. It is indeed a very appropriate recognition for some excellent research work done by India's biggest public sector company.

Today we are honouring scientists with Bhatnagar Prizes for the years 2009 and 2010. Sir, these Annual Awards are given for seven subject domains, covering, Chemical, Biological, Engineering, Physical, Mathematical, Medical and Earth sciences. So far a total of 463 scientists have had the honour to



Shri Prithviraj Chavan, the then Hon'ble Minister of State (IC) for S&T and Vice President, CSIR addressing the audience

receive these prizes including the 20 receiving today. The selection criteria being very stringent, empirically refined, sets a performance bar, which is high and has over the time earned the respect of discerning scientific community. It is for this reason alone that for the year 2010 we have not selected anyone for Earth and Mathematical sciences. I compliment the DGCSIR and the Selection Committees for keeping up the standard.

Sir, in the same vein I must put my admiration for CSIR for continuing a legacy of honouring most creative and innovative young scientists. By honouring them, it in fact celebrates its own achievements. It continues to lead India by sheer range and depth of its contributions. It is in this context I would like to mention



that about 100 industrial partners of CSIR would be showcasing their products and services based on CSIR's knowledgebase in *CSIR Technofest* being organized as a part of *India International Trade Fair 2010* in November this year. It indeed would be a glorious tribute to CSIR's 68 years of service to the cause of the nation.

Setting up of Academy of Scientific and Innovative Research is a quantum leap by CSIR into knowledge space. Sir, not only this Academy would offer most thoughtful, innovation driven and industrially relevant curricula but would have the best of faculty that is the practicing scientists of CSIR system. I convey our gratitude to you, Sir, for making it possible for us. We have already given a soft launch to the Academy.

Sir, it gives me great pleasure and pride that ever since our government coming in power, the Ministry of Science and Technology has given a big thrust to promoting science, technology and innovation driven schemes. We have set up several new institutions and clusters, primarily to give our country a head start in its translational efforts leading to utilization of laboratory generated know-how to industrial processes. National Agri-Food Biotechnology (NABI) at Mohali, Translational Health Science and Technology Institute (THSTI) at Faridabad, National Institute of Biomedical

Genomics at Kalyani and Nano Science and Technology Institute at Mohali, are some of the initiatives which aims at preparing specialist manpower of tomorrow. These are unique endeavours as they recognize the talented and offer remuneration and facilities at par internationally. I am proud to say that my Ministry cares for students and researchers in academia, industry and government institutions. For us they represent the intertwined Triple helix to progress.

Sir, While setting the XIth Plan's inclusive growth agenda for the country, we had envisioned to spend 2 percent of our GDP on R&D funding, but we have been able to reach only about 0.9% with private sector contributing about one fourth of it. This needs to be seriously looked at. Although we have set up many new institutions and clusters under Department of Science and Technology, Biotechnology, Space, Atomic Energy; launched several manpower development schemes like INSPIRE, Nehru Fellowship and Post-graduate Research Programme in Engineering (PGRPE); created funding mechanisms like Science and Engineering Research Board (SERB), Wellcome Trust-DBT India Alliance and Promotion of University Research and Scientific Excellence (PURSE); yet the XIth Plan target is far off.

It is time we bring in a new S&T Policy for the country. Globally, science and technology now operate in a large overarching domain where the boundary lines between biology, chemistry, energy, IT, nanotechnologies, materials, etc. have all blurred thereby leading to a multi-disciplinary convergence. This should indeed be the take off point for our XII plan blueprint for science and technology sector. Investment in science and technology is an investment for our future. I am happy to know that CSIR is going to address this need through a soon to be unveiled long-term policy document," CSIR Vision 2022"

In extending you all a welcome again, I am tempted to quote from Hon'ble Prime Minister's Bhatnagar Awards 2008 speech wherein he exhorted the then Awardees, by saying:

"Even as we applaud these achievements, we have to address ourselves as a nation to the larger challenge before us. How can science, industry and government work as one efficient and integrated machine to deliver to the people the benefits of these scientific and technological advances?" This call remains equally true for those receiving the Awards today, and all of us. Let's live up to his and nation's expectations. Thank you all.



CSIR Award for S&T Innovations for Rural Development ñ 2009

CSIR had instituted, in 2006, the “CSIR Award for S&T Innovations for Rural Development” (CAIRD) to recognize and honour outstanding S&T innovations that have helped transform the lives of rural people. The effort through this Award, in a way, is to give a boost to rural development through intrinsic innovation and implementation at ground level. The Award, which has emerged as a very prestigious one within a short period, carries a cash prize of Rs. 10 lakh, a citation and a shield.

CSIR Award for S&T Innovations for Rural Development - 2009 has been awarded to **Indian Oil Corporation, R&D Centre, Faridabad**. The Award was presented by the Hon’ble Prime Minister of India, Dr. Manmohan Singh to B. M. Bansal Chairman, Indian Oil Corporation and Dr R. K. Malhotra Director (R&D), Indian Oil Corporation. The IOCL has bagged the Award for developing an environment-friendly, non-toxic, biodegradable ‘Servo Agrospray oil’ for pest control in diverse agricultural crops. The oil is highly effective for controlling pests in agricultural crops such as cotton, pulses, grains, mustard, groundnut, sugarcane, potato, tea, grapes, mango, apple, citrus fruits etc. It is also effective in controlling certain plant diseases like *sigotoka* in banana, *powdery mildew* and *scab* on apples etc.

Considerably economical and non-detrimental for flora, fauna, human health and environment, the product is



The Award being presented by the Hon’ble Prime Minister of India, Dr. Manmohan Singh to Mr. B. M Bansal Chairman, IndianOil and Dr R. K Malhotra Director (R&D), IndianOil, in the presence of Shri Prithviraj Chavan, the then Minister of State (IC) for Science & Technology and Earth Sciences and DG CSIR, Prof. Samir. K. Brahmachari

one of its kind. Possessing more than 70% biodegradability, it meets ecomark requirement of Government of India. The agrospray oil gives not only insignificant residue in crops but also preserves their freshness and nutritional value. It could help replace harmful and toxic chemicals for controlling pests/ insects.

Introduced for the first time in India, Servo Agrospray oil is based on new generation bio-degradable base stocks. It fits well in integrated pest management programme, reducing overall pest management cost. Servo Agrospray oil can be sprayed through normal spraying equipments without using safety precautions like goggles, gloves and oxygen masks, which are normally wore for spraying of

conventional pesticides. It thus fits well in the present pest management regimen. The development of IOCL has benefited farmers extensively.



The CAIRD Shield



Shanti Swarup Bhatnagar Prize for Science & Technology

Shanti Swarup Bhatnagar (SSB) Prize for Science and Technology was instituted in the year 1957, in the memory of late Dr (Sir) Shanti Swarup Bhatnagar, FRS, the Founder Director of the Council of Scientific & Industrial Research (CSIR). The SSB Prize is awarded each year on the basis of conspicuously important and outstanding contributions to human knowledge and progress, made through work done primarily in India during the five years, preceding the year of the Prize.

