

An informal survey conducted among young scientists attending the Congress, revealed the following mixed bag of comments; 'Wasteful' said some and 'Should be held every two years' said some; others felt that it improves self-confidence and promotes interaction, etc. When asked whether they would attend the Congress if no financial support was given, most of them said 'no'.

The 88th session of the Indian Science Congress adopted the vision statement for food, nutrition and environmental security of India. The recommendations

presented by Paroda are for establishing 'Genomic valley' for protecting national interests and conservation, eliminating bureaucratic controls in educational establishments and enhancing agricultural R&D to 2% of agricultural GDP. A 'Livelihood box' would allow developing countries to impose restrictions on imports if they affect livelihood opportunities; included among the goals are precision farming, female literacy, infrastructure development, employment generation for rural poor, post-harvest value addition and nutrition management. Biotechno-

logy could be a powerful tool to alter the nutritional, therapeutic, functional and economic aspects of plant and animal food, and synergy between science, technology, organizations and public policy for enhancing competitiveness in the newly emerging global scenario. The statement set a target date of 2020 to achieve the rainbow revolution.

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## The Academy meets in Goa\*

Goa played host to the 66th Annual Meeting of the Indian Academy of Sciences, Bangalore, for the first time. As part of the scientific proceedings in 2000, was the topical symposium on 'Climate, Monsoon and India's Water'.

C. V. Raman, in his presidential address at the 1st Annual Meeting of the Academy held at Bombay in 1935 and attended by 65 Fellows, had outlined that among the activities of the Academy should be meetings for discussion of research papers, symposia on special subjects and publication of the proceedings.

Today, the Academy has nearly 800 Fellows and 50 Honorary Fellows. Raman's views in the inaugural address nearly 65 years ago, that the scientific meetings of the Academy, especially the symposia 'are a valuable opportunity for discussing problems of common interest from different points of view', were amply reflected at the vibrant meeting of the Academy in Goa. The open meeting was attended by Fellows, and other scientists, invited teachers from Goa and rest of India and the media.

There were two captivating public lectures. One was the 'show of visual delight, illusion and magic' demonstrated by S. Ranganathan, Indian Institute of Chemical Technology, Hyderabad in his public lecture 'The magic in chemistry'. This attracted a thumping participation from the public, including young students

who were enraptured by his ability, with the help of his assistant, in drawing them to the beauty of chemistry. The magic of nature as seen around us was richly brought out by Madhav Gadgil, Indian Institute of Science, Bangalore in his public lecture 'Butterflies'. This was preceded by the release of the book '*India - A Lifescape, Butterflies of Peninsular India*'. This is the first of a series of fascicles to be published under Project Lifescape - that is part of an initiative by the Indian Academy of Sciences, to enhance the quality of science education. In addition, an exhibition displaying exquisite nature photographs drew accolades. The Academy's initiative to improve the state of science education by attracting bright young minds, found success in spreading this very message, to jam-packed audiences attending the public lectures in Panaji's beautifully constructed Kala Academy.

The three-day meeting had the opening session followed by nine more, which included special lectures, public lectures, lecture presentations by Fellows and Associates and the micro-symposium. N. Kumar (President of the Academy), Raman Research Institute, Bangalore spoke about India being a participant to the 'knowledge revolution' with its 'multi-disciplinary window' in science and technology. Stressing India's important role in prediction and study of the monsoon, a symposium on the same was part of the meeting.

Kumar's Presidential Address on 'Cold atoms' to the distinguished gathering dealt with the how and why of trapping and cooling of atoms towards Bose-

Einstein Condensation (BEC). It has been easier to heat than to cool, borne out by the fact that refrigeration is costlier than heaters. He said that a gas of identical and quantum-mechanically indistinguishable atoms is cold in an absolute sense, if the de Broglie wavelength for its thermal motion exceeds the mean interatomic spacing. BEC phenomenon associated with superfluidity, as seen in  $^4\text{He}$  has been known for a long time. However, more recently the change-over from helium to alkali centric has occurred. This has been made possible by entrapment in a shallow container (mm size) of dilute alkali-atomic gases, using laser beams for cooling down to nanokelvins. This has created a revolution in cooling, with a new chemistry and physics emerging, he added. Novel applications can be found, as in 'atom laser', extending frontiers of physics. Atom lasers could be used to produce nanometric electronic components, shaping a new lithography unimaginable so far. Other possible uses could be in atomic clock, gravity meter and creating acceleration. He suggested that researchers look anew from a laser viewpoint for building optical elements, as the time had come to take initiatives in this field.

A special lecture by P. M. Mathews, University of Madras, Chennai titled 'Glimpses into the earth's interior from observation of objects in space', dealt with how methods of space geodesy, such as very long baseline interferometry (VLBI), using distant reference objects such as quasars, moon and artificial earth satellites could help unravel the mysteries of lunar and solar gravitational forces to

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a high degree of precision. These forces subject the earth to a stretch and squeeze action (resulting in solid earth tides), raise ocean tides and their interplay causes variations in earth's orientation in space, he said. He added that altimetry satellites for mapping ocean surface topography could be used. Precise information, for the first time, on the magnetic coupling between the outer and inner cores and the inner core and the mantle of the earth, hitherto not measured by electric and magnetic measurements and the importance of magnetic coupling in disturbing tidal frequency could now be obtained. Studying the nutational motion of the earth's pole and its amplitude, i.e. the dance of the earth's axis, is one of the best ways to find out about the earth. For accurate future predictions, an integration has been achieved with geophysical theory, he said, and the present-day space observations give us glimpses of the earth's interior to surprising depths.

