In this issue

Leukocyte apoptosis as a predictor of radiosensitivity

Fanconi anemia (FA) is a rare recessive disorder associated with a cancer predisposition and bone marrow failure. FA cells are characterized by impaired oxygen metabolism and defects in a DNA damage repair, thus having a weakened ability to cope with oxidative and genotoxic stress. While the increased sensitivity of FA cells to crosslinking agents is well documented, the studies of their radiosensitivity still provide controversial results. Determination of radiation-induced apoptosis in peripheral blood lymphocytes by flow cytometry has been proposed as a reliable screening test for cancer-prone individuals. Results have shown that FA patients and female heterozygous carriers display radiosensitive response to ionizing radiation seen as abnormal, massive elimination of cells via apoptosis. Given that prooxidant state of cells was determined in both FA patients and their mothers, and that recent studies demonstrated the radioresistant response of FA cells to ionizing radiation as measured by cytokinesis-block micronucleus test, results of this study confirmed that in diseases related to oxidative stress determination of radiation-induced apoptosis is the method of choice for testing the intrinsic radiosensitivity. Regulation of radiation-induced apoptosis and cell cycle arrests is a p53-dependent mechanism. Many studies have reported that FA proteins and p53 cooperate following DNA damage. Results of this study showed no allele loss in *TP53* gene in primary FA lymphocytes, suggesting that an elevated apoptosis may be the consequence of impaired function of FANC proteins that leads to increased level of ROS or reduced repair of the oxidative DNA damage. See **page 56**.

Ancient eclipses and long-term drifts in Earth–Moon system

Eclipse records mark time more accurately than the clocks or other records. They are also very sensitive to the coupling of the complex Earth–Moon–Sun system and carry time frozen records of their relative location at the time of occurrence of eclipses with an accuracy of a few minutes. Southern Indian dynasties have had a long tradition of recording eclipses since generous donations were made on the occasion of eclipses. M. N. Vahia *et al.* have searched the catalogues of inscriptions at the Department of Epigraphy, Archaeological Survey of India, Mysore and compiled a list of 1107 eclipses with firm dates of which 519 are solar eclipses recorded between 400 and 1800 AD at different locations in India. They have compared them with the eclipse predictions by NASA. The authors identify nine periods when several eclipses that should not have been visible where they were recorded by two or more independent observers. Typical correction in lunar location required to reconcile these anomalous eclipses is consistent with the fluctuations in the length of day that are observed in recent periods. About 80% of these discrepancies occur when the Moon is at declination greater than 10^{o} and closer to its major standstill of 28° (where it spends on 46% of the time). To understand this, the authors (**page 61**) study the change in Earth's moment of inertia due to differential displacement of water mass by the Moon and the asymmetry in the land mass distribution on Earth. They further study the effect of this change in the Moon's acceleration. They also show that the results of eclipse error are consistent with the estimate of a small differential acceleration when the Moon is over land at high latitudes where larger landmass is concentrated.

Algal biofuel

Rapidly depleting stocks of fossil fuels and increasing greenhouse gas (GHG) emissions have necessitated the exploration of cost effective sustainable energy sources focusing on biofuels through algae. Microalgae are emerging as one of the most promising sources of biofuel because of their high photosynthetic efficiency and faster replication as compared to any other energy crops. The concept of using microalgal lipid as a source of fuel is gaining momentum considering the environmental benefits and energy-related issues, which is a frontier research area today. Algal community for the production of lipid depends on the interplay of physical and bio-chemical factors in aquatic systems.

Mahapatra and Ramachandra explore (**page 47**) scope for generating biofuel from algae grown in urban wastewater. Abundant wastewaters generated in urban localities every day provide the nourishment to nurture algae for biofuel generation. Select algal species proliferating in wastewater were isolated and tested for myxotrophy, growth potential and lipid production. The analysis shows that *Chlorococcum* sp. can be an economical and viable feedstock for biofuel production compared to other wastewater grown species due to higher productivity and faster growth rate with higher lipid content consisting of 67% saturated fatty acid dominated by palmitate (36.3%) followed by linoleate (14%), an unsaturated fatty acid. The biofuel production from algae grown in urban wastewater would thus ensure sustainability in terms of (i) meeting the energy demand, (ii) nutrient removal and remediation of wastewater and more importantly (iii) mitigation of GHGs.