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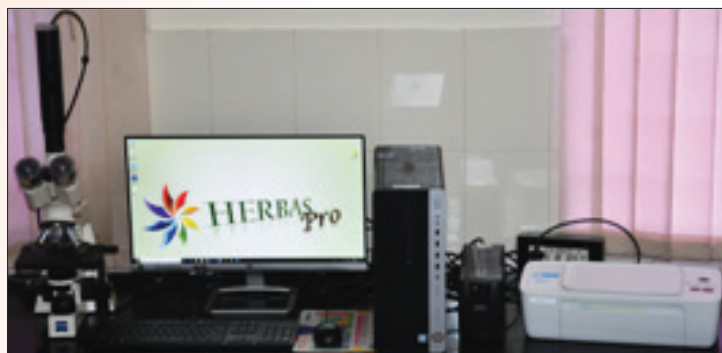
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July 2018

## In The News

### HERBAS Pro

## A Computer-aided Machine Vision System for Authentication of Herbal Plants used in Ayurvedic Medicine



HERBAS Pro:  
Herbal Authentication System



HERBAS Pro being handed over to the Project Director, Dr. Indira Balachandran, Centre for Medicinal Plant Research, Arya Vaidya Sala, Kottakkal, Kerala

A Computer-Aided Machine Vision System for authentication of herbal plants used in Ayurvedic Medicines named HERBAS Pro has been developed by CSIR-CEERI (Central Electronics Engineering Research Institute) Chennai Centre. The project was sponsored by M/s Arya Vaidya Sala, Kottakkal, Kerala, costing ₹10.01 lakhs for the duration of 8 months.

The system captures the images of the herbs from the affixed microscope, collects data, creates a reference for new herbs and authenticates the herbal test specimen. The software for the system

has a dimension measurement feature during image streaming mode that allows the user to measure the distance between feature points based on the microscope objectives. The system also enables the user to generate Quality Check Reports (QCR) for the analysis performed over the herb specimen.

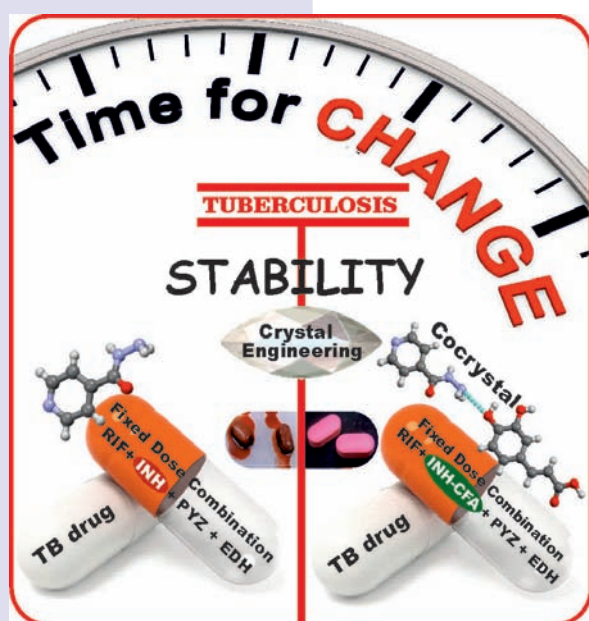
HERBAS Pro system is designed to facilitate botanists in the authentication and grading process of the herbs used in Ayurvedic medicines at the microscopic level and to generate a herb reference collection of the herbs that are being provided by various suppliers. The system will enormously help

in improving the marketability of the company's product.

The project was completed in March 2018 and the product was

handed over to the Project Director, Dr. Indira Balachandran, Centre for Medicinal Plant Research, Arya Vaidya Sala, Kottakkal, Kerala.

## CSIR-NCL Develops Anti-TB Cocrystal 4-FDC Drug with Improved Stability



CSIR-National Chemical Laboratory (CSIR-NCL), Pune, has developed an Anti-TB cocrystal drug with improved stability. The research was done by Prof. A.K. Nangia and team at the CSIR-NCL and the School of Chemistry, University of

Hyderabad, has cleared the way for the development of a stable formulation of 4-FDC (4 drugs Fixed Dose Combination) for TB.

A study by Prof. Nangia and his team reported a new cocrystal of FDC of TB drug to address the issues in the *Journal of Pharmaceutical Sciences*. The team including Suryanarayana Cherukuvada, Devarapaga Maddileti, Swapna Battini, and M. K. Chaitanya Mannava studied the cause for the instability of the 4-FDC drug chemical structures and discovered pharmaceutically stable cocrystal by applying Crystal Engineering principles to improve the stability, so that the drug inhibits the cross-reaction between Isoniazid and Rifampicin, and thereby overcomes the formation of inactive by-products.