'Peering into the hearts of galaxies' by K. P. Singh, TIFR, Mumbai sought to facilitate our understanding of the classification and types of galaxies that exist in space, composed of several billions stars, gas and dust, taking a variety of shapes. In some galaxies, the central nucleus outshines the whole surrounding galaxy. Such galaxies are known as Seyfert or active galaxies. With studies of images, spectra and variations in light output (both X-ray light and visible light) using new diagnostic tools in X-rays, nuclei of galaxies can be studied and newer types discovered. Images of Centaurus A, Andromeda, Starburst and variations of Seyfert such as I and II gave some feeling for the types of activity in galaxies such as starburst, superwinds, conical flows and active galactic nuclei (AGN).

S. R. Shetye, National Institute of Oceanography, Goa introduced the topic of the symposium on 'Climate, Monsoon and India's Water'. He highlighted the need for water resource identification, its distribution and pollution. India's water, he said, is an element of the hydrologic cycle associated with the Indian monsoon. Related to climate is the inter-tropical convergence zone (ICZ) that circulates over the globe and breaks into the monsoon. Variability in precipitation can lead to breaks in the ICZ. Only recently are the biogeochemical effects on global climate being appreciated, he said.

Palaeoclimatic studies of change in monsoon rainfall over several thousand years can usefully complement research on modern monsoons, according to R. Ramesh, Physical Research Laboratory, Ahmedabad. He described quantitative reconstruction of palaeomonsoon parameters from natural archives using stable oxygen and carbon isotopes. For this, three natural archives chosen, namely the speleothems from Madhya Pradesh, sediments from the Lunkaransar lake in Rajasthan and fast-accumulating sediments in the coastal Arabian Sea have yielded valuable data on the past fluctuations in monsoon rainfall.

Speaking on the topic 'Changes in monsoon in the recent past', K. Krishna Kumar, Indian Institute of Tropical Meteorology, Pune said that the knowledge of monsoon variability on time scales in the range from daily, inter-annual to longer periods can be helpful for effective management of available water resources and planning long-term strategies. This has been achieved by studying variations in rainfall and temperature over India using available instrumental records dating back to 1871. Also, variability of the tropical-atmosphere system associated with El Nino/Southern Oscillation (ENSO), which though has its origin in the tropical Pacific, extends to influence even the Indian summer monsoon rainfall. According to Krishna Kumar, surface air temperature over India shows an increasing trend of about 0.4°C per 100 years on an all-India scale.

The aerosol-cloud interaction over the Arabian Sea, playing a crucial part in the onset of the monsoon and the spatial distribution of rain over India was highlighted by A. Jayaraman, Physical Research Laboratory, Ahmedabad. An Indian Ocean Experiment (INDOEX) on-board the vessel *Sagar Kanya*, revealed the presence of large amounts of aerosol over this region. Composed mainly of soot particles produced anthropogenically, they act as condensation nuclei for the formation of raindrops and help in precipitation. However, this is mitigated when they are present in large quantities, as they do not allow the droplets to grow and so rainfall is inhibited.

'Geochemistry of Himalayan rivers as an agent of long-term climate change' is the focus of study by M. M. Sarin, Physical Research Laboratory, Ahmedabad. The transport of dissolved materials and

the distribution of elements such as uranium and strontium carried by erosion to the ocean by the large rivers, give an insight into their significance in the global oceanic budget. Atmospheric CO<sub>2</sub> consumption rates resulting from silicate and carbonate weathering in the Himalayan river basin, related to present day Himalayan erosion could have influence on the global climate, he said.

The details of the 'Prediction of the Indian summer monsoon' were elucidated by M. Rajeevan, India Meteorological Department (IMD), Pune, being of great importance to the commerce and economy of India. IMD has been carrying out operational long-range forecasting activities for more than 100 years now. These forecasts are put into place using statistical models based on neural networks, while research to improve the model with larger number of parameters is in progress.

Concerns about food security and the availability of nearly 8 million hectares of saline land area unsuitable for crop agriculture was the focus of the special lecture 'Genetic engineering for developing plants for high soil salinity environment' by S. K. Sopory, International Centre for Genetic Engineering and Biotechnology, New Delhi. He emphasized the need to use all available technologies to develop plants that are tolerant or resistant to abiotic stress. The tolerance to stress such as drought, salt and temperature conditions varies from plant to plant and these have a negative effect on crop yield. Developing plants to have a higher degree of tolerance, especially to saline soil conditions using a proteomic approach, could lead to better productivity of crop plants under unsuitable soil and environmental conditions, he said.

Several other presentations by Fellows and Associates of the Academy covered wide areas of interest such as probing of microstructures and applications, biogostic approaches to new macroporous materials, cluster dynamics in intense laser fields and porphyrin systems as molecular receptors. In addition, there were presentations in biology about the brain, lipid design, collective behaviour, fluorescence dynamics in macromolecular systems and a panel discussion on the human genome.

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