Editorial*

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We have an eclectic collection of articles in this issue, ranging from molecular and developmental biology and animal behaviour to music and megaprojects.

This issue features Sydney Brenner, an unusual molecular biologist from South Africa, who carried out various interesting lines of research – establishing that RNA was a copy of the information in DNA and trying to decipher the genetic code to studying development and neurobiology using the worm *Caenorhabditis elegans* as a model system. Brenner's choice of *C. elegans* as a model system was brilliant and has led to an entire community of researchers using this system to further understand developmental biology and neurobiology. Brenner, who passed away six months ago, was also known for his generosity, in terms of sharing ideas as well as material such as mutant worms, thus also influencing the culture of this community. Individual *C. elegans* worms have an identical number of cells in their bodies and the same cell positions. Moreover, the worms are transparent, making it possible to use microscopy to trace lineages of cells as the worms develop. Brenner was interested in the link between genes and behaviour, and suggested that this link might be found by understanding how nervous systems were structured and constructed. He, therefore, painstakingly traced the connections between each of the neurons in adult *C. elegans* manually from photographing ultra-thin sections of the worm. The individual neurons were characterised and the different kinds of connections between neurons studied. By studying hundreds of mutants, Brenner was also able to identify genes regulating various functions. Brenner received the Nobel Prize in Physiology or Medicine in 2002, along with Robert Horvitz and John Sulston “for their discoveries concern-

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ing genetic regulation of organ development and programmed cell death". Sydney Brenner's life and work are described in an Article-in-a-Box by Varsha Singh and a General Article (Sydney Brenner: The Tamer of an Elegant Worm) by Kaling Danggen and Varsha Singh.

The Classics is a paper by Francis Crick and others including Sydney Brenner on the nature of the genetic code for proteins. Using a mutagen to make different numbers of addition or deletion mutations in a bacteriophage, they inferred the triplet nature of the genetic code. A background to the work and why the paper is classic is given by Varsha Singh.

This October 2nd marks the 150th anniversary of Mahatma Gandhi's birth. K Indulekha from Mahatma Gandhi University, Kottayam, has selected a speech that Gandhiji delivered at the Indian Institute of Science in 1927 to remember the Mahatma.

Bharati Badami gives a lucid introduction to retrosynthetic analysis in a General Article. While the early synthesis of complex molecules was largely based on intuitively designed synthetic routes, retrosynthetic analysis, developed by E J Corey, involves more systematic synthetic planning by working backwards from the target complex molecule towards simple or easily available starting materials.

We continue two series in this issue and begin a new series. We have, in this issue, the seventh article in the series How to Design Experiments in Animal Behaviour by Raghavendra Gadagkar. Continuing to describe simple, elegant experiments that provide non-trivial insights into animal behaviour, the current article addresses the question of how *Ropalidia marginata* paper wasps, in which queen and worker roles are not fixed at eclosion, decide who will become the queen when a new nest is initiated. The series continues to impress upon us, the necessity for clear, logical thinking, but not high-end equipment or huge grants to further our understanding of the natural world. This is not to say that all questions in science can be addressed with little equipment or money (see Megaprojects below), but the lack of such infrastructure or funds

does not have to stop one from pursuing meaningful research. I encourage you to try doing some of the experiments described in the series and write to us.

We also have the third and final article of the series *The Sounds of Music: Science of Musical Scales* by Sushan Konar. Having explained the perception of sound by humans and the development of scales used in Western classical music in the previous articles, Konar describes the scales used in Indian classical music and their correspondence to and differences from those in Western classical music. She also describes the flexibility afforded by Indian music and how ragas can be created by shifting the scale in this fascinating article.

The new series, coordinated by K Indulekha, is on Megaprojects – technologically challenging, expensive projects that are being executed by a very large number of scientists collaborating across different countries, in order to address some fundamental questions in fields such as high energy physics and astrophysics. The first article in this series is on ITER, written by Laban Coblentz. The ITER – International Thermonuclear Experimental Reactor – project is an attempt to build the first industrial-scale fusion reactor as energy from fusion is potentially safe and clean. The logistic complexity of building such a facility to heat hydrogen to an ionised plasma and confine it using magnetic fields so that fusion can take place beyond 150 million °C, the technologies that are required, and the contributions of different countries including India are explained in the article.

We also have two Classroom articles, by Chanchal Kumar, and Pradeep Kumar, respectively, on combinatorial proofs of identities for $(n - 1)!$, and the use of Young-tableaux representation to obtain atomic term symbols. Please write to us if you would like to see Classroom articles on specific topics.

We hope you enjoy this collection of articles.