Any citizen of India engaged in research in any field of science and technology up to the age of 45 years is eligible to be nominated. Overseas Citizen of India (OCI) and Persons of Indian Origin (PIO) working in India are also eligible. The SSB Prize, comprising a citation, a cash award of Rs.5,00,000/- (Rupees five lakh only) and a plaque, is given to each person selected for the Award in the following disciplines:

- Biological Sciences
- Chemical Sciences
- Earth, Atmosphere, Ocean and Planetary Sciences
- Engineering Sciences
- Mathematical Sciences
- Medical Sciences
- Physical Sciences

SSB Awardees are also entitled to a special honorarium of Rs.15000/- (Rupees fifteen thousand only) per month, till superannuation or till the age of 65 years (whichever is earlier). Till 2010, 463 scientists have received the prestigious Shanti Swarup Bhatnagar Prize for Science and Technology. Majority of SSB Awardees have remained in the country and contributed immensely to Indian Science & Technology. On 20 October 2010, the Hon'ble Prime Minister of India presented the Shanti Swarup Bhatnagar Prizes to 11 awardees for the year 2009 and 9 awardees for the year 2010.

Shanti Swarup Bhatnagar Prizes 2009 CITATIONS

Biological Sciences

Dr Amitabh Joshi

Dr Amitabh Joshi of the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore has made outstanding contributions to the study of experimental evolution and population dynamics. His work has creatively explored the action of natural selection under laboratory conditions.

Dr Bhaskar Saha

Dr Bhaskar Saha of the National Centre for Cell Science, Pune has made outstanding contributions in the area of

immunology and cell signaling. His studies have provided important insights into the plasticity of signal transduction mechanisms in immune cells and have revealed how these may be exploited for therapeutic purposes.

Chemical Sciences

Dr Charusita Chakravarty

Dr Charusita Chakravarty of the Indian Institute of Technology, Delhi has made significant contributions in the development of path integral methods for studying quantum effects in chemical systems, and for applications of classical

and quantum simulations to the study of physicochemical properties of liquids.

Dr Narayanaswamy Jayaraman

Dr Narayanaswamy Jayaraman of the Indian Institute of Science, Bangalore has made notable contributions toward the synthesis of complex carbohydrates and evolution of novel dendritic systems.

Earth, Atmosphere, Ocean & Planetary Sciences

Dr S K Satheesh

Dr S. K. Satheesh of the Indian Institute of Science, Bangalore has made



SHANTI SWARUP BHATNAGAR PRIZES

outstanding contributions to the study of atmospheric aerosols and their implications to climate.

Engineering Sciences

Dr Giridhar Madras

Dr Giridhar Madras of the Indian Institute of Science, Bangalore has made significant and fundamental contributions to understanding and development of novel means of degradation of polymers.

Dr Jayant Ramaswamy Haritsa

Dr Jayant Ramaswamy Haritsa of the Indian Institute of Science, Bangalore has made outstanding contributions to the theory, design and analysis of database engines, spanning across both transaction-processing and decision-support environments.

Mathematical Sciences

Dr Venapally Suresh

Dr Venapally Suresh of the University of Hyderabad, Hyderabad has made outstanding contributions in the algebraic theory of quadratic forms and the study of division algebras.

Medical Sciences

Dr Santosh Gajanan Honavar

Dr Santosh Gajanan Honavar of the LV Prasad Eye Institute, Hyderabad has made seminal contributions to the management of advanced retinoblastoma with dramatically improved patient survival, eye salvage, and visual recovery. His work on high-dose chemotherapy and periocular chemotherapy for advanced intraocular retinoblastoma, adjuvant therapy to minimize the risk of metastasis in patients with high-risk features, and

multimodal management of orbital retinoblastoma have been recognized worldwide.

Physical Sciences

Dr Rajesh Gopakumar

Dr Rajesh Gopakumar of the Harish-Chandra Research Institute, Allahabad has made fundamental contributions to the understanding of string theory, quantum field theory and mathematics. His work provides deep and new insights into the relation between gauge theory and gravity.

Dr Abhishek Dhar

Dr Abhishek Dhar of the Raman Research Institute, Bangalore has got insightful as well as rigorous results in classical and quantum transport in low dimensional systems and has made seminal contributions to non-equilibrium fluctuation theorems.



The Shanti Swarup Bhatnagar Prize winners (year 2009) with the Hon'ble Prime Minister, Dr Manmohan Singh, the then Minister of Science & Technology and Earth Sciences, Shri Prithviraj Chavan, and Director General CSIR, Prof. Samir. K. Brahmachari



Shanti Swarup Bhatnagar Prizes 2010 CITATIONS

Biological Sciences

Dr Sanjeev Galande

Dr Sanjeev Galande of the National Centre for Cell Science, Pune has made outstanding contribution to the understanding of how dynamic changes in higher-order chromatin architecture lead to spatiotemporal changes in gene expression. In particular his work has provided important insights into the role of the Wnt signaling pathway in T-cell development and differentiation.

Dr Shubha Tole

Dr Shubha Tole of the Tata Institute of Fundamental Research, Mumbai has made fundamental contributions to our understanding of brain development in identifying the mechanisms that control the formation of hippocampus, which controls learning and memory.

Chemical Sciences

Dr Sandeep Verma

Dr Sandeep Verma of the Indian Institute of Technology, Kanpur has made significant contribution toward enzymes through metal mediated systems and studied ordered peptide assemblies.

Dr Swapan K Pati

Dr Swapan K Pati of the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore has made significant contributions to understand novel electronic, optical and magnetic phenomena in molecular systems.

Engineering Sciences

Dr G K Ananthasuresh

Dr G. K. Ananthasuresh of the Indian

Institute of Science, Bangalore has made outstanding contributions in developing new theories and design techniques in the emerging field of compliant micromechanisms, as well as made innovative inter-disciplinary contributions in bio-design.

Dr Sanghamitra Bandyopadhyay

Dr Sanghamitra Bandyopadhyay of the Indian Statistical Institute, Kolkata has made pioneering contributions to the theory and algorithms in evolutionary computation, pattern recognition and bioinformatics. Her computational studies on miRNAs and their involvement in cancer provide deeper insight into the functioning of these bio-molecules, critical for developing new lines of therapy.



The Shanti Swarup Bhatnagar Prize winners (year 2010) with the Hon'ble Prime Minister, Dr Manmohan Singh, the then Minister of Science & Technology and Earth Sciences, Shri Prithviraj Chavan, and Director General CSIR, Prof. Samir. K. Brahmachari



Medical Sciences

Dr Mitali Mukerji

Dr Mitali Mukerji of the Institute of Genomics and Integrative Biology (CSIR), Delhi has made outstanding contributions to genomics, particularly in deciphering the genomic underpinnings of some important neurological disorders. She has also provided leadership and important insights into the genomic diversity of the people of India, with profound implications on disease-association studies. She has pioneered integration of Ayurveda and Genomics.

Physical Sciences

Dr Kalobaran Maiti

Dr Kalobaran Maiti of the Tata Institute of Fundamental Research, Mumbai has made outstanding contributions in the field of very high resolution photoelectron spectroscopy in understanding the physics of metal-insulator transition, charge density wave and Kondo systems.

