

Indian Academy of Sciences – Mid-Year Meeting*

This year the Mid-Year Meeting of the Indian Academy of Sciences was preceded by a half-day symposium on 'bridging the gap between earth and life sciences' aimed at drawing collaborations between the two fields. Concern about global warming has led to the realization that earth's climate is based on life and it plays an important role, remarked J. Srinivasan (IISc, Bangalore). There were presentations dealing with topics such as 'biomineralization, biomechanics and the calcite eye', macroevolution and the dialogue between biologists and palaeobiologists, the deep sea as a repository for ancient microorganisms, and palaeobotanical studies from the Indian subcontinent.

The main meeting opened with a special lecture on self-organization by Ashutosh Sharma (IIT, Kanpur), which has applications in the making of various devices like opto-electronics, solar cells and other components, including a micro-lens. He further delved into the making of a nano-lens and its associated limitations. In the second special lecture, Chandrima Shaha (National Institute of Immunology, New Delhi) referred to cell death as an evolutionary process. An elucidation of death pathways in life forms was crucial in understanding disease mechanisms and finding switches that can be altered to manipulate disease conditions, she said. There was a public lecture on 'Making spaces for nature: Science, politics and the environment in an emerging economy' by Mahesh Rangarajan (Nehru Memorial Museum and Library, New Delhi). The theme of his talk was that while in a democracy decisions were difficult to take, however, it provides opportunities for a transparent process. He mentioned several examples of public debates, such as the Forest Rights Act (debated since the mid-1990s) and projects such as the Silent Valley, dams such as the Sardar Sarovar project, and so on. In all these cases he said, a compromise had been settled upon which

was promising. He also touched upon India's efforts towards nuclear non-proliferation. Nehru's advocacy of scientific temper is all the more relevant now, he said.

Natural products isolated from both terrestrial and marine sources are starting points in drug discovery. Srivari Chandrasekhar (Indian Institute of Chemical Technology, Hyderabad) highlighted the work on new chemical entity synthesis which could facilitate early drug discovery using natural products. The focal points of his talk were total synthesis of natural products, unusual peptides, organo-catalysis, deuterium chemistry and industrial collaborative e-research. Some interesting examples that he provided of work in progress included developing technology for the already existing drugs such as Misoprotol and Tamiflu and incorporation of deuterium into the health sector. Synthesis of marine natural products was explained by Faiz Ahmed Khan (IIT, Hyderabad), like those of the amanthamide series and convolutamine with four bromine atoms. Methods such as Grob-type fragmentation of norbornyl derivatives were considered efficient for their synthesis. Amol A. Kulkarni (National Chemical Laboratory, Pune) focused on the use of micro-reactors in synthesizing chemicals – a revolutionary approach, aptly supported by several examples such as carrying out aromatic nitrations, exothermic oxidations, sulphoxidation, Grignard reactions, Bu–Li chemistry and a few case studies.

Viruses and bacteria have led to several public-health outbreaks. Yogendra Singh (Institute of Genomic and Integrative Biology, New Delhi) explained the survival strategies adopted by the bacterial pathogens in a host. He explained that microorganisms equipped with a variety of virulence factors modify the host immune mechanism or inhibit essential functions of the cells, thus restricting survival of the host. G. Balakrish Nair (Translational Health Science and Technology Institute, Gurgaon) presented his life-long work on cholera, a dehydrating disease, which has caused seven pandemics since 1817. He reiterated the clinical spectrum of *Vibrio chol-*

era infection – first described in 1854 and first cultured by Robert Koch in 1883. A brief video clip of a hospital in Bangladesh nursing the victims of cholera reinstated the fatality of the disease. He argued that a strong public health system was lacking to support such outbreaks. Though a cholera vaccine had been discovered and marketed by Shantha Biotech, Hyderabad it had no takers and is nowhere on India's public health policy despite similar outbreaks evident from the data available. He concluded that there was a need to decide and introduce the vaccination programme at a policy level.

Samit Chattopadhyay (National Centre for Cell Science, Pune) directed his talk on SMAR1, a nuclear matrix protein and its role in human cancer. Rakesh Mishra (Centre for Cellular and Molecular Biology, Hyderabad) explained how information is encoded and packaged in a genome. The non-coding part of the genome that led to evolution of complexity was discussed with techniques now used to study it.

Use of computed tomography or computed axial tomography, a medical diagnostic technique to investigate the processing of the ionosphere and its use in extracting information on the regions of the ionosphere that were not easily accessible by the conventional probing methods was briefly introduced by Smitha V. Thampi (Physical Research Laboratory (PRL), Ahmedabad). Manoj Saxena (Deen Dayal Upadhyaya College, New Delhi) explored the working principle of the tunnel field effect transistor (TFET) and its use as a biomolecule sensor. His talk highlighted the recent interest of using the technology in biomedical applications.

C. Pulla Rao (IIT, Bombay) explained how synthetic metalloproteins could open avenues and opportunities in the area of bioorganic chemistry, metallomics, materials science and medicine. Recently, his group has been conducting metallation studies in the laboratory with albumins, lectins and enzymes. V. K. Chandrasekar's group (Bharathidasan University, Tiruchirappalli) performed experiments on anaesthetized rats and patients with Alzheimer's disease and

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Parkinson's disease to study the role played by the external stimulus on the occurrence of event-related synchronization or de-synchronization.

