

for resistance to *Fusarium* head blight were discussed by George Fedak (Canada). A study on the breeding for biofuel production was also presented. There was an excellent presentation by Mike Bevan (John Innes Centre, UK) on the progress made on *Brachypodium* genome sequencing, which has been completed at 8X level, and can be used for comparative genomics as a guide to the wheat genome, although the possible difficulty

in using this approach was evident from an earlier presentation of Katherine Devos, who showed much more rearrangements in wheat relative to *Brachypodium* and rice. The symposium ended with a presentation on 'Priorities for the future of wheat' by the Patron of the symposium, Bob McIntosh (University of Sydney).

1. *Science*, 2008, **322**, 101–104.

ACKNOWLEDGEMENTS. We thank CCS University, Meerut; UGC; CSIR; DST and DBT for providing financial assistance to participate in the 11th IWGS.

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MEETING REPORT

Mid-year meeting of Indian Academy of Sciences*

The 19th mid-year meeting of the Indian Academy of Sciences held at Bangalore, revolved around present-day challenges faced by the scientific community, covering diverse topics ranging from nuclear power benefits and neutron stars to molecular tools for studying emerging diseases. The gamut of topics spanned biological, chemical, mathematical as well as earth sciences.

The opening talk on 'Joy of exploring the rich repertoire of carbohydrate motifs and their shapely lectin receptors' was presented by A. Surolia (National Institute of Immunology (NII), New Delhi). He described the significance of functionally important proteins, including lectins, amylase and protease inhibitors from the widely studied legume. Lectins known for their red blood cell agglutination property are attracting much attention due to their involvement in cellular recognition. The diversity of the specificities of legume lectins emanating from their ability for bonding hydrogen with a distinct pair of monosaccharide hydroxyl groups formed a framework for carbohydrate specificities such as peanut agglutinin's specificity for tumour associated T-antigen, an important marker for prognosis and diagnosis of cancer in humans.

S. Mittal (IIT, Kanpur) in his talk entitled 'Flow in the air intake of a high speed aircraft' discussed concepts of fluid

mechanics, shock waves and types of air intakes, and laid emphasis on mixed compression air intake as well as a transient phenomenon known as buzz.

Transient solar events such as coronal mass ejections and 'ionospheric irregularities known as plasma bubbles and their possible effect on the satellite-based communication systems were explained in a talk on 'The variable sun and an irregular ionosphere' by Archana Bhattacharya (Indian Institute of Geomagnetism, Navi Mumbai).

Keeping in tune with the current global energy problems, K. P. Vijayamohan (National Chemical Laboratory, Pune) presented a viable solution of nanomaterials in his talk entitled 'Impact of hybrid nanomaterials on energy research'. The unique importance of nanotechnology in creating fuel cells, synthetic trees, and solar energy storage as well as hybrid vehicles was illustrated. He propagated the need for utilization of nano-structured hybrid materials for energy generation and storage ultracapacitors.

'Chemical control using electrons' was discussed by E. Krishnakumar (Tata Institute of Fundamental Research, Mumbai). He stated that 'electrons play a major role in fields ranging from atmospheric chemistry to radiation waste management and pollution control'. Yashwant Gupta (National Centre for Radio Astrophysics, Pune) described how magnetic fields are responsible for the generation of beams of radio radiation that enables one to detect these stars as radio pulsars, in his

talk on 'Magnetism of neutron stars'. He shed light on the nature and arrangement of the radio emitting regions in pulsar magnetospheres.

Considering the critical role of Indian monsoon in agrarian economies, Anil K. Gupta (IIT Kharagpur) spoke about the 'Spatial and temporal changes in the Indian monsoon system during the past 450,000 years'. He explained the driving forces of the monsoon caused by the differential sensible heating of the Himalayas-Tibetan plateau, and the Indian Ocean, further elucidating the impacts of Indian monsoon and its variability over 450,000 years using SW monsoon proxies from the equatorial Indian Ocean and eastern Arabian Sea.

P. Senthil Kumar (National Geophysical Research Institute, Hyderabad) spoke on the 'Meteorite impact cratering processes' and described geomorphologic features of meteor crater leading to gully formations, on the basis of his studies on Lonar Crater, central India and Meteor Crater, western USA. His declaration on the 'recently formed gullies on Mars to be indicative of liquid flow' showed adherence to the oft-quoted reports on the presence of water on Mars.

Talking about the 'Paradox of vitamin D deficiency faced in sunny India and its significance', R. Goswami (All India Institute of Medical Sciences, New Delhi) explained the role of vitamin D in bone mineral homeostasis. It has been observed that vitamin D deficiency causes ailments such as osteoporosis, cardiac dysfunction, arthritis and, prostrate as well

*A report on the 19th mid-year meeting of the Indian Academy of Sciences, Bangalore held during 4 and 5 July 2008 at the Indian Institute of Science, Bangalore.

as breast cancer. He added that the availability of 7–8 h of sunshine provides a good scope for UV-rays-mediated formation of vitamin D in the skin.