Dr Umesh Vasudeo Waghmare

Dr Umesh Vasudeo Waghmare of the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore has made outstanding contributions in developing *ab-initio* methods and using microscopic models that capture the spirit of soft modes, magnetism, defects & chemical disorder in materials in understanding key properties of bulk and nano scale materials.

Earth, Atmosphere, Ocean & Planetary Sciences

No Award

Mathematical Sciences

No Award

CSIR, India and UNIK, Malaysia Sign Agreement for Research and Development Collaboration



The High Commissioner of India to Malaysia, Shri Vijay Gokhale and the Malaysian Chief Executive Officer, Special Innovation Unit of the Prime Minister's Office, Y. Bhg Dato' Dr. Kamal Jit Singh signing the Agreement between Special Innovation Unit (UNIK) and Council of Scientific and Industrial Research of India (CSIR), on Research and Development Collaboration, in the presence of the Prime Minister, Dr. Manmohan Singh and the Prime Minister of Malaysia, Dato' Sri Mohd Najib Bin Tun Abdul Razak, at Putrajaya, the Prime Minister Office, in Malaysia on 27 October 2010

The Council for Scientific and Industrial Research (CSIR) and Special Innovation Unit, Unit Inovasi Khas (UNIK) of Prime Minister's Department of Malaysia signed an Agreement on Research and Development Collaboration during the visit of Prime Minister Dr. Manmohan Singh to Malaysia on 27 October 2010, to increase cooperation in research, development innovation and commercialization of technology.

The Agreement envisages establishment of a Joint Innovation Accelerator Centre in Malaysia to carry out research on areas of mutual interest such as green technology, water treatment, medicinal and aromatic plants and also includes other innovative technologies. It also encourages transfer of knowledge; exchange of experts, scientists and researchers; production of joint reports of publications; and study visits relating to the projects and programme to be undertaken by the Joint Innovation Accelerator Centre. Both CSIR and UNIK will also explore and develop the use of herbs, plants, flowers and fruits for medicinal and aromatic purposes by way of extraction techniques, processes and methodologies.

In pursuance of the above Collaboration Agreement signed between Council of Scientific and Industrial Research (CSIR), India and Unit



A Towering Success of CSIR Terafil for the Thirsty

Dr. P. Cheena Chawla

Innovasi Khas (UNIK), the Central Institute of Medicinal and Aromatic Plants (CIMAP), a national laboratory of CSIR, Monash University Sunway Campus, Malaysia and UNIK, Malaysia signed a partnership (tripartite) agreement for the establishment of a Joint Innovation Accelerator in Malaysia for prospecting the natural flora; to explore and to develop the use of plants and its parts for medicinal and aromatic purposes by way of extraction techniques, processes and products; for the exchange of experts, scientists and researchers and other programmes that shall be of mutual benefit of all the partners. Prof. Ram Rajasekharan, Director, CIMAP signed the agreement on behalf of CIMAP.

UNIK has been set up in 2010 in the Prime Minister's Department to enable it emerge as an important focal point for innovation in the country. CSIR, a premier scientific and industrial research organization in India, would share its knowledge and expertise for mutual benefit.

Water — the elixir of life — is abundant on our planet but alas, access to safe drinking water is a major challenge faced by most developing countries including India. About 800 million people that represent the face of rural India are severely prone to water-borne diseases, primarily diarrhoea in children. Sure, it is the lack of adequate drinking water — the basic requirement for survival — that poses a major health burden on our people. No doubt, one of the UN Millennium Development Goals (MDGs) is reducing to half, by year 2015, the proportion of people without sustainable access to safe drinking water and adequate sanitation.

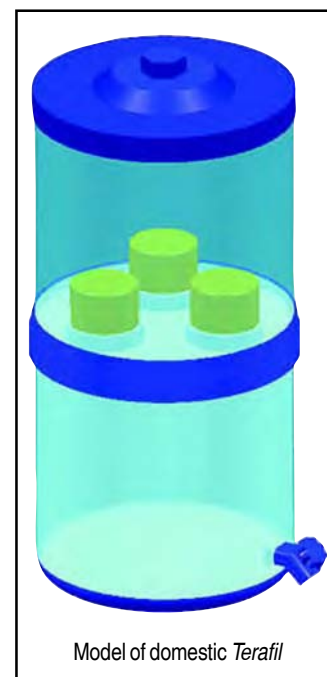
It is a heartening fact that today CSIR stands strong with an indigenously developed technology, which amply suits the needs of people in rural areas who use water from both surface and ground water sources like dug wells, ponds, tube wells and rivers for drinking purpose. One simply needs to 'see' to 'believe' it, for how such a low cost device



Community *Terafil* serves the drinking water needs of a large population

by the name *T e r a f i l* magically cleans impure, turbid water into sparkling drinking water. This filter has a astounding ability to remove sediments, suspended particles, iron and harmful microorganisms from contaminated water.

The credit for this innovative achievement goes to Dr. Surendra Khuntia and his team at the Design & Rural Technology Department, Institute of Minerals & Materials Technology (IMMT), Bhubaneswar, who strived for three long years and came up in 1998 with this simple yet efficient water filtration technology. CSIR scientists, led by Dr Khuntia, arduously perfected the porous media for filtering water by changing the proportion of the raw material – ordinary pottery clay, sand and wood saw dust – and firing temperature through hundreds of experiments, and thus the protocol was finally standardized. This technology was first demonstrated in an All India Science Exhibition in 1997 held at Gangtok. In the same year, a micro-pottery



Model of domestic *Terafil*



Making of *Terafil* discs —
The innovative water filter designed by
CSIR scientists

cottage industry, M/S Modern Pottery Industry, Bhubaneswar joined hands with CSIR for developing the mass production process of *Terafil* discs.

With its filtration discs being prepared under license and training from IMMT, *Terafil* is gaining widespread popularity, and is already being used by thousands of households in the States of Orissa, Karnataka and Meghalaya.

Technically, *Terafil* disc is formed from a mixture of red clay (silt clay/terracotta), river sand and wood saw dust without using any chemicals. The dough of the mixture, in specific proportion, is sintered at high temperature in a low cost coal/wood fired furnace to make the disc structure porous. During sintering process, the wood particles are burnt and clay

particles are sintered around the sand particles leaving large elliptical/circular pores in between.

If *Terafil* is over sintered, then the size of the pores is reduced. Thus, proper sintering of *Terafil* is important for obtaining the required thickness of membrane as well as the shape of pores, which defines the strength of the filter. These pores are not connected with each other, unlike that in white ceramic filter candles, but are separated by semi-permeable, thin clay walls of 50-100 micron thickness. These clay walls contain several ultra-fine capillary openings. The average diameter of the capillary openings is sub-micron in size.

During the filtration process, water flows from one pore to another pore through the capillary openings due to

pressure of water over the *Terafil* disc. The pores inside the *Terafil* disc, therefore, work like micro-reservoirs of filtered water. The opening of the capillaries are, however, too small for the impurities to enter into the capillaries, which is why such impurities, comprising suspended particles and microbes, get deposited on the top of *Terafil* disc as water is filtered through it. It is for this reason that the core of *Terafil* disc is never clogged unlike the ceramic candle filters that are in vogue in most currently available filters.

