

₹50/-

# Resonance

January 2017

Volume 22 Number 1

journal of science education



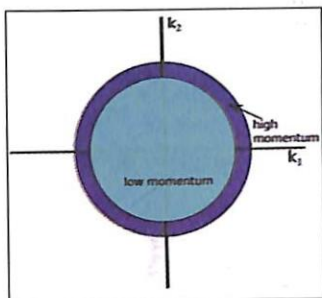
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Allosteric Regulation of Proteins ❖  
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Indian Academy  
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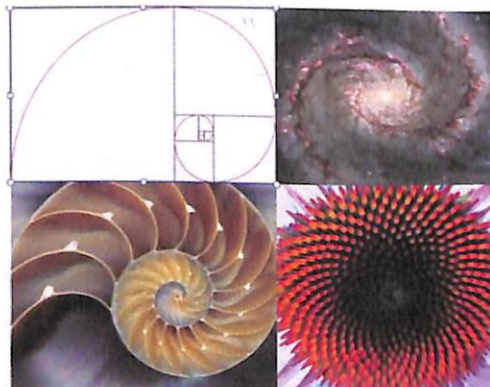
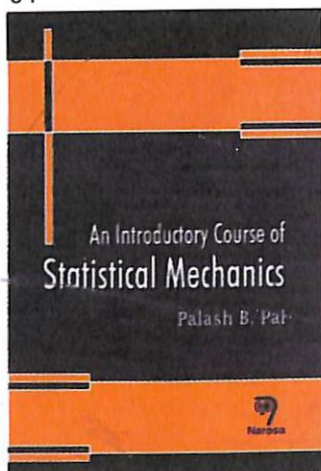
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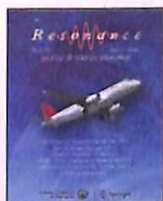
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The wings of an airplane generate an upward force, called lift, as it moves forward through the air. One of the articles in this issue explores the concept of lift in detail.

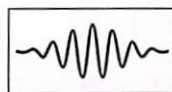
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Kenneth G Wilson  
(1936–2013)

Illustration: Subhankar Biswas

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(1936–2013)

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Flowering Trees

Credit: Raja K Swamy, IISc

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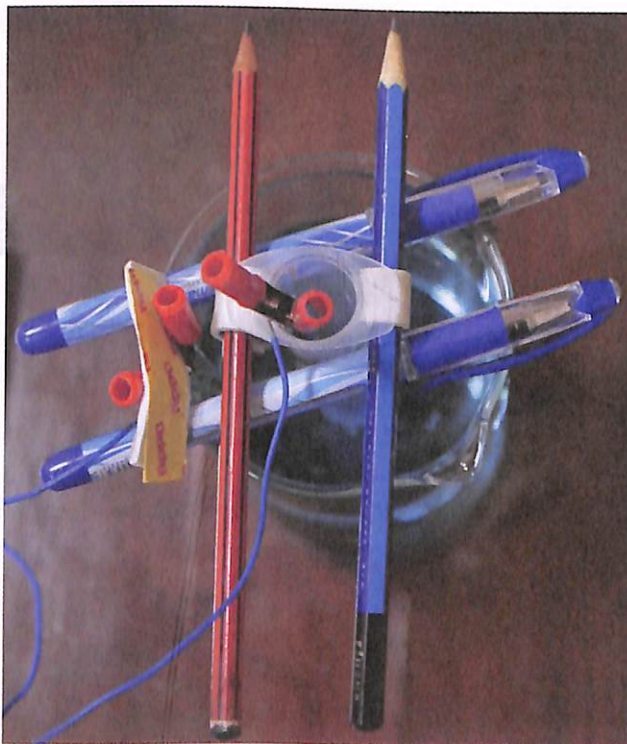
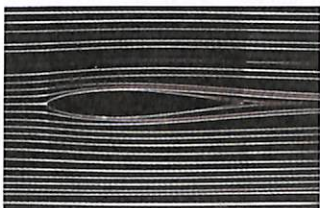
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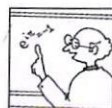






