Editorial*

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"Major Mathematical Conjecture Propounded 177 Years Ago Is Disproved"—thus ran the heading of a new item on the front page of the *New York Times* dated 26 April 1959. Never had a mathematical discovery been featured in a leading newspaper in that manner until then, nor has such an endorsement been repeated since. The announcement was of the collaborative work of Bose, Parker and Shrikhande proving the most world's most prolific mathematician Euler wrong; since then the three were referred to as "Euler's spoilers". The disproof of Euler's conjecture has a huge significance as it enables us to obtain applications including designing controlled experiments in biology, medicine, agriculture and industry. This issue features S S Shrikhande, one of the architects of this and other subsequent path-breaking contributions to design theory. Shrikhande lived a full life—he was born in October 1917 and passed away in April 2020. Two articles on his work appear in this issue, and they also contain interesting biographical details on his life and times. A short classic paper of Shrikhande based on some part of his doctoral research work has been printed. It is said that the ideas in this short paper have still not been exploited fully.

In the present age, when there is no clear line delineating one subject of science or mathematics from another, the impact of our journal on the student community could grow in leaps and bounds. The editorial team is forever attempting to bring state of the art research, especially those involving multidisciplinary discoveries, to the students in an understandable, yet, professionally rigorous form. The articles in this issue also bear witness to this aspect. For instance, an intriguing discussion of the science of cause and effect is carried out by A Kathpalia and N Nagaraj.

Causality testing has several applications in diverse disciplines like neuroscience, econometrics, climatology, and artificial intelligence. Their special focus is on measuring causality from time-series data. This article on 'Measuring Causality' would be of interest to the scientific community at large.

Similarly, a lovely article by R Johal and A M Jayannavar deals with diverse aspects of Curzon–Ahlborn Efficiency that is at the crossroads of theoretical thermodynamics and engineering avataars. The CA model of 1975 was apparently posed as a classroom problem, and attracted the attention of the physics community. This led to a new field of study termed as the 'finite-time thermodynamics', and the analogous approach in the engineering literature is called 'entropy generation minimization.'

A Singh and M Bokolia write about quality improvement of crops. The advent of DNA technology in the 20th century enabled DNA sequence-specific manipulations by transferring the gene of interest under the tissue-specific promoters in the target plant using vectors. Later, more versatile techniques based on targeted or site-specific nucleases have emerged. This opened up the possibility of directly modifying the gene sequence of all the cell types in eukaryotic organisms. Recently, a novel method for site-directed mutagenesis has been derived from an ancient immunity system adopted in nature by some prokaryotic cells like bacteria and is known as CRISPR ('Clustered Regularly Interspaced Short Palindromic Repeats'). The authors show that the technology based on CRISPR/Cas seems more efficient for gene editing.

In 1914, Paul Walden synthesized and characterized a certain room temperature ionic liquid. R Ghosh describes the synthesis of a similar type of ionic salt which is a liquid at room temperature, by P C Ray already in 1911. V K Gahalaut describes the continental deformation due to the earthquake cycle. The mechanism of earthquake occurrence is different in regions that are at the plate boundary from the regions that are interior to the plate. In his article, the author discusses the subtleties of crustal deformation in the inter-plate and intra-plate regions in the Indian context.

Resonance is also a platform where students' write-ups periodically appear under the supervision of an active researcher. Here, we have the second part of the article on Lax pairs by T R Vishnu and G Krishnaswami. In this second part, the authors discuss continuum mechanical systems of fields such as the linear wave equation for vibrations of a stretched string and the KdV equation for water waves; here Lax pairs are differential operators.

Besides, this issue carries two interesting book reviews. The one by Lilavati Krishnan discuss the book titled *What Did You Ask at School Today? A Handbook of Child Learning – Book 2*, authored by Kamala V. Mukunda, while Sujata Deshpande reviews *Every Creature Has a Story: What Science Reveals About Animal Behaviour* by Janaki Lenin.

It may not be well known that *Resonance* has presence in social media as well, and many young students may well feel more inclined to engage with the journal in this manner (Check the contents page for the social media handle).