MEETING REPORT

An artful peek into the world of mathematics*

Mathematics is finding use in other disciplines from economy to ecology, oceanography to optical fibre communication, genetics to glacier dynamics, physics to palaeontology and weather predictions to warehouse management. Mathematics provides efficient and fundamental techniques to quantify the varied phenomena in the world around us, and also to elucidate complexities of science to address societal needs.

This year has been dedicated as the year of 'Mathematics of Planet Earth (MPE 2013)'. A global initiative, MPE has more than 100 scientific societies, universities, research institutions, and organizations all over the world that have come together to formulate the most urgent planetary problems that mathematics can address and bring together world-class researchers to find solutions to these problems, and also to engage the public in a dialogue about their significance.

To align with the theme of MPE 2013 in India, a unique exhibition, 'Mathematics for billions' was organized at Bangalore. Aimed at school children, science enthusiasts and the general public, the exhibits broadly covered topics like structures, networks, waves and optimization (Figure 1). Amit Apte (International Centre for Theoretical Sciences (ICTS), Bangalore and one of the organizers) mentioned that the exhibition was not aimed to explain pedagogical concepts, but provide a glimpse of how mathematics finds applications in, for example, road and railway networks, internet, food web, smartphones, etc.

During the exhibition, various outreach activities for school students and teachers like open quiz sessions and hands-on astronomy-based activities were also organized. A poster on Comet ISON[1], a large sun-grazing comet was exhibited. The organizers told *Current Science* that they hope such workshops and other activities will improve the way mathematics is taught in schools and infuse interest in students towards the subject.

Mythily Ramaswamy (TIFR's Centre for Applied Mathematics (CAM) in Bangalore) mentioned that teaching mathematics to school children and introducing them to mathematical concepts was a challenge. Fusion of arts and science may bring a new dimension to learning mathematics and make it more interesting. She said that the exhibition was a unique and rewarding experience.

Roddam Narasimha (JNCASR) in his inaugural speech mentioned how mathematics is being used in atmospheric and climate sciences. He recalled the contributions made by Sir Gilbert Thomas Walker, a trained mathematician, to atmospheric and climate sciences. Walker, who was the Director of India Meteorological Department (IMD), applied his training as a mathematician, to give India its first forecast of monsoon rainfall in 1909, using a regression equation. His contributions in studying the monsoon using mathematical models, have enormously improved our understanding on climate sciences. According to Narasimha, mathematical ideas may be abstract but have several applications. He observed an unusual attitude towards mathematics learning in India. He pointed to a school-level survey conducted in New Delhi to learn what subjects interested students. The survey suggested that 30% students were interested in mathematics. Ironically, most of them did not pursue the subject at an advanced stage. The young minds are lost to our school education system. Events like these, according to him, may help instigate and rekindle interest among 30% to take up mathematics. He laid special emphasis on such demonstrations, and said that India did not know how to use its mathematicians.

Mustansir Barma (TIFR, Mumbai) said that it is important to convey the excitement of doing research and engage the public at large. According to Spenta Wadia (ICTS) the idea to organize an exhibition was discussed during an international congregation of mathematicians at Hyderabad in 2010. It took three years to design a structure for an event like

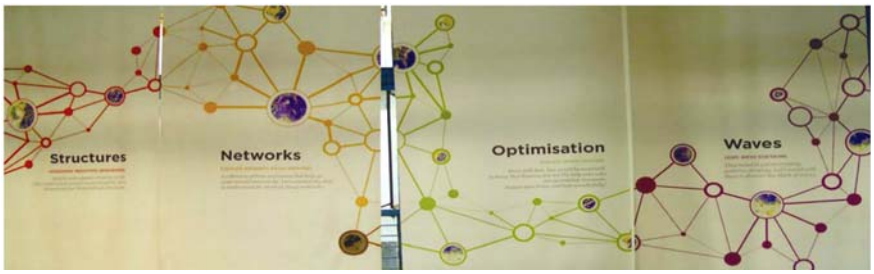

Figure 1. Theme of the exhibits.

Figure 2. Demonstration by students (a collage by the author).

*Based on the inaugural ceremony of exhibition 'Mathematics for the Billion', a part of ICTS programme for Mathematics of Planet Earth 2013 held at Visvesavaraya Industrial Technological Museum, Bangalore on 22 November 2013.

this. The idea was to: (i) draw scientists from various disciplines; (ii) formulate laboratory problems that can be tackled by mathematicians; (iii) clearly show the role of mathematics in our daily lives and (iv) engage the public at large.