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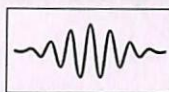
Gravitational lensing of the light emitted by distant galaxies, which manifests itself in distorting the shapes of those galaxies, as shown in this image, constitutes a strong evidence of the presence of dark matter. (Picture credit: NASA)

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Vera C Rubin  
(1928–2016)  
Illustration: Subhankar Biswas

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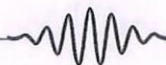
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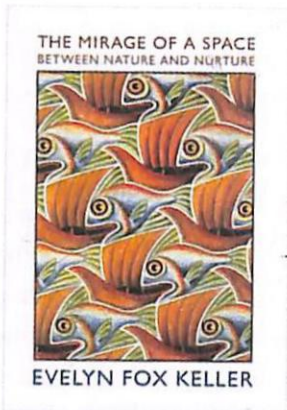


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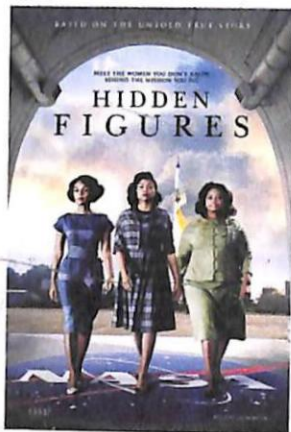
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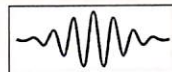
The periodic table on the front cover shows an element  $Z=109$  Meitnerium, in honour of Lise Meitner, one of the most prominent physicists of the 20th century. Her explanation of the nuclear fission process – breaking of heavy uranium nucleus into two nearly equal fragments with a large energy release when hit by a neutron, is also depicted in schematic figure.

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Lise Meitner  
(1878–1968)  
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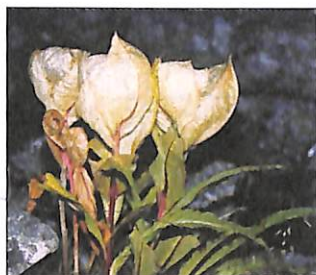
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Flowering Trees  
Credit: Raja K Swamy, IISc

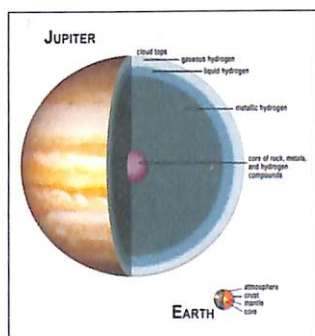
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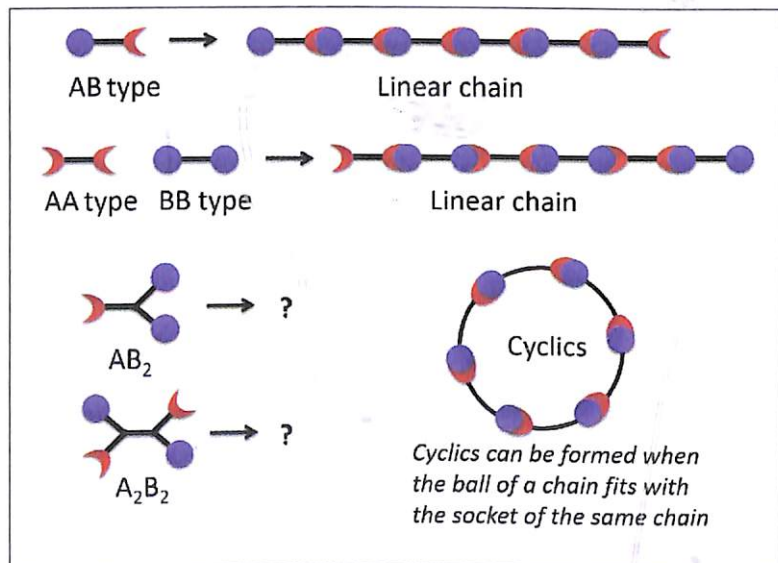
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Brahma Kamal is a rare, high-altitude plant endemic to the Himalayas. The plant belonging to the thistle tribe is fascinating because of its morphological adaptations and importance in traditional medicine.