The pharmaceutical cocrystals of INH (INH-Caffeic acid and INH-Vanillic acid) were used to improve the stability of 4-drug FDC. The team showed that the pharmaceutically stable cocrystal of INH is able to improve the stability greater than 5-fold compared to the current 4-FDC drugs. The coformer additives which stabilise the formulation are pharmaceutically accepted excipients. Stability studies were carried out under accelerated conditions of 40°C temperature and 75% relative humidity. The first time improvement of stability of anti-TB 4-FDC drugs using cocrystals of INH in a fixed dose formulation was reported.

Tuberculosis (TB) is an airborne infectious disease caused by a species of pathogenic bacteria *Mycobacterium tuberculosis*. It is one of the top ten leading causes of deaths worldwide. According to the World Health Organisation (WHO) in 2015, an estimated 10.4 million people developed TB and 1.8 million died from the disease including 0.4 million deaths among HIV-positive people.

WHO has recommended Rifampicin (RIF), Isoniazid (INH), Pyrazinamide (PZA), and Ethambutol dihydrochloride (EDH) drugs for the treatment of TB. The use of a fixed-dose combination (2-drug, 3-drug and 4-drug FDCs) for the treatment of tuberculosis was recommended in 1994 by WHO and the International

Union against Tuberculosis and Lung Disease (IUATLD). In 1999, the 4-drug FDC tablet was included in the WHO Model List of Essential Drugs that comprises above four drugs. The 4-FDC tablets had quality and stability issues, including poor bioavailability of rifampicin and instability during storage; this raised serious concerns on the utility of this FDC. It was essential to address the quality and stability issues.

In March 2018, a summit – END TB Summit 2018 – intended to review the progress of the efforts to eradicate TB took place in Delhi. On the occasion, Honourable Prime Minister of India called for “Greater focus on financing and political will to end TB by 2030”. He stressed that all forces must come

together from private and public sectors and the civil society to fight this battle. All must join hands to overcome TB.

The key components to combat TB are a confirmative diagnosis, early initiation of Anti-TB treatment and preventing the development of multidrug resistance. It was stated that inventions of Anti-TB drugs and improvement of drug quality are the major areas to explore.

Prof. Nangia said, “Stable cocrystal drug with longer shelf-life will improve the prospects of transport logistics and inventory management of TB drugs”. In the next phase, longer-term stability data on 4-FDC will be validated with suitable excipients and polymeric additives to develop the tablet formulation in fast-track translation.



Prof. Nangia said, “Stable cocrystal drug with longer shelf-life will improve the prospects of transport logistics and inventory management of TB drugs.”

## CSIR Scientists Find New Clues to Parkinson's

A protein called alpha-synuclein plays a very crucial role in the development of Parkinson's disease. Researchers from CSIR-IICB (Indian Institute of Chemical Biology), Kolkata, have shown that the protein (native form), oligomers

(early), as well as amyloid fibrils, affect each other in the aggregation pathway.

Out of 20 amino acids they used only two amino acids to direct their study in live neuroblastoma cells (type



Image Credit: Vigyanprasar.gov.in

Through this research collaboration, CSIR-NCL and Lupin Ltd. would collaboratively work towards the development of a novel continuous purification process for manufacturing a biosimilar monoclonal antibody therapeutic (mAb).

of cancerous cells). The first amino acid was glutamate which was responsible for the formation of amyloid fibrils by facilitating early oligomer generation; the other was arginine responsible for amyloid fibril inhibition by inducing a change in the actual (native) structure of the protein.

The study also reveals that glutamate acts as a facilitator and

arginine as an inhibitor of the late stage of alpha-synuclein aggregation pathway. However, it is not clear whether the observed effects are due to cellular changes or due to direct interaction of these molecules with alpha-synuclein. The nature of interaction of these molecules with alpha-synuclein as well as the mechanism of internalisation needs to be better understood.

#### MoU/Agreement

## Biogas from Degradable Waste Tirupur Corporation Signs MoU with CSIR-CLRI

The Tirupur Corporation has signed a Memorandum of Understanding with CSIR-CLRI (Central Leather Research Institute), Chennai, to prepare a Detailed Project Report (DPR) and develop sustainable technology for a Bio-Compressed Natural Gas (Bio-CNG) bottling plant.

The plant will help the environment by converting the degradable waste

generated in the city into CNG which can then be used by automobiles with good mileage. Currently, nearly 100 tonnes of organic waste is generated every day in the city from approximately 520 tonnes of mixed municipal solid waste. The two plants will have a cumulative capacity to produce 300 Bio-CNG cylinders per day.

