Exciting world of nanoscience – going green

In the dimensions of $10^{-9}$ m, the science of nanomaterials comes alive. Widely accepted as the future technology for all kinds of applications ranging from advanced materials research, catalysis, energy storage, microelectronics to biotechnology, the science is now keeping in tune with the requirement for green sustainable chemistry. Nanoscience research has shown the materials synthesis could comprise of using eco-friendly technologies that minimize, for example, toxic wastes as a by-product. Sastry and co-workers (page 162) have shown the possibilities of devising from the commonly used biological systems such as bacteria and yeasts in preparation of nanomaterials, to the method of making use of fungal broths for obtaining silver nanoparticles. In addition, nanosized gold is synthesized from the actinomycete sp. From such systems and with a biomimetic approach, large variations in chemical compositions, size and shape of metal nanoparticles may be achieved. Further, the article by Jyoti Bhat (page 147) gives a bird’s eye-view of the implications of nanotechnology.

History of monsoon magic

Twice every year the skies over the Indian Ocean break into rainfall that supports life in the Asian and African regions. Forecasting monsoons using statistical methods predict the timing and intensity of expected rainfall over the Indian Ocean region during the two monsoon seasons. However, past trends in monsoon activity are recorded, like pages of a history book, in both land and marine sediments. A study of such sediments, helps in mapping past changes in monsoon over a time period of several hundreds of years. Gupta and Mélèze (page 179) have described the study of biological response to monsoon activity preserved in deep-sea plankton for understanding past changes in the strength and seasonality of both the southwest and northeast monsoons that have implications on human migration, triggered by the changes in rainfall in the past.

Survival on Barren Island

The Deccan Traps are evidence of the remarkable volcanic activity that once dominated the Earth. The basalt flows have even been linked to dinosaur extinction. Over 60 million years later continental India is devoid of any active volcanoes. Barren Island, located 135 km east of Port Blair in the Andaman Sea is India’s only active volcano, last erupting in the period December 1994–March 1995. The plume from that eruption was recorded by the astronauts on the Space Shuttle on 9–10 March 1995. Devoid of native human habitation, Barren Island is the home to feral goats. The apparent absence of freshwater on the island has given rise to many interesting, but implausible, hypotheses on the ability of these goats to survive on apparently inhospitable terrain. Do the goats drink sea water and survive or do they meet their water requirements by eating leaves or have they adapted to an extremely scarce freshwater environment? The report by Chandrasekaram et al. (page 136) lays to rest all speculation. The authors find, following an expedition to the island, the existence of cold springs, putting an end to the ‘myths about the life of feral goats’.

A cyanobacterial restriction enzyme

The discovery of restriction nucleases by Werner Arber in the 1960s and their purification and use in DNA characterization by Daniel Nathans and Hamilton Smith are major events in the development of recombinant DNA technology. Bacteria produce restriction enzymes to break the DNA molecules of invading viruses. A high degree of target sequence specificity is a hallmark of these enzymes; a blessing for molecular biologists, who now use a battery of restriction nucleases for cutting long DNA molecules, with high specificity. While large numbers of these scissors for snipping DNA are available commercially, the search for new enzymes with novel specificities continues. On page 188 Saravanan et al. report the purification of the type II restriction endonuclease Ofo1 from the cyanobacterium Oscillatoria foreaui. Ofo1 recognizes and cleaves a palindromic hexanucleotide 5’-CCCAGG-3’. Ofo1 appears to show recognition and cleavage patterns, identical to those for Avul, previously isolated from Anabaena variabilis.