The water filtered through *Terafil* is thus free from turbidity, colour, bad odour while the process also effectively removes microorganisms, soluble iron and heavy metals from raw water. *Terafil* also removes fluoride, chromium, nickel, cobalt, lead, and chloride from raw water. All these impurities get precipitated on the top surface of *Terafil*, which can be periodically removed by cleaning the filter disc. Thus regular cleaning of the top surface of *Terafil* is important as over a period of time the collected impurities may clog the outer surface of *Terafil*, thereby reducing the flow rate of filtered water. Besides, the rate of filtration is also dependant upon the turbidity and pressure of raw water as well as the diameter of *Terafil* disc inside the filter.

The outer surface of *Terafil*, therefore, needs to be scrubbed, once a week or as and when required, with a soft nylon brush or coir to remove the sedimented impurities to open new pores for facilitating the filtration process. Although the thickness of *Terafil* may slightly reduce by scrubbing its top surface, the quality of water filtered by it does not change for about five years.



Large scale production of *Terafil* filters in progress



CSIR 800

For Equitable and Inclusive Growth

CSIR-800 is a revolutionary initiative of CSIR linked to the socio-economic prosperity of 800 million people who are at the 'bottom of the pyramid of life'. It is envisaged that with proper utilization of CSIR technologies, through a network of activists/NGOs, there could be rapid transformation of rural India ensuring equitable and inclusive growth of the deprived masses.

The technology for producing *Terafil* water filter is undoubtedly novel yet simple and, therefore, can be manufactured anywhere by small and micro-entrepreneurs, without any prerequisite conditions. All what is required is the easy availability of its raw materials, namely, red clay (clay used by potters), river sand and wood saw dust. The production unit requires one 5 hp *Atta Chaki* (Pulverizer) for grinding red clay, manual/motorized sieves, mixing machine, hand tools for moulding green *Terafil*, RCC platforms (60 ft × 40 ft) for sun drying of *Terafil*, coal/wood fired pottery kiln for sintering of *Terafil*, and a shed of 30ft × 20ft size. A three phase 5 KW power is required for operations of the machines. Manpower, without any specific expertise, can be easily trained for producing *Terafil* water filtration discs. There is a minimal technology fee for licensing the manufacture of *Terafil* discs.

The traditional artisans can be trained to produce *Terafil* water filters, in place of water pitchers in rural areas of the country. The marketing of *Terafil* water filters can be carried out by the artisans themselves, just as water pitchers and other domestic earthen items are sold. The cost of complete set of *Terafil* water filter with clay containers is about Rs.200/-.

For further information, please contact: Director/Dr S. Khuntia, Head, Design & Rural Technology, Institute of Minerals and Materials Technology (IMMT), P.O. RRL, Bhubaneswar – 751013, India; Tel (off): 0674 2581635-39, (Ext.-522 & 307); Fax: 0674 2581637, 2581160; E-mail: khuntias@gmail.com, khuntias@yahoo.com, skhuntia@immt.res.in

As the pH of filtered water is also improved, *Terafil* water filter is well suitable for treatment of both surface and ground water with affordable cost and without significant maintenance for a long period.

The circular, disc shape of *Terafil* filter is more preferable due to its high strength, long operational life and for easy maintenance, besides being simple to produce and fix with the container. The *Terafil* discs in both domestic or community filters are easy to dismantle/reassemble. Generally *Terafil* discs of 50 mm thickness and 100 & 220 mm diameter are produced to obtain maximum benefits.

Domestic *Terafil* water filter is available in 20 and 30 liter sizes with 1 to 4 litre/hr rate of filtration. The cost comes to just Rs.2/- per ton of filtered water. Domestic *Terafil* water filters are normally made with chambers made from food grade plastic. For installing community *Terafil* water filters, space required is 1 to 300 square meters for filters of 1,000 to 1,00,000 litres/day capacities. The chambers of *Terafil* filters, for community use, are usually cemented structures where filtration and collection of filtered water occurs. Besides, electricity is not required for operation of the *Terafil* water filters. On-line pressure *Terafil* filter with capacity of 60 to 10,000 litres/day have also been developed.

IMMT, Bhubaneswar had distributed 1000 sets of *Terafil* water filters to the victims of cyclone in affected areas of Orissa during November 1999 to March 2000 for evaluation of the performance of these filters. Different Govt. departments, NGOs, International organizations like UNICEF and OXFAM have distributed about 30,000 sets of water filter in rural areas of Orissa. These filters are being installed in schools, community centers and villages in Orissa by Rural Development (RD) Department, Govt. of Orissa. Such efforts are being replicated in other States as well, under Central Govt. Schemes like *Bharat Nirman Yojana* and *Jalmani* (a Ministry of Rural Development scheme for Installation of Stand Alone Drinking Water Purification Systems in Rural India).

Meanwhile, CSIR scientists are working to develop more advanced versions of *Terafil* discs that have nano-silver impregnated into them for complete removal of microorganisms from raw water. Sure then, there is a bright ray of hope that as *Terafil* filter goes places touching the lives of common masses, it could emerge as the most promising solution to providing sustainable drinking water to our people.

(Technical Inputs & Photo courtesy: Dr. S. Khuntia, Head, Design & Rural Technology Department, IIMT, Bhubneswar)



HRDC Conducts *Entrepreneurship Development Programme*

Recognizing that promoting science and engineering based enterprise and entrepreneurship is the future challenge for Indian R&D institutes, the Government approved, in the year 2009, DSIR/CSIR's scheme on "*Encouraging Development and Commercialization of Inventions and Innovations*". This scheme provides budding scientist entrepreneurs ways and means to unleash their entrepreneurial skills. It not only provides the more business-savvy scientists a platform to move into the marketplace and commercialize research using the knowledge they carry with them but also encourages them to create new business/spin off companies through the "*Scientific Entrepreneurship Scheme*" that leverages scientific research, inventions and innovation and transforms them into commercializable technologies/products.

In order to sensitize and train the scientific and technical manpower of CSIR in subtle nuances associated with entrepreneurship, HRDC in association with a leading business school of New Delhi organized a six-day Training Programme on "*Entrepreneurship Development*" from 26-31 July 2010.

The Programme focused not only on familiarizing and orientating the participants on a range of issues relating to setting up, promoting and putting in growth trajectory the knowledge driven businesses but also on salient provisions of CSIR's Scientific Entrepreneurship Scheme. The Programme attended by 25 middle to senior level scientists covered diverse yet cognate topics: Enterprise Planning, Project Preparation, Financing and Feasibility Analysis, Venture Funding, Issues related to HR, Marketing, Operation for a new

enterprise, Innovators vs Entrepreneurs vs Managers and Intrapreneurship etc.

During the Programme, a number of first generation entrepreneurs were invited to share their experiences with the participants. This interaction acted as a stimulus for the participants who wanted to move into the marketplace and commercialize their research output. A visit to 'SAMTEL' a high tech industry was also arranged to demonstrate how innovation driven enterprises operate.

The Programme was well received by all the participants suggesting organizing more of such programmes. A participant Dr. B. D. Malhotra, Scientist 'G' from NPL, felt that the week spent in this programme was the best period of his life when learning and relaxation in HRDC's salubrious ambience went hand in hand, a feeling echoed by many other participants.