## CSIR-NCL and DST sign an Agreement with Lupin

CSIR-National Chemical Laboratory (CSIR-NCL, Pune) and Department of Science and Technology (DST, New Delhi) signed a research collaboration agreement with Lupin Ltd. for a continuous purification process for the development of a biosimilar monoclonal antibody therapeutic.

Monoclonal antibodies represent the most important biopharmaceutical product class, serving the high-demand treatment area of immuno-oncology diseases. With an increasing demand for biosimilar therapeutics and an ever-increasing pressure for manufacturing cost reduction with quality maintenance, the



Prof. Ashwini Kumar Nangia (Middle) exchanges agreement document with Dr. Rustom Mody (Left) in presence of Dr. C. Rajadurai (Right)



biopharmaceutical industry is showing a keen interest in the development of continuous manufacturing processes.

All unit operations in existing manufacturing processes are currently performed in a batch mode with an overall process recovery limited to 40-50%. Existing purification platforms for biosimilar mAb therapeutics involve an integration of two to three offline controlled chromatography processes which severely limits the throughput and yield of the target therapeutic product. Additionally, in comparison to the innovator's drug manufacturing processes, biosimilar manufacturers also have the compulsion to match the purity profile to innovator drug molecule thereby limiting the performance of the conventional batch manufacturing processes.

Through this research collaboration, CSIR-NCL and Lupin Ltd. would collaboratively work towards the development of a novel continuous purification process for manufacturing a biosimilar monoclonal antibody therapeutic (mAb). The process development team of CSIR-NCL led by Dr. Rahul Bhambure will work in

collaboration with the team of Lupin for developing the target process, said Prof. Ashwini Kumar Nangia, Director, CSIR-NCL. Biopharmaceuticals, biologics and monoclonal antibodies are the next waves of discovery and innovation in new pharmaceuticals. This early research collaboration between industry and CSIR institute is expected to yield rich dividends for the country.

Speaking about the partnership, Dr. Rustom Mody, Senior Vice President and Head-R&D, Biotechnology, Lupin said, "Biotech is one of Lupin's key growth drivers and we are committed to advancing our biotech R&D capabilities through strategic partnerships. Our collaboration with a premier CSIR institution is an exemplary industry-academia collaboration that can help further the development and commercialisation of biologics and biosimilars for a better and more affordable healthcare to customers across the globe."

Prof. Ashwini Kumar Nangia, DST representative Dr. C. Rajadurai and Dr. Rustom Mody signed the agreement in presence of respective teams on 6 Feb 2018.

Said Dr. Rustom Mody, "Our collaboration with a premier CSIR institution is an exemplary industry-academia collaboration that can help further the development and commercialisation of biologics and biosimilars for a better and more affordable healthcare to customers across the globe."

## CSIR-National Physical Laboratory signs MoU with HPCL

Being a part of the national initiative for developing Bhartiya Nirdeshak Drvayas (BND™) used in the Petroleum sector in India, CSIR-NPL (National Physical Laboratory), New Delhi, and Hindustan Petroleum Corporation Limited (HPCL) have joined hands by signing an MoU for indigenous development of petroleum Certified Reference Materials (CRM) with the trade name BND™.

CRMs play an important role in

maintaining the high standard quality ecosystem for petroleum products; and also in the calibration of laboratory testing equipment for assuring quality. This will be useful for all stakeholders and common people as well and will also save vital foreign exchange through import substitution for CRMs.

CSIR-NPL has also developed BNDs for high purity Gold, Coal, and Water & building materials.

### Workshop/Training Programmes

## CSIR-NISCAIR Organises Science Communication Training



CSIR-NISCAIR (National Institute of Science and Information Resources), New Delhi, conducted a short-term training course on “Science Communication” during 9-13 July 2018.

The course was aimed at introducing the fundamentals of effective science communication to the participants, and simultaneously underlining the various fields involved in it.



Dr. Nakul Parashar addressing the gathering



The five-day training programme was scheduled meticulously, comprising balanced proportions of theory, assignments, as well as interactive sessions and campus visits in order to make the course as lively and engaging as it could be for the trainees. Eminent scientists and experts in their respective fields delivered lectures during the course.

The programme was formally inaugurated by Dr. Nakul Parashar, science communicator and Senior Vice President, Electronic Content Management in Exela Technologies. In his keynote address, he discussed the various facets of science communication and the challenges.

Dr. Manoj Kumar Patariya, Director, CSIR-NISCAIR welcomed the participants and asked them to extract as much benefit they could from the course. A round of introductions followed thereafter.