Subhasish Dey (IIT, Kharagpur) described experimental studies by his group aimed at quantifying the near-bed turbulence parameters of mobile-bed flows with non-cohesive bed-load sediment transport and compared them with those in clear-water flows. S. R. Barman (Consortium for Scientific Research, Indore) described the search for single-element quasicrystalline metallic films, which have been achieved so far for copper, antimony and bismuth. The question still remains whether such quasicrystallinity can be induced in free-electron metals. R. P. Chhabra (IIT, Kanpur) defined a visco-plastic fluid, which deforms (shears) only when the applied shear stress exceeds a threshold level, a problem most researchers face in developing products. Moreover, most products used in our daily life are suspensions. An understanding of the hydrodynamics of particles in visco-plastic fluids is therefore required.

Utpal Sarkar (PRL, Ahmedabad) attempted to analyse what would happen if neutrinos did travel faster than light. This was in the context of an apparent discovery of such faster-than-light neutrinos. He discussed some of the theoretical issues and implications of the effect and gave examples of situations that would violate other experimentally observed facts.

K. Porsezian (Pondicherry University, Puducherry) gave an introduction on the use of super-continuum generation (SCG) in photonic crystal fibres. The discovery, properties and applications of SCG using photonic crystal fibres were discussed in-depth. He stated the differences between the conventional and photonic crystal fibres. Some of the important properties of different fibres, its cause and effects were highlighted. S. J. Bhatt (Sardar Patel University, Vallabh Vidyanagar) talked about the different structures in C^* -algebras. A general approach to the construction of such differential structures and their regularity properties were described using several examples.

R. K. Kohli (Panjab University, Chandigarh) referred to the Eucalypt plantations controversy (Karnataka 1980–90s), in which the tree was accused of draining more water to the detriment of adjoining crops or vegetation and

depleting biodiversity. A series of experiments established that this exotic tree releases secondary metabolites known as allelochemicals into the environment that affected the adjoining vegetation, and how such interactions resulted in the competitive exclusion of other plants. He discussed the possibility of using such natural chemicals in weed management. M. Rajeevan (Ministry of Earth Sciences, New Delhi) elaborated on a new drought indicator, the standardized precipitation–evapotranspiration index recently proposed to quantify the drought condition over a given area. Using this model a trend in increasing drought conditions has been reported, which is attributed to increasing global surface temperatures.

Abhishek Dey (Indian Association for the Cultivation of Science, Kolkata) looked upon hydrogen as an environment-friendly and sustainable energy vector – an alternative to fossil fuel. But due to the costs involved, production of hydrogen was limited and much focus was on its storage. Dey threw light on his group's effort in producing cost-efficient hydrogen using cheap electro-catalysts such as Co and Fe.

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Recent advances in electron microscopy

The 33rd meeting of the Electron Microscopy Society of India (EMSI) held at the Indian Institute of Science, Bangalore during 2–4 July 2012 laid stress on recent advances in electron microscopy and its importance in various disciplines such as materials science, biology, medicine, metallurgy, etc. The keynote address by Gustaaf Van Tendello (University of Antwerp, Belgium) on the use of electron microscopy in the 21st century emphasized the important role of microscopy in today's world. C. Barry Carter (University of Connecticut, USA) spoke on interfaces between biological materials and metal or ceramic materials, which has become a critical issue today in health sciences. Among various invited lectures, Partha Goshal (Defence Metallurgical Research Laboratory, Hyderabad) dealt with carbon nanotubes

and nanofibres present in novel combinations with mechanical and electrical properties. Amar N. Ghosh (National Institute of Cholera and Enteric Diseases, Kolkata) talked about the pore-forming toxin of *Vibrio cholerae* and the study of the differences in observed hemolytic activity. Industry lectures delivered by the participants included topics ranging from helium ion microscopy, *in situ* 4D microscopy, atom probe tomography, energy filtering in transmission, etc. The contributions of the Society were highlighted in the general body meeting on day three, following the poster presentation. On the whole, the meeting recognized the efforts of scientists working in the field of electron microscopy and provided a platform to showcase their work to a multidisciplinary audience.

Young protectors of nature

The Student Conference on Conservation Sciences (SCCS) held at the Indian Institute of Science, Bangalore during 2–4 August 2012 brought together young researchers in conservation sciences to facilitate interaction, help them develop their research ideas and methods, build contacts and capacity. As a sister conference to SCCS-Cambridge and SCCS-New York, the Bangalore event focused on attracting fellow conservation students and conservation professionals from around the world primarily from countries in South and Southeast Asia and Africa. The three-day event presented a variety of lectures ranging from biodiversity, human–animal conflict, tourism in biodiversity areas, marine biodiversity, etc. Workshops were organized on divergent topics such as the craft of compelling communication with Geoff Hyde (National Centre for Biological Sciences, Bangalore), communicating science to the general public with David Quammen (travel writer) and conservation photography with Kalyan Varma. Mahesh Rangarajan (Nehru Memorial Museum and Library) delivered the first Ravishankaran memorial lecture. He spoke about democracy and its relation to the conservation process. Quammen gave a plenary lecture on the infections, transmissible diseases caused by AIDS, SARS, rabies, etc. responsible for dramatic epidemics. Bittu Sahgal (environmental