(Left to right)

Sitting Row: A.R.R. Menon, M. Ravi, S.Y. Bodkhe, S.K. Goel, J.K. Bassin, A.S. Shawl, Naresh Kumar, Girija N.Nair, K. Sathiya Mals, Kumkum Srivastava, B.D. Malhotra, R.K. Singh, Laxman Singh Meena, Pratap K.Das, Sitendu Mandal

Standing Row: Abhitij Roy, Vinay Kumar, Neelesh Kumar, O.P. Chakraborty, Bittagopal Mondal, Pranab Samanta, Y.N. Sreerama, K. Senthil Kumaran, K. Sathiyamoorthy, Amol P. Bhondekar, J.L. Raheja, R. Ranga Rao, N.P. Yadav, Kaaran Dhar, Ankeet Bhat



Inauguration of PGRPE Course on *Engineering of Flight Vehicles*

CSIR has started Post-Graduate Research Program in Engineering (PGRPE) since last year to recruit bright talents having Bachelor's degree in Engineering for its various engineering laboratories. Under this program this year, a course on '*Engineering of Flight Vehicles*' was initiated by National Aerospace Laboratories and 12 students were selected as per the prescribed procedure. The Inaugural Function to induct the new students was held on 10 August 2010. Dr. Gautam Biswas, Director, Central Mechanical Engineering Research Institute (CMERI) Durgapur and Chairman, PGRPE Committee was the Chief Guest.

Dr. Sajeer Ahmed, the Course Coordinator welcomed the Chief Guest, new students and the audience. He thanked Dr. Biswas for accepting the invitation at such short notice and introduced the Chief Guest to the audience. He further informed the details of the course and its importance to the laboratory. He stated that the course was conducted by five divisions of the laboratory namely Flight Mechanics and Control Division (FMCD), Centre for Civil Aircraft Design and Development (C-CADD), Experimental Aerodynamics Division (EAD), Computational and Theoretical Fluid Dynamics Division (CTFD), Propulsion Division (PRD); and as on that date six students had joined and the remaining six students were

expected to join by the end of the week.

Dr. Biswas in his address briefed the gathering about the PGRPE courses conducted last year with 54 students. This year 11 courses were offered with 110 students. He emphasized the need for inclusion of Mathematics as a subject to form a comprehensive course. He also mentioned that people trained at CSIR were valued Engineers outside, and briefed the students that the courses they had entered related to the future of Indian Aviation. He also brought out the importance of PGRPE course stating that the manpower trained can be deployed directly to the specific application and explained about the importance of NAL.

In the national context, NAL had designed, fabricated various aircrafts and flight-tested them. He also lauded the role of NAL in meteorological computing and its contribution in strategic sector. He called NAL as 'pride of the Nation'. He also mentioned that development of a Regional Transport Aircraft (RTA) for which a one-year feasibility and definition study has been approved with National Aerospace Laboratories as the lead organization lead to prosperity and enhancement of livelihood. Every technology involved under RTA could be taken up as network project.

Dr. A. R. Upadhyya, Director, NAL in his remarks mentioned that he was happy that Dr. Gautam Biswas accepted the invitation to be the Chief Guest. He said that Dr Biswas had been very instrumental in the design and

implementation of this PGRPE programme and had put in great efforts to make it so successful. He thanked Dr. Biswas for his kind words about NAL. He welcomed the six students who had joined and explained about PGRPE courses being run at NAL. He recalled that in the previous year, NAL had joined with SERC Chennai, in conducting a course on '*Engineering of Structures*' and nine students were attending the course at NAL.

Dr. A. R. Upadhyya mentioned that '*Engineering of Flight Vehicles*' had a wider scope and required fundamental knowledge of all aeronautics disciplines. Compared to any other organization, CSIR was a technology institution leading to scientific innovations and publications, R&D, and product design and development. CSIR-NAL was like a microform of CSIR. He said that the present students of PGRPE had a lot to contribute to drive the basic engine and senior leaders can provide the support. He wished the students good luck and thanked NAL colleagues involved in the programme for making PGRPE a success. Dr M N Sathyanarayana, Joint Head, KTMD and Student Advisor delivered the Vote of Thanks.

Thus the beginning of PGRPE course marked another major milestone in the history of NAL by bringing academics as another activity in addition to research, design and development for building talents for future aerospace activity of the country.



New Incubators for Tomorrow's Leaders

Convocation Address by Prof. Samir K. Brahmachari, Director General, CSIR at Kalyani University

His Excellency, Shri. M. K. Narayanan, Hon'ble Chancellor, Kalyani University; Prof. Alok Banerjee, Vice Chancellor, Kalyani University; Shri. Utpal Bhattacharya, Registrar, Kalyani University; Shri Nirendranath Chakraborty; Shri. Dwijen Mukhopadhyay, Dean and Heads of the various Departments; distinguished invitees; all the students graduating today, ladies and gentlemen. I always enjoy interacting with young students; students who represent untold and infinite potential. Each time I address students at the Convocation ceremony, as they wait to graduate, I find I cannot shake off the image of aircrafts lining up on the runway, just waiting to take-off. In a way, I suppose the motif is an appropriate one. Just as the limitless sky beckons the aircraft; so too does unlimited opportunity beckon the student; especially in the "flat" world of today. Here only talent and training matter. However, there are at least two major differences between an aircraft and you, a student. There is no limit to how high you can fly and no limit to how far you can go.

I am truly delighted to be here today addressing an audience that is so bright with the promise of tomorrow. In the audience, I can see the happy faces of the young graduates eagerly awaiting the degrees to be conferred. I see also, the quietly satisfied faces of their teachers—the distinguished faculty of

Kalyani University. They are the ones who have tempered the steel of youth and fashioned it into instruments that are empowered, and entrusted, to change the course of our nation's destiny. To the first group, I offer my congratulations. To the second, I give my thanks...for they are the custodians of a long heritage. They are, by their efforts, keeping the future of the nation well secured.

Addressing the audience at a Convocation ceremony always fills me with a tremendous excitement...a sense of anticipation...and hope. I am excited by what the students represent: a brand new generation of Indians educated at a University with a proud legacy of excellence. Of course, education and training in pure and applied sciences has had a flourishing tradition in India dating back over 2500 years.

Under the British rule, the Universities of Bombay, Calcutta and Madras were established in 1857, interestingly the very year that coincides with the first War of our Independence. It is ironic that while the nation's political liberation was still many years away, institutions that were entrusted to grant education that liberates the mind, were being set up. In any case, this welcome move was not limited to three Universities but continued even after Independence, this time with renewed vigour. The Kalyani University was set up, as you know in 1960. It plays a major



role by focusing on rural economy and the need and aspirations of the youth in the region.

This was a time that witnessed

major changes in many areas. Actually there was something magical in the air in the first half of the 20th century; particularly in Bengal. It is a time that the world recognizes as "The Bengal Renaissance." Intellectual giants such as Sir Ashutosh Mukherjee, Acharya P.C. Ray, Sir J. C. Bose and Dr. Bidhan Chandra Ray were at the helm of Universities, Centres of learning and research institutions. Their spirit lives on, infusing with forward-looking vision, the higher echelons of education in India even today.