Kicking off the training, Mr Hasan Jawaid Khan, Editor, *Science Reporter*, delivered a lecture on “Importance of Science Communication”. He said that the purpose of scientific writing was to inform and teach the general public about scientific issues, to analyse or predict the cause or implication of an



Dr. Manoj Kumar Patariya, Director, CSIR-NISCAIR addressing the participants; Dr. Nakul Parashar on the left and Mr Mukesh Pund on the right

event, and inculcate scientific temper among the public. He mentioned that writing is one of the most effective methods in communicating science, not just because the written content has a longer life as compared to the spoken word, but also as it possesses more credibility than the latter. “Passion for writing is a source of inspiration which can be converted into a powerful tool to communicate effectively with the people,” he added. Mr Khan also discussed the challenges faced in communication such as sensationalism and trivialisation, incorrect reporting,

Mr Hasan Jawaid Khan said, “Passion for writing is a source of inspiration which can be converted into a powerful tool to communicate effectively with the people.”

Dr. G. Mahesh also raised concerns over the prevalent parameters used for rating journals. For instance, Impact Factor (IF), which is calculated using citations for a period of two years cannot be considered as a true parameter, since it does not take into account the citations that take place later on.

irresponsible reporting, etc.

In the next session, Mr Hasan Jawaid Khan talked about “Effective Science Writing”, in which he gave an overview of the nuances and intricacies of writing effective popular science articles. Later, the participants were given writing assignments based on actual research articles published in journals.

Day two had a vivid mix of subjects as well as experts in the schedule. Ms Geeta Mahadevan, Editor, *Indian Journal of Chemistry-Section A (IJCA)*, delivered a talk on “Research Communication”. She explained the concept of ‘IMRaD’ (Introduction, Method, Research and Discussion); which is a commonly used format for scientific journals.

Moving on to the next session, Ms Kanika Malik, Editor, the *Journal of Intellectual Property Rights (JIPR)*, gave an introduction to the role of “Publishing & Copyright” in science communication, and journals in particular. She talked about the origin, need and importance of copyright, and its recognition as a law in our constitution. Since not many people are aware of the law, rules & regulations regarding copyright and patents, the lecture was quite an informative insight into this complex field.

Dr. G. Mahesh, Senior Principal Scientist and Editor, *Annals of Library*

*and Information Studies*, commenced Day three of the training with his lecture “Scholarly Communication & New Measures”. He gave a deep insight into the historic evolution of journals as well as their metamorphosis with respect to the digital era. He talked about the wide variety of journals that exist today and the fundamental differences between them.

Dr. G. Mahesh also raised concerns over the prevalent parameters used for rating journals. For instance, Impact Factor (IF), which is calculated using citations for a period of two years cannot be considered as a true parameter, since it does not take into account the citations that take place later on. He gave numerous examples of classic articles which have had barely a handful of citations in the initial one or two years, but a couple of years later garnered them by the hundreds. Such logical arguments seem to defy the credibility of certain parameters and hence render them dubious.

Day four was probably the most exciting one for the participants, as “Facing the Camera” gave jitters to a few, whereas others seemed rather confident about their first experience in front of a camera. The participants enjoyed the experience and relished every bit inside the in-house studio laden with ultra-modern equipment.

In the second half of the day, a visit to the state-of-the-art printing press was arranged where the trainees got familiar with the working of the gigantic, imported machinery used in printing.

On the final day, Ms Charu Verma, Principal Scientist & Team Leader of the CSIR Knowgate Project, highlighted the role of “IT in Science Communication”. Refreshing the basics of Information Systems and Information Technologies, she emphasised on the need as well as benefits of IT in overcoming challenges



Ms Charu Verma, Principal Scientist,  
CSIR-NISCAIR addressing the participants



Trainees with Dr. Manoj Kumar Patariya, Director, CSIR-NISCAIR and officers of the institute

of Science Communication. Talking about the evolution of the web, she informed that “the focus is shifting from web of content to web of communication, to the web of things and most recently web of thoughts”. Citing benchmark examples such as the Human Genome Project and the Large Hadron Collider, Ms Verma reiterated the prowess of IT in modern day science & technology.

Post lunch, the five-day training came to an end with a feedback session followed by the valedictory. The participants echoed that the course was highly informative and even inspiring for many to venture into the field of science writing, marking the successful completion of the programme.

*Contributed by Mr Prashant Raghan, Research Intern, International & Popular Science Division, CSIR-NISCAIR*

Mrs Charu said, “The focus is shifting from web of content to web of communication, to the web of things and most recently web of thoughts.”



