

In this issue

Air pollution in Calcutta

Increasing levels of air pollution is probably one of the most common problems faced by almost all the cities in India. However, it is also the one which is fairly low down on the priority lists of most governments, or, for that matter, most organizations. When more serious matters like shortages of water and electricity, mushrooming of slums, increasing incidence of crimes, congestion on roads, accumulation of garbage, rising unemployment, political uncertainty and so on have to be faced daily, who has the time to worry about air pollution? The lack of water or electricity has to be dealt with immediately; the harmful effects of breathing polluted air, however severe, are generally felt only after a relatively long time.

It is therefore not surprising that the air pollution in Calcutta has been steadily increasing. As reported by Dipankar Chakraborti and colleagues in the extremely detailed article on page 123 of this issue, numerous studies (from 1955 onwards) have been carried out to measure the various aspects of air pollution in Calcutta. These studies have examined the levels of suspended particulate matter, oxides of sulphur and nitrogen, volatile organic compounds, heavy metals like lead, and so on. In continuation of their studies spanning several decades, Chakraborti *et al.* have reported, for the first time, results of a systematic study of a much larger set of air pollutants sampled in winters of 1992, 1993 and 1994 at five important street crossings in the core city.

Even a casual look at the findings of Chakraborti *et al.* is enough to show the seriousness of the situation

in Calcutta, compared to other cities in India. The levels of suspended particulate matter in Calcutta are two to three times higher than those in cities like Mumbai, Ahmedabad and Kanpur – which are quite famous in their own right for high levels of pollution. Another worrisome factor is the presence of carcinogenic compounds like polynuclear aromatic hydrocarbons; a hawker exposed to these compounds for eight hours a day (by simply sitting at a street corner) is likely to get cancer in fifteen years. The authors have also drawn attention to the increasing levels of asthma and other respiratory problems especially among children.

Perhaps the more important indirect message of this article is in its lists of references and the list of authors. There is no dearth of studies on pollution; nor is there a shortage of scientists studying pollution. Going by the number of scientific establishments in Calcutta, and the enormous contributions made by scientists from Calcutta in the last hundred years, lack of scientific expertise has not been a limiting factor. The levels of pollution (and of many other undesirable entities), however, continue to rise – in step with the frequency of slogans from the paymasters about how scientists should work for the betterment of the common people.

Coming back to the article – a positive point to note is the helping hand extended by Nature. The authors point out that air is 'relatively clean' during rainy season – the heavy rains wash away the pollutants – and in summer, where the high winds blow them away. Perhaps as a balancing negative point, the article on page 123 also contains comparative figures for

pollution levels at many other cities in the world.

N. V. Joshi

Do plants have hearts?

Lifting water from the depths of the earth to great heights is an activity that has made living in skyscrapers possible. Pumps and borewells are a common appendage in all apartment buildings in many cities. Considerable energy is expended in the business of pumping water to great heights. Nature, of course, has more elegant solutions to the problem of lifting water. Plants successfully absorb water by subtle mechanisms, with the process of transpiration powered by solar energy being most widely appreciated. Other mechanisms involving capillary and osmotic forces have also been well studied by plant physiologists. But the need for additional mechanisms to ensure steady state circulation have been clearly felt for more than two centuries. The process of exudation, most dramatically exemplified by water pouring from cut branches or stem in some species of plants argues for 'root pressure' and the consequent need for 'pressurizing pumps', analogous to the hearts of animals. Wolfgang Kundt addresses this problem on page 98. What are these pumps and how do they operate? Could 'molecular motors' be of importance? While answers to these and other questions may appear in future, at present one cannot but wonder at the economy and efficiency of Nature's processes.

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