As I stand here addressing you, I cannot but help remembering what Dr. Bidhan Chandra Roy, the spirit behind Kalyani township, said in his Convocation Address on 15 December 1956 at the University of Lucknow. To the students, Dr. Roy said, "*My young friends, you are soldiers in the battle of freedom: freedom from want, fear, ignorance, frustration and helplessness. By a dint of hard work for the country, rendered in a spirit of selfless service, may you march*



ahead with hope and courage... If you think about it, the message is a timeless one and one whose fervor has not been diminished by time. This is the hallmark of eternal truth because time is a catalyst that changes everything else.

The period between 1900-1950 was characterized by an amazing resurgence in Indian Science. India, at that point of time was blessed with globally competent leadership. The dawn of Independence therefore, though fraught with enormous challenges, was also a period marked by hope and tremendous achievements in many fields. Almost at the birth of the new nation, Pandit Jawaharlal Nehru announced unequivocally that, "...the future belongs to Science and those who make friends with Science." Despite many constraints faced by the nation, an entire chain of National laboratories were established, to cater to the growing needs in different sectors. S&T was used as crucial weapons for economic growth and social transformation. This helped the new nation to consolidate its S&T prowess, which was essential for self-reliance.

A nascent India placed great emphasis on self-reliance. So from the 1950s to around the 1970s, Indian science strove not just to meet the needs of the people but also their expectations.

From the CSIR laboratories came technologies and products that were sorely needed by the newly independent nation. I wonder if you know that the *Amul* milk powder, that is still a national favourite, owes its genesis to CSIR scientists who stepped in to develop a process to manufacture baby food from buffalo milk when multinationals refused to set up a manufacturing facility citing inadequate production of cow's

milk as an excuse. Despite the claims of multinationals that buffalo milk has too high a fat content, India's indigenous baby food had excellent digestibility.

The trend continued with the 20 hp tractor, called SWARAJ that ushered in the era of mechanized agriculture. You will agree that the name is redolent with national pride. Today there are nearly one million SWARAJ tractors tilling the Indian soil alongside CSIR's next-generation Indian tractors called SONALIKA. The new nation had many mouths to feed and CSIR undertook the task of filling the granaries. It also mounted an integrated programme to develop cost-effective processes to manufacture essential pesticides. Over 70 per cent of the new pesticides production was based, in those days, on CSIR technology.

From the 1970s to the 1990s the nation sought to test its wings to fly free in the sky of science. However, the winds of technology denial were strong. Many developed nations denied India the technology she wanted. The denial was intended to deter India in her quest for advancement. However, the world forgot that the young never take "No," for an answer. It forgot that not all needs can be denied. Indian science merely looked inwards and discovered enormous pockets of strength. Tapping the enormous pools of indigenous talent and fired by unwavering determination to overcome, the scientists found ways to overcome international sanctions and technology denials.

This was the time that CSIR-National Chemical Laboratory (NCL), Pune, virtually smashed the global barrier that made the manufacture of industrial catalysts such a closely-guarded technology. Starting from

Kalyani University conferred the *Honoris Causa* D.Sc. degree to DG CSIR, Prof. Samir K. Brahmachari at the 23rd Convocation of the University held on 3 September 2010.

developing known catalysts, CSIR introduced its own brand of new zeolite catalysts, named encilites, for diverse industrial processes. It created a large indigenous base for a whole host of industries; be it petrochemicals such as the one in Haldia, or pharmaceuticals or chemicals. Soon, India was exporting catalysts to the world—including to the western markets. Today, India is among the top few countries that possess world-class capabilities for development and manufacture of new catalyst formulations.

CSIR also built *Flosolver* Mk1—the first parallel computer of India, way back in 1986; again an appropriately defiant response to technology denial. The *PARAM* series of supercomputers was later assembled by the Centre for Development of Advanced Computing (C-DAC) in Pune. In a diametrically different field, yet one of no less importance to the nation, CSIR National Aerospace Laboratories, Bangalore, created *Varsha*, a hydrostatic spectral general circulation model developed at *Flosolver*. It is used for modeling weather and forecasting the monsoon. Today India's IT prowess is recognized worldwide.

CSIR also, confidently entered the world of optical-glass manufacturing and since then it has developed 400 different types of glasses including radiation shielding glasses to provide protection



CONVOCATION ADDRESS

from harmful radiation. The CSIR Institute that contributed so much to this cause is celebrating its Diamond Jubilee this year. It is the Central Glass and Ceramics Research Institute and you will be happy to know that it is located not very far from here...in Kolkata. I could go on and on with the CSIR story! From the tea gardens of Kangra to the bamboo forests of the North East; from the coal mines to the leather and the catalyst industries of India; from building up a new national resource on the genomic profiles of the Indian populations to topping the list of nations producing generic drugs...CSIR's contributions have always been silently at the service of the nation. Now that India has announced the *Decade of Innovation* there is the need for timeless innovation enterprise, not only at CSIR, but at all S&T and educational institutes in India, in order to meet the new challenge.

One positive result of the efforts of Indian scientists is that the world has been forced to take notice of India's growing strength in S&T. So today, we have many potential partners who are interested to contribute and collaborate on the next *Chandrayaan* Mission being planned. Although, complacency has no place in global and knowledge-driven economy, it is pertinent, however, to remember that the triumphant launch of *Chandrayaan-1* too has roots that go back to the era of technology-denial and we owe a debt of gratitude to those visionary leaders in those days who did not hesitate to pick up the gauntlet despite the heavy odds.

Swami Vivekananda, had once said that, "*We are responsible for what we are, and whatever we wish ourselves to be, we have the power to make*

ourselves. If what we are now has been the result of our own past actions, it certainly follows that whatever we wish to be in future can be produced by our present actions; so we have to know how to act." So, today's developments are a happy footnote to the struggle that our scientist waged in the period spanning the two decades: 1970s to 1990s. It is also an unequivocal message about just how much the world order has changed in the past 50 years. In this change lie the seeds of what our actions should be today, if we aspire for leadership position tomorrow, as well.

One must understand both yesterday and today if one is to plan and to prepare successfully for tomorrow. As you know, the post 90s period was characterized by a wave of liberalization that swept through the world. During the next decade, Intellectual Property generation became the new "buzzword". Global competitiveness held the key to development and progress. This was only natural since globalization and liberation are directly linked with each other. Today we are at home in a globalized world. Ironically, it was an Indian scientist of colonized India who had articulated the concept as early as in 1927. Sir Jagdish Chandra Bose had said in his Presidential Address at the Indian Science Congress at Lahore, "*... there must also be an unity of all human efforts and in the realm of the mind there can be no boundaries and no separations...*"

In 2010, we have arrived at a world that, in many ways, has no boundaries. Our India too is a new India. And you will enter that new arena the moment you step out of this auditorium armed with your graduation certificate. You will

be expected to earn your wings in a new global order when you take up the challenges of your first professional assignment. In today's changed world, geographical distances mean little. Technology has bridged this gap well and the communications revolution has shrunk the globe into a networked village.