## CSIR-NISCAIR Organises Symposium on Human Excellence and Spirituality



Dr. Manoj Kumar Patariya, Director, CSIR-NISCAIR; Dr. Chinmay Pandya, Pro-Vice Chancellor, Dev Sanskriti Vishwavidyalaya, Haridwar, Uttarakhand; Prof. Raja Ram Yadav, Vice-Chancellor, VBS Purvanchal University, Jaunpur, Uttar Pradesh and Shri Praveen Ramdas, Organising Secretary, Vijnana Bharti, New Delhi



Dr. Manoj Kumar Patariya felicitating Dr. Chinmay Pandya

A symposium on “Human Excellence: A Holistic Approach to Science and Spirituality” was organised by CSIR-National Institute of Science Communication and Information Resources (CSIR-NISCAIR) at the National Academy of Agricultural Sciences, NASC Complex, Dev Prakash Shastri Marg, Pusa, New Delhi, on 16 July 2018.

Dr. Chinmay Pandya, Pro-Vice Chancellor, Dev Sanskriti Vishwavidyalaya, Haridwar, Uttarakhand, was the keynote speaker, Prof. Raja Ram Yadav, Vice-Chancellor, VBS Purvanchal University, Jaunpur, Uttar Pradesh was the Chief Guest, and Shri Praveen Ramdas, Organising Secretary, Vijnana Bharti, New Delhi, was the Guest of Honour.



Dr. Chinmay Pandya, Pro-Vice Chancellor,  
Dev Sanskriti Vishwavidyalaya, Haridwar



Dr. Manoj Kumar Patairiya  
Director, CSIR-NISCAIR

In his keynote address, Dr. Pandya highlighted the connectivity between science and spirituality and about the purpose of human excellence and how science and spirituality complement one another. Further, he said that Purpose, Attitude, Compassion, and Commitment lead to Human Excellence. According to him, science and spirituality enlighten individuals in the process of the manifestation of life, reason, realism, and understanding.

Addressing the gathering, Prof. Yadav said that science & technology and spiritual development are integrated and are incomplete without one another.

Earlier in the symposium, welcoming the audience Dr. Manoj Kumar Patairiya, Director, CSIR-NISCAIR, said that if you have purity of mind, you will be able to observe what others can't like Newton observed the falling apple, the basis of the theory of gravitation. After the lectures, audiences also interacted enthusiastically with the experts.



Prof. Raja Ram Yadav, Vice-Chancellor,  
VBS Purvanchal University,  
Jaunpur, Uttar Pradesh



A view of Science Communication Gallery



Vote of thanks by Ms Veena Jain, Controller of Administration (CoA)

A Science Communication Gallery was also organised which displayed the various publications, posters depicting the activities of the institute as well as the raw crude drug samples, medicinal plants and herbarium available in the institute.

Finally, the symposium was concluded with a vote of thanks by Ms Veena Jain, Controller of Administration, CSIR-NISCAIR. Over 150 scientists, academicians, media persons, journalists, etc. participated.

The World Environment Day aims to promote awareness about the importance of preserving our biodiversity, the need to acknowledge the problem of increasing levels of plastic waste that is becoming unmanageable and destroying our environment and ways to take corrective action by rejecting single-use plastic items.

## World Environment Day at CSIR-CBRI

CSIR-Central Building Research Institute (CSIR-CBRI), Roorkee, along with the Institution of Engineers (India), Roorkee Local Centre, celebrated the World Environment Day on 7 June 2018. The aim was to promote awareness about the importance of preserving our biodiversity, the need to

acknowledge the problem of increasing levels of plastic waste that is becoming unmanageable and destroying our environment and ways to take corrective action by rejecting single-use plastic items.

Dr. P.G. Rao, Former Director, CSIR-NEIST, Jorhat, graced the



Dignitaries planting saplings (above) and lighting the lamp (below)

occasion as the Chief Guest and Dr. Sharad K. Jain, Director, National Institute of Hydrology, Roorkee, was the Guest of Honour. Dr. N. Gopalakrishnan, Director, CSIR-CBRI, Roorkee presided over the function. The celebrations began with the planting of trees by the dignitaries in CSIR-CBRI, Roorkee, Lawns as a gesture of harmonious living with nature followed by lighting of lamp.

Dr. P.G. Rao presented an intriguing lecture on “Green Technologies: Need of the Hour” and said that scientists can play a major role in saving our environment from the impending doomsday conditions by developing innovative environment-friendly materials and technologies from waste. He said that plastic makes up 10% of the entire waste we generate, be it agricultural, industrial or domestic. This plastic waste is incredibly difficult to dissipate and so the focus should be to utilise this plastic waste in every way possible through new and innovative technologies.



Dr. Sharad K. Jain informed the gathering that every year, approximately 8 million tonnes of plastic end up in our water bodies, destroying marine lives and disturbing the ecology. He also spoke about the various activities being carried out to clean various water bodies of the state under the Government

Programmes such as Namami Gangey.