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Wallace Carothers  
(1896–1937)

Illustration: Subhankar Biswas



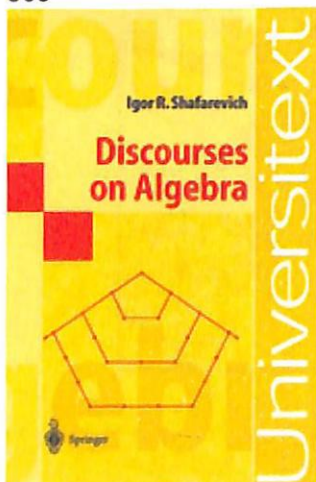
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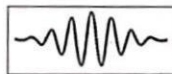
Breakup of a vortex ring into a cascade of smaller vortex rings in water. See article on page 485.

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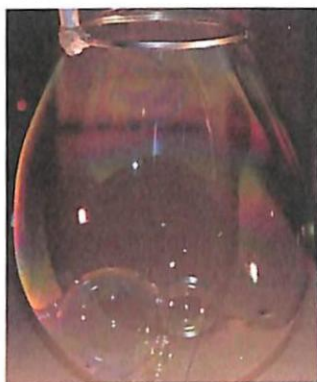
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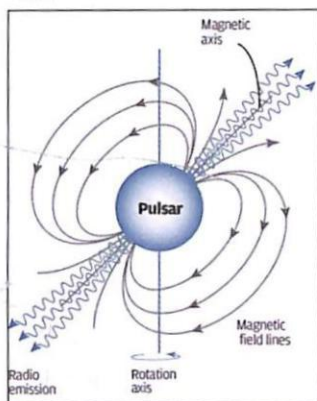
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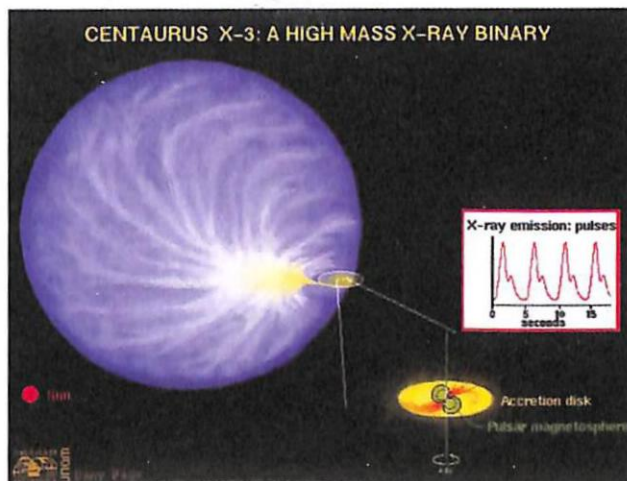
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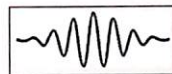
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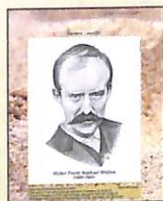
Walter Frank Raphael Weldon  
 (1860–1906)  
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### Front Cover



The littoral crab, *Carcinus maenas* (Crustacea: Portunidae), also called the shore crab, green crab or European crab, is a common species from the North Atlantic, North Sea, and Baltic coasts that has successfully colonized similar habitats in the America, East Asia, South Africa, and Australasia. This species, then called *C. moenas*, was used by Weldon in his famous experiments that provided direct proof of both stabilizing and directional selection in wild populations.