The exhibits were an outcome of collective effort by Bangalore-based ICTS, its parent organization TIFR, Mumbai and TIFR's Centre for Mathematics. The interactive exhibits explaining applications of mathematics in our daily lives were displayed at the Visvesavaraya Industrial and Technological Museum in Bangalore during 20 November–1 December 2013. Students from Indian Institute of Science Education & Research (IISER), Mohali; Indian Institute of Science, Bangalore, TIFR, ICTS and volunteer teams from various science colleges participated in conceptualizing the exhibits together with Srishti School of Art, Design and Technology (Figure 2).

To sum up, an event like this surely corroborates with Blaise Pascal's succinct words, 'Mathematics is too serious and, therefore, no opportunity should be missed to make it amusing'.

1. Prakash, Megha, *Curr. Sci.*, 2013, **105**, 754.

Megha Prakash (S. Ramaseshan Fellow)
e-mail: prakash.megha@gmail.com

MEETING REPORT

Stem cells and cancer biology*

Stem cells play a crucial role in the generation and maintenance of adult tissue. Emerging evidence suggests that they are also key elements in maintenance and progression of cancer. Many solid cancers harbour a distinct sub-population of cancer cells that bear stem cell features and are therefore termed cancer stem cells. Cancer biology and stem cells research are rapidly emerging fields in medicine. With the mission and slogan 'Spreading the knowledge and bringing people together', the Fourth International Conference on Stem Cells and Cancer (ICSCC-2013), helped people from all over the world to gather and discuss their research. ICSCC-2013 also provided a platform in bridging the gap between the biologists and medical scientists.

Abhay Chowdry (Director, Haffkine Institute, Mumbai) in his welcome speech featured the history of Haffkine Institute, its interest in public health improvement and also its success rate in curing diseases. Christopher Heeschen (co-organizer of the conference and Senior Group Leader, Clinical Research Programme, Spanish National Cancer Research Centre, Spain) called cancer biology and stem cell science as hot topics for research in medicine. Keith Humphries (Director, Terry Fox Laboratory, Canada) expressed happiness on seeing a large number of young scientists gathered at the conference and encouraged them to participate in such conferences.

The chief guest of the inaugural ceremony, R. D. Lele (Director, Nuclear Medicine Department, Jaslok Hospital & Research Centre, Mumbai) dwelt on inherited cancer syndrome and mentioned that cancer development does not depend only on the genes. He also stressed on the prevention of cancer and importance of RBC membrane. He said that women should follow a strict diet, as dietary habits of a mother will greatly affect the development of stem cells in a child. According to the guest of honor, Rajan Badwe (Chief of Surgical Oncology, Tata Memorial Hospital, Mumbai) stem cells provide resistance against drugs and also against radiations. He highlighted the importance of stem cells and hypoxia induction.

The keynote address at the inaugural ceremony was presented by Mukesh Hariawala (Cardiac Surgeon from Boston, USA). He highlighted the basics, clinical and future of therapeutic aspects of stem cells and stem cell application in cardiac angiogenesis shockwave therapy. He also highlighted that chemotherapy for treating cancer may lead to heart disease, and stressed upon treating of disease at its matrix level itself. There is need for a marriage between stem cells and angiogenesis, which is a physiological process through which new blood vessels form from pre-existing vessels.

The scientific sessions of oral presentations included topics like molecular mechanisms in cancer development/ leukaemia cancers, cancer stem cells, cancer therapeutics, mesenchymal and cardiac stem cells, cancer diagnostics and biomarkers, etc. The presentations elucidated that the presence of cancer stem cells has the exclusive ability to regenerate tumours. The cancer stem cells share many characteristics with normal stem cells, including self-renewal and differentiation. With the growing evidence that cancer stem cells exist in a wide array of tumours, it is becoming increasingly important to understand the molecular mechanisms that regulate self-renewal and differentiation, because corruption of genes involved in these pathways likely participates in tumour growth. The presentations helped in understanding the biology of cancer stem cells, which will contribute to the identification of molecular targets important for future cancer therapies.

Some of the best oral and poster presentations were awarded at the valedictory ceremony. T. A. Malancha (IISER, Kolkata) was given the 'Best young investigator award'.

Researchers could take home many clinical aspects and clinicians the scientific aspects from this international conference. The organizers have been successful in achieving their mission of spreading knowledge and bringing people together.

K. V. Soumya* and **S. K. Ashwini**
*e-mail: soumyakori89@gmail.com

*A report based on the 'Fourth International Conference on Stem Cells and Cancer (ICSCC-2013): Proliferation, Differentiation and Apoptosis' held in Haffkine Institute, Mumbai, during 19–22 October 2013. The conference was organized by the International Centre for Stem Cells, Cancer and Biotechnology, Pune.