# In this issue

### The Two-culture Divide

*A bridge between science and art*

Renaissance, the period of rebirth of European society, produced many prominent scientists and celebrated artists. The sciences and the arts were not segregated back then. But over time, the dialogue between these two fields has ceased to occur. This has given rise to two different cultures – one of the sciences and the other of the arts.

But when one scratches the surface, they are likely to find that scientists and artists have more in common than what appears. Both fields are dedicated to the development of humans. A cross-pollination of ideas between them helps scientists navigate the lesser discussed domains of the scientific world, and artists transcend the barriers of their artistic limitations.

A General Article on **page 275** discusses Carl Djerassi and Roald Hoffmann's views and the attempts to integrate these two fields for creating a third culture that integrates both the sciences and the arts. In a play titled *Oxygen*, Djerassi and Hoffmann bring forth the social issues associated with science that remain less discussed. In doing so, they try to bridge the gap between the two disciplines by using science-in-theatre.

### Laser Diaries

*India's foot forward*

With high speed electrons in their lasing medium, infrared free electron lasers (FEL) are widely regarded as one of the most advanced tools for scientific inquiry. They find applications in a myriad of areas of science spanning chemistry and biology and are vital for studying the structure of molecules. Now, with the first Indian FEL at an advanced commission stage at the Raja Ramanna Centre for Advanced Technology, Indore, India has joined the world in developing and utilizing this technology.

In a Research Communication on **page 367**, scientists involved in the study discuss the setup and output. The device makes use of an electron accelerator to speed up the electron beam. Once sufficiently accelerated, the beam is made to pass through a strong magnetic field. This makes the electrons wiggle along the width of the beam thereby producing the lasing medium. Because accelerated electrons could generate radiation, the entire setup is shielded within a radiation facility.

Almost all the components used in the FEL at Indore have been developed indigenously. After an initial testing of the elements, the scientists started assembling the FEL in June 2015. The first few experiments after installation show enhanced power output for the expected beam parameters. Presently, the scientists are making further efforts to maximize the power output. This facility is being developed for the study of materials at low temperatures and in high magnetic fields.

### Climate Change Strips Colour

*Coral bleaching in Malvan*

In December 2015, scuba divers noticed that the corals of the Malvan marine sanctuary in Maharashtra were losing their colour. This prompted a detailed analysis of corals in the area. Scientists found that about 70% of corals had undergone bleaching. Similar studies carried out six months later, in May 2016, showed that the bleaching had reduced to ~7% and that the corals had recovered. During this interim, the temperature fluctuated by only one degree.

Between 2014 and 2016, wide scale temperature changes have been reported from different regions and 36% of the world's coral colonies have undergone some bleaching. This raises alarm because corals support a wide variety of marine life. They also sustain fish populations and are vital to the tourism industry.

Because of climate change, such thermal fluctuations are also expected in the future. It then becomes important to analyse factors that affect coral recovery. Local stressors like fishing and scuba diving affect coral health. Since we cannot control global warming at local levels, it is paramount that we regulate human activity in the area locally, concludes a team of scientists from Tuticorin and Mumbai, in a Research Communication that outlines the investigations into the coral reefs and the implications of the findings on **page 384**.

### Liquid Metal Pumps

*The story of self reliance*

Coolant circulation is an important parameter for the operation and efficiency of nuclear reactors. The heat generated by a nuclear core is transferred to water jets by liquid sodium. This produces the steam that powers a steam turbine for producing electricity. The circulation of liquid sodium is achieved by centrifugal pumps that can operate at a capacity of 7600 $m^3$/h.

To be incorporated in the reactors, the pump should also be able to function in a radioactive environment at a temperature of 400 degrees. When India was taking its initial steps in nuclear reactor construction and design, no indigenous manufacturers had the means to build a pump for the proposed reactors.

Scientists then stepped up to the challenge and started developing the sophisticated technology. When a sodium pump they imported started to malfunction, researchers in the Indira Gandhi Centre for Atomic Research, Kalpakkam, constructed a small sodium pump to gain insights into the working mechanism of the device. The rest is history. Today India is fully efficient in developing complex hydraulic pump technology. To read a Research Account of the development of pump technology in India, turn to **page 292**.

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