Addressing the gathering, Shri Malvinder Singh, Chairman, the Institution of Engineers (India), Roorkee Local Centre, swore an oath to beat plastic pollution by rejecting single-use plastic which cannot be reused or recycled and work together to pave the way for a cleaner and greener world.



Dr. N. Gopalakrishnan



Dr. A.K. Minocha presented a formal introduction of Dr. P.G. Rao



Dr. Sharad K. Jain proposed vote of thanks

In his Presidential Address, Dr. N. Gopalakrishnan expressed concern at the disastrous impact of the overwhelming use of single-use plastic and said that this is a call to action for all of us to come together to combat one of the great environmental challenges of our time – Plastic Pollution. He

asked everyone to make changes in the daily routine to ensure that our zest for material prosperity does not compromise our environment and our own health. While plastic has many valuable uses, we have become over-reliant on single-use or disposable plastic with severe environmental

consequences. He informed that CSIR-CBRI is working in the right direction to face these challenges by developing environment-friendly building materials

Dr. A.K. Minocha, Chief Scientist, welcomed the gathering and informed

about the theme “Beat Plastic Pollution” and presented a formal introduction of Dr. P.G. Rao. Dr. A.K. Mittal, Senior Principal Scientist presented a formal introduction of Dr. Sharad K. Jain and proposed a vote of thanks.



### Awards/Honours

## Dr. Sakya Singha Sen Awarded with INSA Young Scientist Medal

Dr. Sakya Singha Sen, a Senior Scientist from CSIR-National Chemical Laboratory (CSIR-NCL), Pune, has been awarded the INSA Young Scientist Medal 2018 by Indian National Science Academy (INSA), New Delhi. The INSA scheme rewards young scientists with extraordinary promise and creativity who have made notable research contributions in Science and Technology.

Dr. Sen completed his M.Sc. (Chemistry) from the Indian Institute of Technology, Kharagpur, in 2006. He obtained his PhD in Chemistry from the University of Göttingen, Germany, in 2010. Later, he received the Alexander von Humboldt postdoctoral fellowship and joined the laboratory of Prof. Holger Braunschweig at the University of Würzburg, Germany.

Dr. Sen's research group works on topics such as synthesis of low oxidation state and low coordination number, s- and p-block compounds and their application into small molecule activation as well as in



catalysis.

Dr. Sen has published more than 50 research papers in peer-reviewed international journals. He has been guiding 6 students for PhD. He is also the recipient of the CSIR-Young Scientist award in chemical sciences in 2017 and has been selected as a Young Associate of the Indian Academy of Sciences, Bengaluru (2017-2020).

The Award will be presented to Dr. Sen in the Anniversary General Meeting of the Academy to be held in December this year.

The INSA scheme rewards young scientists with extraordinary promise and creativity who have made notable research contributions in Science and Technology.

**Appointments**

## Director, CSIR-IICB Takes Over Additional Charge as Director, CSIR-NEIST



Dr. Samit Chattopadhyay, Director, CSIR-Indian Institute of Chemical Biology (CSIR-IICB), Kolkata, has taken over additional charge of Director, North East Institute of Science and Technology (CSIR-NEIST), Jorhat.

Dr. Samit Chattopadhyay, Director, CSIR-Indian Institute of Chemical Biology (CSIR-IICB), Kolkata, has taken over additional charge of Director, North East Institute of Science and Technology (CSIR-NEIST), Jorhat (Assam), on 30 June 2018. Dr. Chattopadhyay had assumed charge as Director, CSIR-IICB in 2015. Earlier, he was Scientist G and Associate Dean of National Centre for Cell Science (NCCS), Pune. CSIR-IICB Translational Research Unit of Excellence (CSIR-IICB TRUE) at Salt Lake, Kolkata, is functioning under his leadership.

The focus of his research interest covers a wide range of biological sciences like Epigenetics in Cancers and other diseases; Molecular biology work on HIV transcription and latency; Role of nuclear matrix proteins in DNA damage repair, splicing; the structure-function

relation of MAR-binding proteins; miRNA in cancer and other diseases, Immunobiology, etc.

After completing his M.Sc. (1983) in Botany, Cytogenetics from the University of Calcutta and PhD (1989) in Molecular Biology, Biochemistry from Jadavpur University, he did his postdoctoral research work in University of Connecticut, Farmington, USA (1989–1995) and in Massachusetts Institute of Technology (MIT), Boston, USA (1995–1998).

