

In this issue

The history and geography of rainwater harvesting

Few would disagree that water scarcity is the most important problem facing India at the moment. The failure of monsoon last year was followed by an unusually severe summer this year. The delay in the onset of monsoon this year has made matters much worse. The only positive outcome of this situation is the increased awareness (and at least a few instances of concrete action) towards rainwater harvesting. This is nothing but yet another example of history repeating itself—as has been demonstrated by Deep Narayan Pandey *et al.* (page 46) in their article ‘Rainwater harvesting as an adaptation to climate change’.

Tracing the changes in the climatic patterns across the globe for the last few thousand years, the authors have documented many instances of extreme climatic events leading to prolonged aridity and draughts. The most frequent response of human societies has been migration. However, there have been instances when people have tried to continue staying in their homelands as long as possible, and have evolved various methods for harvesting and conserving rainwater. The



authors have provided many examples from all over the world—the 13,000-year-old well dug by Clovis people in America and the water reservoirs built by the Mayans in Mexico being particularly interesting. Particularly fascinating is their description of such instances from India—culled from sources such as Rig Veda and Sangam Literature, and locations ranging from Neolithic settlements in the Deccan to the havelis in Jabalpur. Also thought provoking are their comments on the present scenario—see p. 46 for more details.

N. V. Joshi

Atmospheric boundary layer

The atmospheric boundary layer (ABL) is the lowest layer of the atmosphere. The pollutants released at the surface by human activities are rapidly dispersed in the vertical within the ABL. When the ABL heights are small, the pollution levels can build up beyond safe levels. Therefore data on the structure of ABL are important but this information is usually not available in India. In this issue, Praaveena Krishnan *et al.* (page 75) report the diurnal evolution of ABL height and wind structure. The measurements were made at Gadanki (near Tirupati) using a wind profiler that can probe the first few kilometers of the atmosphere using electromagnetic radiation. The data for the spring months reveal that the ABL height increases from few hundred meters in early morning to more than 2 km in the afternoon. An interesting feature seen in the vertical wind profiles is the vertical cells of ascending and subsiding air currents which appear to have a duration of 10 to 20 min and extend all the way to the top of the ABL. The ascending cells correspond to the thermals that form when the land surface is strongly heated.

G. S. Bhat

Stratospheric bacteria

Panspermia, the idea that life on Earth has an extraterrestrial origin, has had many distinguished proponents, Svante Arrhenius among them. But its most vigorous



champion in recent times has been the late Fred Hoyle, a scientist of rare distinction. Origin of life theories which envisage terrestrial scenarios sometimes appear implausible; bringing in organisms from outer space, of course, only transfers the problem of bridging the gulf between chemical and biological evolution to another and more distant arena. Are there life forms in the cold reaches of outer space; grains of bacteria coated with carbonaceous matter as postulated famously by Hoyle and his colleagues? A possible approach to experimental verification is to examine the nature of organisms isolated from the upper reaches of the Earth's atmosphere. On page 23 Narlikar *et al.* report on the detection of microorganisms at high altitudes. The stratospheric samples were collected at heights up to about 40 km in balloon-borne cryosamplers. Are the isolated organisms artifacts of sampling and contamination? The authors believe that their isolates are representative of life forms in the stratosphere. Did they float upwards from the Earth, carried along by atmospheric turbulence or are they truly of extraterrestrial origin? The jury is probably still out.

Protein dynamics

Fluorescence resonance energy transfer (FRET) is a powerful technique to probe spatial proximity of a matched pair of fluorophores. Time resolved FRET exp-



eriments have begun to yield insights into protein folding processes. On page 68, Mukherjee and Bagchi investigate computationally, using a Brownian dynamics simulation, FRET behaviour during the folding of the model protein HP-36. They conclude that FRET efficiency is particularly sensitive to changes in the late stages of folding.