This issue

Materials science
Carbon nanotubes have taken the world of materials by storm. Nath et al. (page 956) describe the incorporation of nanoparticles of CdSe, CdS and ZnSe into the inter-tubular gaps of carbon nanotube bundles, suggesting an approach to quantum wires. A route to nanocrystals of metals, semiconductors and oxides is described by Rao et al. on page 1041, in a report which also demonstrates potential applications. Rao and Kumar (page 945) discuss transport phenomena in multalkali phosphate glasses and propose a new mechanism of ion transport in oxide glasses.

Seismology
The devastating Bhuj earthquake of 2001 focused public attention on the science of seismology in India. Rajendran and Rajendran (page 896) consider the issue of seismogenesis in stable continental regions, and highlight its relevance to realistic hazard assessment. Understanding the Himalayan Frontal Fault is critically important for earthquake hazard management along a broad front in northern India; Valdiya (page 1031) describes the implications of its reactivation.

Crystallography
Neutron diffraction has been particularly valuable in providing insights into the nature of hydrogen bonds. On page 871 Chidambaram and Sikka review the status of neutron crystallography, highlighting applications in biomolecular structure determination and high pressure science. The remarkable rapidity with which protein structures are determined today by X-ray diffraction is a tribute to the maturity of the method. Vijayan (page 878) presents an overview of a structural genomics programme in India, focusing on microbial pathogens. Several structures of mycobacterial proteins and some viral and parasite proteins are described. Viruses are among the largest molecular assemblies whose atomic resolution structures have been determined by X-ray crystallography. M. R. N. Murthy (page 1071) outlines a computational method for the evaluation of all short interatomic contacts between subunits in viral capsids.

Dissipation
Dattagupta (page 961) begins an analysis of dissipation in the presence of cooperative effects in strongly interacting system by drawing attention to enigmatic concepts like friction, resistance and, of course, dissipation. He discusses dissipation in connection with physical phenomena like pattern formation, phase-ordering and domain growth kinetics. He also considers quantum dissipation influences on tunneling, Brownian motion and the crossover from coherence to decoherence.

Sonoluminescence
The nonlinear motion of a gas bubble results in light emission, with an extreme degree of energy focusing. Arakeri (page 911) reviews the remarkable phenomenon of sonoluminescence and bubble fusion.

Applied mathematics
Engineers and physicists use mathematics in a form where abstractions give way to a more robust connection to real life problems. Rigour and elegance can often be sacrificed on the altar of pragmatism. Prathap and Mukherjee (page 989) re-examine the most important statements on error analysis of the finite element method from the perspective of an engineering approach. Shankar (page 975)
discusses the solutions of the biharmonic equation, which appears in many areas of science and engineering.

Information processing

The algorithms of quantum computing have been implemented using NMR spin systems as a platform. Mahesh et al. (page 932) demonstrate the use of strongly coupled nuclear spins in quantum information processing. Decoding algorithms based on graphical descriptions of block codes are examined by Priti Shankar on page 980.

Liquid crystals

High pressure studies of solids have been important in solid state physics and materials science. Their application to liquid crystals is demonstrated by Manjuladevi and Madhusudana (page 1056), who provide evidence for a nematic–nematic transition in the polar nematogen, p-cyanophenyl-p-n-heptylbenezate. The discovery of the liquid crystalline state in cholesteryl benzoate is a historical landmark in the study of smectic phases. Shubhashree and Sadashiva (page 1061) describe the preparation and identification of mesophases in a series of cholesteryl-2-fluoro-n-alkoxybenzoates.

Anomalies and discontinuities

Mashelkar (page 860) traces a research path that follows a trail of unusual observations on the behaviour of non-Newtonian fluids. In a personalized account, he surveys size independent particle dissolution, migrating spheres, fibres from water-soluble polymers and self-organization in gels.

Structural chemistry

Crystal engineering is facilitated by an understanding of the modes of intermolecular interactions and the precise interatomic forces that control self-assembly. Thallapally et al. (page 995) use the concept of crystal structures defined as networks in analysing crystal structures of polysubstituted bromanitrobenzenes, which are based on the Br–NO₂ supra-molecular synthon. Transition metal clusters find a wide range of applications, most importantly in catalysis. Venkatakrishnan et al. (page 969) describe the characterization, by spectroscopy and X-ray diffraction, of ruthenium carbonyl clusters of diphosphazenes bearing axially chiral groups. Gabapentin, a simple γ-aminoo acid and a 1,1-disubstituted cyclohexene is a widely used anti-epileptic drug. Ananda et al. (page 1002) present the crystal structures of the parent drug and several derivatives. The observation of both possible chair forms of the cyclohexene ring in crystals and solution has implications for receptor binding.

Relieving cataract

Oxidative stress is a major factor in age-related cataract of the eye lens, which is a dominant cause of blindness. Thiga-rajan et al. (page 1065) report a set of in vitro studies that point to the potential use of Ashwagandha (an extract of the plant Withania somnifera) in retarding cataract formation.

Dinosaurs of India

Dinosaurs exercise a special fascination for children and the imaginative adult. Their extinction 65 million years ago constitutes a cataclysmic event unparalleled in the subsequent history of the earth. There are only two mounted skeletons of dinosaurs in India—at the Indian Statistical Institute, Kolkata and the Birla Science Centre, Hyderabad. Sahni (904) surveys the Indian dinosaur record, noting that most of the localities where dinosaur remains have been found are in Central India, along the Pranhita–Godavari valley and the Narmada river.

Cloning fishes

In fishes the egg nucleus is almost invisible, rendering cloning by nuclear manipulation, difficult. Pandian and Kirankumar (page 917) review the strategies of androgenic cloning, which appears set to be of importance in fish conservation and aquaculture.

Peacocks, macaques and elephants

The extravagant secondary sexual characteristics seen in male peacocks led Darwin to a theory of sexual selection. But in the years since Darwin, little attention has been paid to the peacock by evolutionary biologists interested in sexually selected traits. Gadagkar (page 1012) draws attention to the work of Marion Petrie, which justifies the choice of the peacock as the ‘icon of sexual selection’. He concludes that ‘the elaborate and ornate train of a peacock is an honest signal of his health, vigour, survival ability and good genes’. Anindya Sinha (page 1021) provides an account of cognitive processes in wild bonnet macaques. He considers the ‘possible cognitive bases of social knowledge-based decision-making and tactical deception, processes that appear to be integral to the development and maintenance of social relationships’.

Poaching has resulted in highly female-biased adult sex ratios for Asian elephants; the males being hunted for ivory. The regular monitoring of sex ratios in the field by observation may soon be supplanted by molecular methods which use DNA extracted from elephant dung, followed by restriction fragment length polymorphism analysis. Vidya et al. (page 1074) use molecular sexing methods to estimate adult sex ratios in the Nagarhole and Mudumalai–Bandipur reserves.

Agricultural competitiveness

Swaminathan (page 886) provides a broad overview of the issues facing Indian agriculture, reminding readers of Jawaharlal Nehru’s statement that ‘everything else can wait but not agriculture’. Noting that ‘every fourth farmer in the world is an Indian farmer’, he addresses the issues of water security and the technological divide in farming.

The editorial staff and the editorial board of Current Science have produced this issue as a surprise for Sivaraj Rama-seshan on his 80th birthday; a small token of recognition and affection for an editor, who has striven hard to keep the journal on course during difficult times.

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