### Back Cover

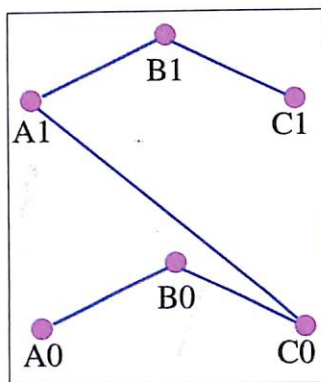


Walter Frank Raphael Weldon  
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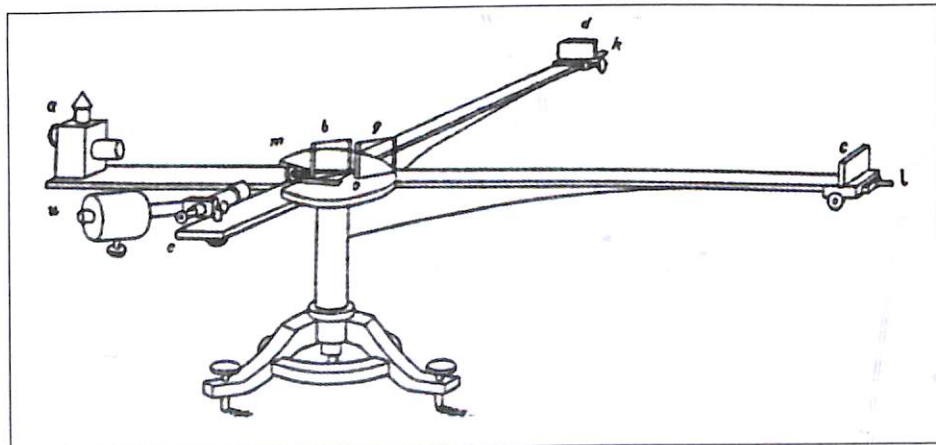
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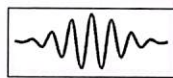
The Snow Leopard, (scientific name: *Panthera uncia*) is a solitary hunter of the cat species. A native of the cold mountain ranges of Central and South Asia, this majestic animal is today listed as 'endangered' species on the IUCN Red List.

### Back Cover



Albert Abraham Michelson  
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Illustration: Subhankar Biswas

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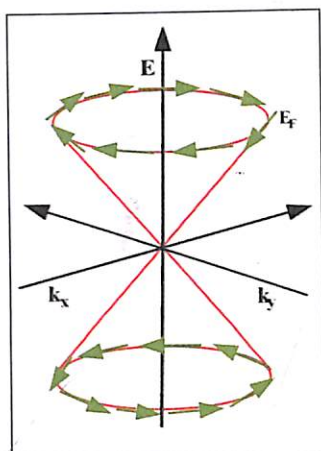
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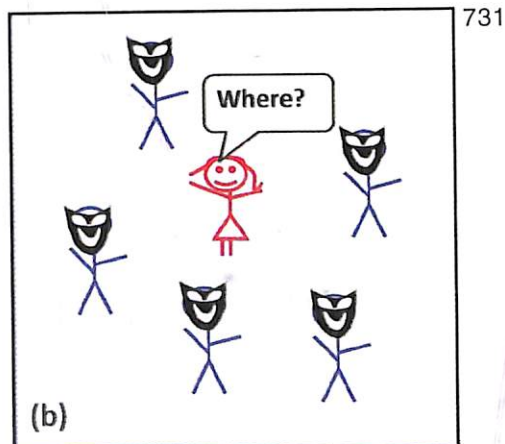
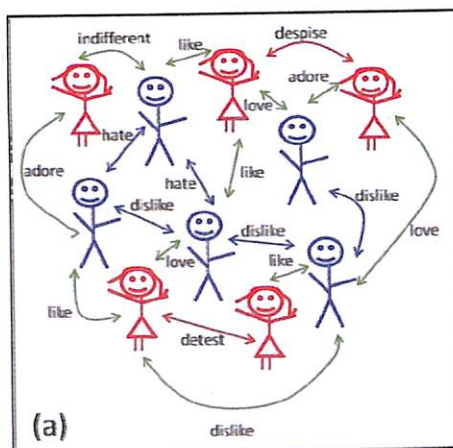
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The image shows the redistribution of electronic charge density when a twenty-atom gold cluster is placed on the surface of a crystal of magnesium oxide. This was computed using density functional theory by Nisha Mammen and Shobhana Narasimhan.

## Back Cover



Walter Kohn  
 (1923–2016)  
 Illustration: Subhankar Biswas

## Inside Back Cover

Flowering Trees  
 Credit: Raja K Swamy, IISc





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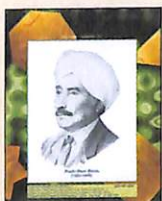
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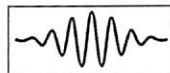
When sand is sprinkled on a vibrating metal plate, it collects at the 'nodes' – places where the amplitude of the plate motion is zero. These figures, named after Chladni, form our cover theme to complement Rajendra Bhatia's article on vibrations of a string of beads (p.867).