Dr. Chattopadhyay is a member and chairperson of many academic and research committees in various institutes in India. He has several distinguished recognitions to his credit for his outstanding research contributions in frontier areas of biology, science and human resource development among which Sir J C Bose National Fellowship by DST (2013), Fellow of The World Academy of Sciences (FTWAS), 2015, Fellow of Indian National Science Academy (FNA), Delhi (2013), Fellow of Academy of Science (FASc), Bangalore (2011), Fellow of National Academy of Science (FNASc), Allahabad (2006), Fellow of West Bengal Academy of Sciences and Technology (FAScT), 2016 and Fellow of Maharashtra Academy of Science (FMASc), 2000, are only a few to mention.

## Obituary

# Professor Digvijai Singh

11 December 1934-20 July 2018

It is with a very heavy heart that I write about my friend, philosopher and guide Professor Digvijai Singh who left us for his heavenly abode on Friday the 20 July 2018 in New Delhi.

Born on 11 December 1934, he was seven years senior to me in age, but miles ahead in his contributions to the world of Science and Engineering. His passing away at a time when he was still biologically so young and professionally so active is indeed an irreparable national loss. While saluting him for his unstinted friendship, generous support and outstanding contributions in the field of engineering, my wife Meena and I pay our heartfelt condolences to the bereaved family, especially to Mrs Usha Singh, his wife, Nandita and Soumen, his daughter and son-in-law, and Maj. Gen. K. Jai Singh and Sushil, his brother and sister-in-law.

During my sojourn in this world, rarely have I come across people who are attributed with the expression of the altruistic gene, which induces a large heart, sharp intellect and wide vision. In Professor D.V. Singh, I found such a man for which I most sincerely thank my stars. To all those who knew him, his identity was of an unassuming man of simple living and high thinking. Now when he has gone the way of all those in flesh and blood do, leaving his foot prints on the sands of time, it is our turn to bow to his qualities of head and heart and pay our debt of gratitude he so richly deserves.

Decades ago, in 1978, when Dr. Singh won the most coveted Shanti Swarup Bhatnagar Prize at the age of 41 years, the world of science acknowledged with acclamation his original thinking in the field of Dynamics of Mechanical

Systems, Tribology. He later went on to serve the Tribology Society of India as its President. Years thereafter, with the Lifetime Contribution Award of the Indian National Academy of Engineering bestowed on him in 2015, the world of engineering honoured him for his long string of lifetime contributions.

At every juncture of his journey of life, in the relentless pursuit of higher goals, rewards and awards followed him like his shadow. The Life Time Achievement Award of Tribology Society of India, The Lifetime Achievement Award of the International Society of Production Engineers, USA, the Distinguished Alumnus Award of IIT Roorkee, the National Design Award of IE (I), the IMDA Silver Jubilee Award and the Khosla Awards are only just a few of the other awards bestowed on him from time to time.

The Indian Academy of Sciences, Indian National Science Academy, Indian National Academy of Engineering, and National Academy of Sciences, India all honoured him with Fellowships, one after the other, in recognition of his outstanding contributions in the field of Science and Engineering. Inter alia, he also served as the Vice President of the Indian National Academy of Engineering and of the Indian National Science Academy.

Besides, Dr. D.V. Singh served with distinction a number of institutions and professional bodies. He was the Director of CSIR-Central Road Research Institute, New Delhi during 1990-1996; Vice Chairman, AICTE during 1996-2000; Vice Chancellor, University of Roorkee and Director IIT Roorkee during 2000-2002.



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We first met each other within a couple of weeks of my joining the CSIR-Central Building Research Institute, Roorkee in the year 1975. My intimacy with him, however, grew after I became the Director of CBRI in 1986. The bond between us became stronger as the years and decades rolled by and would remain as strong even after his departure. Down the lane of memory, I recall several anecdotes frozen in time and space.

On 12 February 1990, I got a formal letter from Dr A.P. Mitra, the then Director General of CSIR, conveying to me the approval of the Prime Minister of India to my appointment as Director, Central Road Research Institute. Having already given my consent to join the United Nations Centre for Human Settlements in Nairobi, I expressed my inability to accept the offer; Dr. Mitra was not disturbed in the least. He paused for a couple of minutes and then picked the directory of INSA resting on his table, ruffled its pages and asked me whether I knew Professor D.V. Singh. I nodded in affirmation. It appeared to me that he was already convinced of the exceptional merit of Dr. Singh as a pick for the post of Director, CRRI.

Dr Mitra knew all about his work on dynamics of single track vehicles and fluid film lubrication studies. He also knew about his degrees of Mechanical Engineering and Civil Engineering from the University of Roorkee. Subsequent conversation with me was merely to find more about my view of the connection between Dr. Singh's field of expertise and the challenges he would face, if selected to lead CRRI.