Lack of resources can be overcome using open-source technology and cloud computing. Even hierarchical set-ups can be by-passed using peer-to-peer networking. A huge problem can be broken into smaller pieces and each piece of the jigsaw can be addressed by individuals or teams who bring their diverse skills to bear on it. You are lucky indeed to be entering a world that is so flat and flexible. However, just being lucky to be around when times are changing is not enough. The trick is to be always ahead of the change. The idea is to consolidate any competitive advantage that we have.

As globalized citizens and Indians, we must blaze new paths, not follow the trail that many have traveled before. You must understand that today's technology will not be adequate for tomorrow's well being. You must accept that though the country today has vast S&T infrastructure comprising national laboratories, institutes, universities and colleges but not all are future-ready, let alone equipped to anticipate change. You must be ready to rewrite this scenario by becoming the change we want to see in this country. However, there is no reason to be afraid. You are the proud inheritors of a rich legacy. If you flip the pages of history you will realize that exceptional people have walked the corridors of Indian Universities...the institutes have traditionally empowered minds to soar high.



The likes of Ashutosh Mukherjee who was Vice Chancellor of the University of Calcutta from 1906 to 1924; Arcot Lakshmanaswami Mudaliar, the longest serving Vice-Chancellor of Madras University (for 27 years) and his twin brother, Sir Arcot Ramasamy Mudaliar who was Vice Chancellor of Travancore University for eight years are examples of the legendary academicians India can be proud of. Many of our Universities are following in their footsteps and academic giants still walk the corridors of many Institutes, mentoring the next generation. However, sometimes simply carrying the banner forward is not enough. This is particularly true at that point of history, which marks the ending of an era and the beginning of another.

The present period is one such time, when traditionally established subjects, that used to be studied as if these were water-tight compartments, are suddenly becoming fluid. Traditionally established areas of studies are merging and evolving into a new avatar...and emerging as new branches. For example, Computer science (itself a new area of study) has merged seamlessly with Biology to emerge as the subject of Bioinformatics.

Another matter of grave concern is that, according to the India Science & Technology 2008 report published by CSIR (National Institute of Science, Technology And Development Studies), over the last few years the growth of highly specialized manpower (Ph.D) has been much less than the growth in graduate S&T manpower. India's leadership in science and engineering of tomorrow would depend upon its strengths in interdisciplinary and trans-disciplinary areas of science. Countries

such as China and South Korea, which were once behind India in their scientific output, have not only overtaken but also are well ahead of India. Our country is likely to lose a large number of students interested in interdisciplinary areas to other countries unless similar opportunities are created indigenously.

This problem is further intensified by "brain drain" or the migration to other countries. This means that there will soon be a critical shortage of appropriately trained, highly educated young talent in science and education. We need to immediately invest resources to build new centres of learning, which will act as generators of knowledge and provide world-class training in the appropriate areas. Such centres of learning must also equip the students to be able to not merely cope, but to provide leadership in emerging areas in these times of change.

Under such rapidly evolving conditions, as we are witnessing today, it is necessary to recall that philosophers have always held that continuity gives us roots and change gives us branches, letting us stretch and grow and reach new heights. We must remember that India has always reacted in an exemplary manner when faced with apparently-insurmountable problems.

It is universally recognized that S&T is the driver of economic growth. So, a high standard of science education is mandatory if our forthcoming S&T efforts are to be crowned with success. It is clear to all educationists that the S&T of the future will be multi-disciplinary. Tomorrow's science will demand an integrative and trans-disciplinary approach. It is clear that there is the need to create a structure, which can leverage development of

desired human resources and pursuit of R&D through involvement of young minds.

In an attempt to "grow to reach new heights", and in keeping with CSIR's tradition of being prepared for the future, we have establishment of an Academy for furtherance of the advancement of learning and prosecution of research in the field of science & technology. This *Academy of Scientific and Innovative Research*, called AcSIR for short, places special emphasis on emerging areas and on such areas of inter-disciplinary and trans-disciplinary nature that are not ordinarily taught in regular universities. The Academy has been conceptualized as a one-stop solution to synergize education, research and innovation on cutting-edge trans-disciplinary areas of science and engineering.

The Academy perceives a natural advantage as we believe that the opportunity to work on the frontier and trans-disciplinary areas will attract the best of the young minds, thus creating reversal of brain drain. It will also place an army of highly skilled and well-trained personnel at the service of the nation. We will be well-placed to harness the natural and engineering sciences into interdisciplinary and trans-disciplinary pathways for directed and translational research; and be favourably placed to create global technological niches.

India desperately requires a critical mass of qualified human resources that would be crucial to capitalize on the ensuing Asian economic boom. I am sure that this Academy with its unique nature, structure and knowledge base shall effectively complement our other higher education institutions in achieving this critical mass. Kahlil Gibran once said, about teachers that, "If he is indeed



wise he does not bid you enter the house of wisdom, but rather leads you to the threshold of your own mind.” This is exactly what AcSIR proposes to do...help you to realize the full power of your potential so that you can carve your name on a global template.

Kalyani has always enjoyed the distinction of being regarded as, “...university town...” because it has two universities namely, Kalyani

University and Bidhan Chandra University of Agriculture and many other educational institutions. It is currently witnessing a resurgence of developmental activity on the academic front. Two new institutes namely; National Institute of Biomedical Genomics and the West Bengal University of Technology are slated to begin functioning here shortly. Once this happens, there is no doubt that the academic climate in Kalyani, will be

charged with new excitement.

I hope that the cluster of educational institutions; old and new, will contribute towards making history repeat itself. I hope that Golden Bengal, renowned for providing enlightened leadership to India will emerge once again. In summation I can do no better but to repeat the message of Vivekananda, “*Arise, awake and stop not till the goal is reached.*” Thank you.

Entrepreneurial Training for Women at CIMAP

Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow organised a two-day Women Entrepreneurship Development Programme based on herbal products at Biotech Park, Lucknow during 14-15 September 2010. This Training Programme was aimed at developing the entrepreneurship in women by utilizing the CIMAP’s technologies for making herbal formulations useful to mankind. The Programme included lectures and live demonstrations organized by Dr. Dinesh Kumar and his team. A visit of the participants to CIMAP Farm was also arranged by Dr. R. P. Bansal to get them acquainted with utility of medicinal and aromatic plants and their cultivation.

Sixteen women participants attended the training programme. They learnt the technique of making Agarbatti (Incense Sticks), Rose Water, Floor Mopping Scented Emulsion and Mosquito Repellent Body Lotion.

Prof. P. K. Seth CEO, Biotech Park inaugurated the Training Programme. Dr A. K. Singh, Head Technology &

Business Development at CIMAP called upon the participants to come forward for adopting CIMAP know-how for establishing small units for various herbal formulations of daily use. At the end,

Dr. Sanjay Kumar, Scientist, CIMAP proposed the Vote of Thanks. The participants were also given certificates on successful completion of the training.