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Ruchi Ram Sahni  
(1863–1948)  
Illustration: Subhankar Biswas

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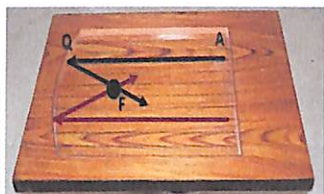
Excerpts from A Memoir of Pre-Partition Punjab: Ruchi Ram Sahni in his own words

### Inside Back Cover

Flowering Trees  
Credit: Raja K Swamy, IISc



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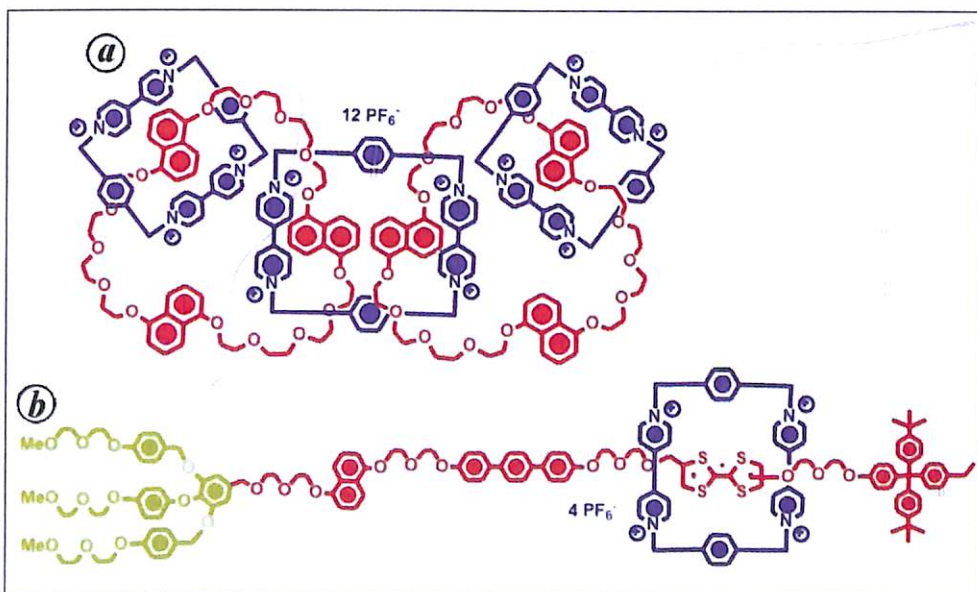
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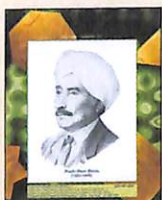
Science Academies' Refresher Course in Statistical Physics **903**

### Front Cover



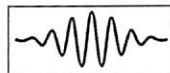
When sand is sprinkled on a vibrating metal plate, it collects at the 'nodes' – places where the amplitude of the plate motion is zero. These figures, named after Chladni, form our cover theme to complement Rajendra Bhatia's article on vibrations of a string of beads (p.867).

### Back Cover



Ruchi Ram Sahni  
(1863–1948)  
Illustration: Subhankar Biswas

## DEPARTMENTS



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*Ruchi Ram Sahni  
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Excerpts from A Memoir of Pre-Partition Punjab: Ruchi Ram Sahni in his own words

### Inside Back Cover

Flowering Trees  
Credit: Raja K Swamy, IISc

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**915** On the Hahn–Banach Theorem  
S Kesavan