Dr Mitra also wanted to know from me how similar institutions in the United Kingdom and other parts of the world are run. Well connected with CIB at that time, I cited the example of the Building Research Institute at

Garston in the U.K. which was led by a physicist. I could see a smile on the face of Dr. Mitra as I left his room. Dr. D.V. Singh was not only destined to become CRRI Director but to take it to taller heights! He made such a dent in the field of highway engineering that, he was called upon to serve on the Board of Governors of International Road Federation, Washington, D.C., three Committees of the World Road Association (Paris), Board of Governors of the International Federation of Science, Stockholm, and was also the Secretary of the Federation of the Asian Scientific Academies and Societies.

In the last one decade or so, for every professional discourse, we frequently interacted with each other. About five years ago, for almost about two years at a stretch, I used to share draft chapters of my book as it was being written. So thorough and intense was his review and so perfect was his editing that the final chapters looked very different from what I had originally written. My book had a large number of cartoons and illustrations. He was so concerned about the quality of my book that he, on his own, redrew some of the cartoons. It was only at that time I came to know that he was an ace cartoonist too!

We worked together very closely on the INAE Forum on Engineering Interventions in Disaster Management and he continued to be pro-active despite his steadily failing health. The last of the INAE Forum meeting he had attended was on 27 June 2018 just three weeks prior to his death. So strong was his will that the hardship of 2-3 hours of travel time from his residence in Vaishali to the INAE office in Gurgaon paled into insignificance, despite his failing health. He not only called me over the phone a day earlier to confirm his participation but to follow it up after the meeting with the written version of

his statements which are now part of the minutes. Imagine someone doing all that brushing aside the health related problems!

His citation for INAE Lifetime Contribution award records:



*“Dr D.V. Singh obtained his basic degree of Science from Allahabad University, degrees of Mechanical Engineering and Civil Engineering from University of Roorkee and his post-graduation degrees, M.S. and Ph.D., from University of Wisconsin. He joined the faculty of the University of Roorkee in 1958 and served the University as Professor and Dean until 1990. He was Director, Central Road Research Institute. He has published 160 research papers, guided 19 Ph.D. Theses and several M.E. Theses. His domain areas of specialization are Dynamics of Mechanical Systems, Tribology, Stress Analysis, Fluid Mechanics, and Road Transportation Engineering. Among his distinguished research, his pioneering work on dynamic stability of two-wheeled vehicles and his analytical work on hydrodynamic and hydrostatic bearings and fluid seals, tyre mechanics, design of micro hydro- machines and modelling of welding arc and its stability stand out. He was the Lead Person of the enormously successful Fly Ash Mission of DST, which has made a great impact on utilization, safe disposal and management of Fly Ash in the country. He has served on many Committees. Among them, are Science and Engineering Council of DST, Programme Advisory Committee of Civil and Mechanical Engineering (Chairman), PAC of Manufacturing Technology, TIFAC-CAR Programme Committee and its Panel on IC Engines and Drive Trains (Chairman), Fly Ash Mission of DST (Lead Person), INAE Forum of Technical Education (Chairman), Research Council of CSIRCRRI (Chairman), National Board of Accreditation, Board of Governors of the Engineering Council of India Board of Governors, IIT Kanpur, etc. He has also served DST Technology System Development Group (Chairman) and DST-PAC of International Programme (Engineering and Material Science). He was the National Coordinator (Engineering Science) Indo-Russian Integrated Long Term Programme of Cooperation in Science & Technology, Chairman of CSIR Engineering Cluster and Chairman NRDC Award Committee. He served as Member Indian National Academy of Engineering Council, and as Chief Editor, National Academy of Sciences Letters. He is presently the Chairman of the Research Council of CSIR-CMERI.”*

It will be unfortunate if his real identity were to get lost in the dazzle of the countless awards and rewards that knocked his door one after the other. To me, above all, he was a thorough gentleman, human being par excellence and a man of high values.

According to E.M. Forster: “Failure and success seem to have been allotted to men by their stars. But they retain the power of wriggling, of fighting with their stars and in the whole universe

the only interesting movement is his wriggling.” Dr. D.V. Singh fought with his stars like a warrior until the very end. When the history of contributions by Outstanding Indian engineers is written, Dr. D.V. Singh will doubtless occupy a full page.

May his soul rest in peace.

*Dr. R.K. Bhandari is former Director of the CSIR-Central Building Research Institute (CSIR-CBRI), Roorkee*

He was the National Coordinator (Engineering Science) Indo-Russian Integrated Long Term Programme of Cooperation in Science & Technology, Chairman of CSIR Engineering Cluster and Chairman NRDC Award Committee. He served as Member Indian National Academy of Engineering Council, and as Chief Editor, National Academy of Sciences Letters. He is presently the Chairman of the Research Council of CSIR-CMERI.

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