Dr A. K. Singh interacting with the participants



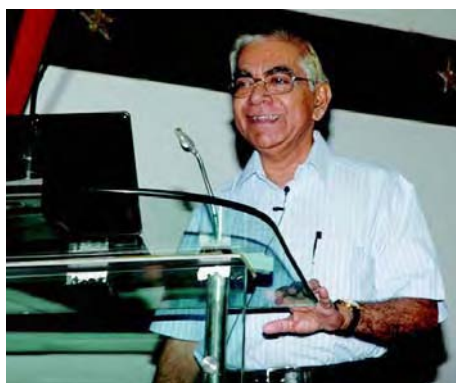
A group of women participants with CIMAP faculty



Dr. Vijay Nair delivers Prof. K. Venkataraman Memorial Lecture at NCL

Dr. Vijay Nair, former Director, National Institute for Interdisciplinary Science and Technology (NIIST) formerly Regional Research Laboratory, (RRL), Thiruvananthapuram, delivered a lecture *on Some Novel Carbon-Carbon Bond-forming Reactions Catalyzed by NHCs and Related Chemistry*. The lecture, held on 7th June 2010 was part of a series conducted in honour of Prof. K. Venkataraman, the first Indian Director of the National Chemical Laboratory (CSIR-NCL).

Novel ways of C-C bond and carbon heteroatom bond formation occupies a central position in the repertoire of synthetic chemists. Dr. Nair talked about multicomponent reactions where new bonds (C-C and C-heteroatom) are formed and broken in a single pot. Multi-component reactions are those where two or more reactants are mixed to furnish a new compound in which all the atoms in the reactants are incorporated to form the final product. This leads to diverse structural scaffolds. Dr. Nair explained how these reactions can be promoted by a variety of catalysts. His talk focused mainly on the use of NHC (heterocyclic carbenes) as catalysts to stitch together electron deficient species involving reversal reactivity. He elucidated this concept elegantly by several reactions involving electron deficient olefins to access a wide array of difficult to access scaffolds. Some



Dr. Vijay Nair, delivering the lecture

of these include GABA analogues, butyrolactones lactams and spirocyclic compounds.

Dr Nair concluded his talk by elucidating a very novel and unusual reaction where CO₂ was shown to act as “oxidant”. In this reaction, aromatic aldehydes were efficiently oxidised to the corresponding acids with the concomitant reduction of CO₂ to CO. This concept is of particular interest in the context of CO₂ emission.

Dr. S. Sivaram, Director, CSIR-NCL welcomed the audience and guests on the occasion. He presented the credentials of Prof. K. Venkataraman in whose honour the lecture was being held. Dr. Sivaram said that Prof. Venkataraman was the first Indian and the third Director of NCL from 1957 to 1966. A reaction called ‘Baker-Venkataraman rearrangement’ was named after him that has applications in synthetic molecules. This is the only “named” reaction in organic chemistry bearing

the name of an Indian. Most of his early publications are cited even today indicating the fundamental importance of his contributions. Dr. Sivaram talked about Prof. Venkataraman’s academic and professional career.

Dr. Ganesh Pandey, Head, Organic Chemistry Division, introduced Dr. Vijay Nair to the audience. Dr. Pandey said that Dr. Nair is a distinguished organic chemist of India and well known for his research. Dr. Nair has Ph.D degrees from Banaras Hindu University (1967, with Professor R. H Sahasrabudhey) and the University of British Columbia (1969, with Professor James P Kutney). Subsequently he did post-doctoral work with Prof. Josef Fried at the University of Chicago, Prof. Peter Yates at the University of Toronto and Prof. Gilbert Stork at Columbia University. About 43 students have completed Ph.D. under his supervision and he has published more than 200 papers in major international journals.



Dr. Ganesh Pandey, Head, Organic Chemistry Division, introducing Dr. Vijay Nair



IITR Scientist Honoured

Each year Council of Science & Technology, U.P. invites applications under “*Science Awards Scheme*” to honour eminent scientists either born in Uttar Pradesh or who are working in Uttar Pradesh for last 10 years continuously. Under this Scheme, each year five Awards are given to young scientists below 35 years for their outstanding contributions to science and technology development. Each Award consists of cash Rs. 25,000/-, a memento and a citation. This year Dr. Kausar M. Ansari, Scientist ‘B’ working in Food Toxicology Division, Indian Institute of Toxicology Research (IITR), Lucknow, has bagged the “*Young Scientist Award for 2008-09*”.

The research work of Dr. Kausar M. Ansari embodies the assessment and elucidation of biochemical and molecular mechanism of toxicity of commonly encountered food adulterants like



argemone oil and natural contaminants, mycotoxins such as patulin, ochratoxin A and deoxynivalenol etc. Consumption of argemone-adulterated mustard oil is known to cause epidemic dropsy. The toxicity of argemone oil has been attributed to benzophenanthridine alkaloids, sanguinarine and dihydrosanguinarine.

In recent times higher incidence of gall bladder carcinoma in the Indo-Gangetic basin has been linked with the consumption of contaminated mustard oil. In addition, massage of hair and smearing the body with mustard oil in children and population is quite popular in northern States of India. If such mustard oil happens to be contaminated with argemone oil, the chances of skin absorption of argemone long-run even

if they do not use such oil for cooking.

Using the mouse model, argemone oil *per se* and its sanguinarine alkaloid were found to show genotoxic and carcinogenic effects. Moreover, studies have suggested that singlet oxygen, hydroxyl radicals, depletion of free glutathione and enhanced lipid peroxidation were involved in argemone oil toxicity and oxidative stress. It was observed that bio-antioxidants such as vitamin E and riboflavin can protect against argemone oil induced genotoxicity in experimental animals. The protective efficacy of these bio-antioxidants would be beneficial for dropsy patients as these may lead to the development of systemic therapeutic interventions of the disease. Dr Ansari is now engaged in studying the molecular mechanism of dermal toxicity of the mytofixin, patulin, using *in vitro/in vivo* models.

IICB Scientist Selected as Associate of the Indian Academy of Science, Bangalore



Dr. Suvendra Bhattacharyya who has joined the Indian Institute of Chemical Biology (IICB), Kolkata as Scientist EI in 2008 has recently been selected as the Associate of the Indian Academy of Science, Bangalore. The Academy selects every year a certain number of young Indian scientists as the Associates who are below 35 years of age and of great promise. Dr. Bhattacharyya's present research interest is focused on the regulation of gene expression by miRNA in mammalian cells. Dr. Bhattacharyya is also an International Senior Research Fellow of the Wellcome Trust, London and a recipient of the *Career Development Award Grant* from the International Human Frontier Science Program Organization (HFSP).



Printed and Published by

Deeksha Bist on behalf of National Institute of Science Communication And Information Resources (NISCAIR), (CSIR), Dr K.S. Krishnan Marg, New Delhi -110 012 and printed at NISCAIR Press, Dr K.S. Krishnan Marg, New Delhi -110 012

Editor: Dr. P. Cheena Chawla; **Editorial Assistant:** Neelima Handoo

Design: Neeru Sharma; Sarla Dutta; **Production:** Kaushal Kishore; **Editorial help:** Dr Sukanya Datta

Phone: 25846301; **Fax:** 25847062; **E-mail:** pchawla@niscair.res.in; pcheena@gmail.com; **Website:** http://www.niscair.res.in

For subscription: The Sales & Distribution Officer, NISCAIR; E-mail: sales@niscair.res.in;

Annual Subscription: Rs 300; Single Copy: Rs 30.00

Subscription Complaint No: 25843359

RN 4512/57