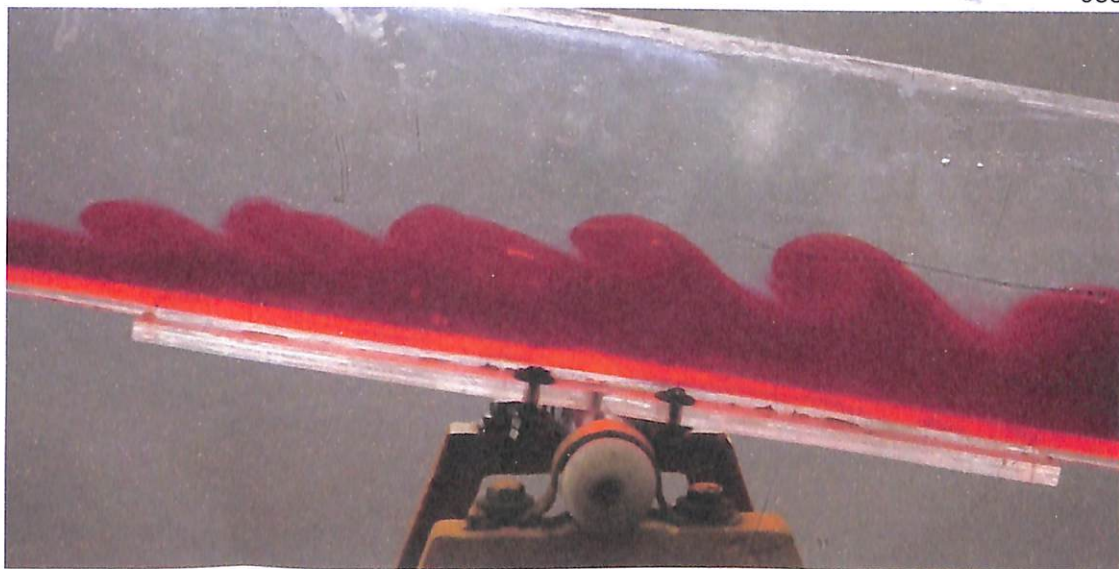
**935** A Primer on the Functional Equation  
 $f(x + y) = f(x) + f(y)$   
Kaushal Verma

**943** Unearthing the Banach–Tarski Paradox  
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**Inside Back Cover**

Flowering Trees  
Credit: Raja K Swamy, IISc

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### Front Cover



The Scottish Café at Lwów was the gathering point for local mathematicians led by Banach. This group included S Ulam, who was an undergraduate student at that time and who came to be known also through the Manhattan project. The marble tabletops of the Café were witness to vigorous mathematical discussions and scribblings for a long time. The tabletops allowed writing and erasing easily.

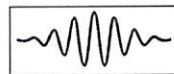
### Back Cover



Stefan Banach  
(1892–1945)

Illustration: Subhankar Biswas

## DEPARTMENTS



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*Kaushal Verma*



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Stefan Banach  
(1892–1945)  
*B Sury*



### Classroom

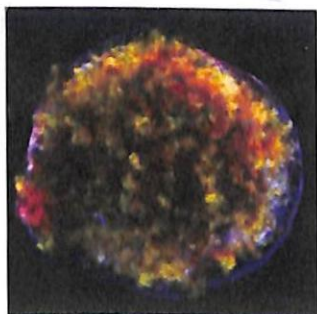
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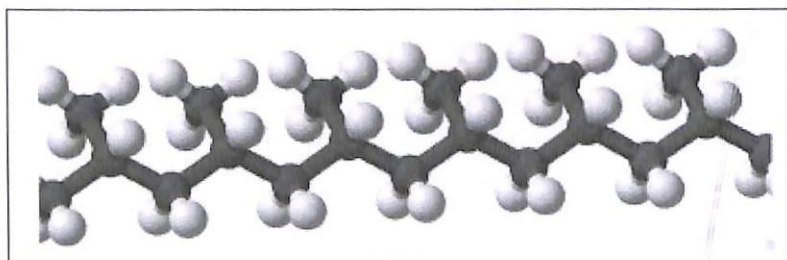
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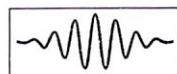
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*Guruswamy Kumaraswamy*



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Tinkerer: Rayleigh–Taylor Instability

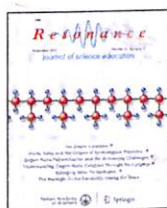
*Chirag Kalelkar*

**Inside Back Cover**

Flowering Trees

Credit: Raja K Swamy, IISc

## Front Cover



The cover page illustration is a schematic representation of the structure of isotactic polypropylene, one of the most widely used polymers today. This polymer was first produced in Natta's laboratory, using Ziegler's catalyst.

## Back Cover



Karl Ziegler (1898–1973)

Giulio Natta (1903–1979)

Illustration: Subhankar Biswas