Modern tools for understanding diseases such as tuberculosis and cancer were presented in an assortment of talks. ‘Drug-resistant tuberculosis: Current status and emerging scenario in India’ was presented by V. M. Katoch (National JALMA Institute, Agra). Drug susceptibility surveys carried out by the Government of India suggest primary drug resistance to be in the range 0–3%, as opposed to the magnified reports of high incidence of drug-resistant tuberculosis. Katoch extolled that ‘India is following a multi-pronged strategy to tackle the problem of drug resistant tuberculosis’. R. S. Gokhale (NII) working on the microbial genome sequencing projects, in his lecture on ‘How metabolic diversity could be generated from limited number of genes?’ explained, the mechanism and cell-wall lipids of *Mycobacterium tuberculosis*. Studies on mycobacterial polyketide syntheses and FadD proteins emphasize the strategy used by the pathogens to generate metabolic repertoire by evolving its gene products.

In a therapeutic approach to combat cancer, Arabinda Chaudhari (Indian Institute of Chemical Technology, Hyderabad) spoke about preventing the formation of new blood vessels around tumour tissues in his talk entitled ‘Cationic lipopeptide in targeted cancer therapy’. He indicated that selective targeting of anti-cancer genes was accomplished by exploiting overexpressed molecular markers in the endothelial cells of tumour neovasculatures.

In the Public lecture, ‘Development of nuclear energy in India: Rationale and perspectives’, Anil Kakodkar (Atomic Energy Commission) warned that ‘if India is unable to import nuclear reactors/energy under international cooperation, the country will have to import coal to the tune of 1.6 billion tonnes by 2050, unless it develops large scale solar power’. To combat an estimated energy deficit of

the order 412 GWe in the year 2050, the Department of Atomic Energy has undertaken uranium exploration across the country.

D. P. Sarkar (University of Delhi South Campus) gave a talk on ‘A histidine button of the hemagglutinin-neuraminidase protein triggers paramyxovirus-cell membrane fusion’. The function of the attachment protein, hemagglutinin-neuraminidase in promoting membrane fusion in paramyxovirus was propounded.

G. K. Dey (BARC, Mumbai) offered a view into ‘High resolution electron microscopy of novel materials’. High resolution electron microscopy investigations on interfaces associated with nanocrystalline and nanoquasicrystalline phases, produced by the crystallization of Zr-based metallic glasses, has emerged as a powerful tool for probing the structure of electronic materials.

The scope and tools for designing self-assembled materials – a part of supra-molecular chemistry – was presented by Pritam Mukhopadhyay (Jawaharlal Nehru University, New Delhi). In his talk on ‘Self-assembly processes in organogel and its applications’, Mukhopadhyay presented issues like specificity and control in designing organogel materials, besides emphasizing on the various properties of the material. A purview on ‘biophotonics’, a science dealing with the interaction of light (photons) and biological matter, was offered by P. K. Gupta (RRCAT, Indore). The optical coherence tomography set-ups and their use in imaging were discussed. He presented techniques of optical micro-manipulation, laser-assisted injection of genetic material and malaria diagnosis with laser tweezers. ‘How far can one go with silicon?’ by V. K. Yadav (IIT, Kanpur) elaborated the β -effect of silicon in the formation of a cyclopropane bond in an event that produces 1,3-dipole, which is further utilized in synthetic reactions.

Phase transitions occurring by both discrete nucleation and growth process due to amplification of a fluctuation in displacement were presented in a special

address, ‘Structural transitions: Discrete versus continuous’ by Srikumar Banerjee (BARC). The hybrid displacive–replacive ordering was shown by the formation of ordered omega structures in Zr–Al alloys.

Anil K. Ghosh (Indian Statistical Institute, Kolkata) in his talk on ‘Multi-scale smoothing in supervised statistical learning’ put forth the idea of adopting a multi-scale approach for solving problems in the traditional approach based on fixed scale in smoothing. The role of classical and quantum randomness in computational communication was discussed by J. Radhakrishnan (TIFR, Mumbai) in his lecture on ‘Communication complexity’.

The significance of biodiversity was recalled through lectures on nematode and population assessment of tigers. In ‘Nematodes: The incredible metazoans’, Qudsia Tahseen (Aligarh Muslim University, Aligarh) described the ecological significance of nematodes with emphasis on its taxonomic, phylogenetic as well as ecological studies. K. Ulhas Karanth (Centre for Wildlife Studies, Bangalore) in his talk on ‘Science of monitoring wildlife populations’ gave guidelines on population monitoring and sampling methods to obtain an accurate estimate of the tiger population.

The eco-friendly process of transforming the dead animal’s skin into leather was presented by P. Thanikaivelan (Central Leather Research Institute, Chennai), in his lecture on ‘New paradigms in leather science: a journey from process to product’. He laid emphasis on the solid waste management to produce carbonaceous materials and flexible composite sheets. The innovative technique that promises to provide fuller leather is believed to have environmental benefits as well as near-zero discharge.

The meeting highlighted scientific accomplishments of the Academy fellows and was well attended by Fellows, Associates as well as the students.

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