In this issue

An AFM measurement of elastic modulii

A brief report on the design and development of an atomic force microscope at Central Scientific Instruments Organization, Chandigarh had been published by A. D. Kaul *et al.*, earlier in the pages of *Current Science* (1997, **73**, 738). In addition to discussing some aspects of the mechanical and optical design, the authors had given some results on studies related to surface topography of a holographic grating and a micro-machined silicon surface in that publication. The instrument had also been used for scanning a polycarbonate filter surface showing clearly 200 nm diameter perforations and a surfactant on a polymer macromolecule.

In this issue, A. D. Kaul *et al.* (**page 1561**) have reported results of load–depth indentation measurements, using their atomic force microscope. Mechanical properties of materials on nanometer scale can be studied using an atomic force microscope in the indentation mode because of the high lateral and depth resolutions. A phenomenon referred to as 'reverse path effect', an instrumental artefact that affects quantitative measurements is taken care of by the authors by measuring the displacement of the PZT actuator absolutely, by measuring laser Doppler shift. These data have been used to correct force curves. The elastic modulii of pyrolytic graphite, silicone elastomer, mica and gallium arsenide have thus been measured on a nanometer scale.

K. R. Rao

A celebrity antigen

In 1963, Kare Berg and his colleagues at the University of Oslo discovered a fascinating antigen. They had from different human subjects isolated a protein, which carries lipids in blood (lipoprotein) and injected the fraction into rabbits. Then they tested the reactivity of the rabbit antisera to human plasma samples, in search of variant forms of beta lipoproteins in the human population. Interestingly, they found that only one-third of the samples reacted to the rabbit antiserum and that the others did not. Thus, a new antigen was recognized. The lipoprotein-associated antigen was given the name lipoprotein (a) – Lp(a). In the late sixties and early seventies several studies tried to link Lp(a) positivity or negativity with disease states. Later it was shown that nearly all humans have Lp(a) in their blood, in varying amounts.

The interest in Lp(a) increased in 1974 when Berg, Dahlen and Frick reported association between high plasma levels of Lp(a) and coronary heart diseases. A number of case-control studies have confirmed their observation and suggested that Lp(a) may be an independent risk factor for premature cardiovascular disease. The GRIPS study in which individuals were followed for ten years found that Lp(a) is an independent risk factor for coronary artery disease, stroke and peripheral vascular disease. High blood levels of Lp(a) can contribute to accumulation of fat in the blood vessel wall and also enhance formation of blood clots in vessels.

Lp(a) is now identified as a genetic trait that is autosomally transmitted. It is assembled from low-density lipoprotein and apolipoprotein(a). Apolipoprotein(a) is coded by one of the most polymorphic genes known in humans. Variations in the gene are a major determinant of the plasma levels of Lp(a), which differ considerably between individuals and also across populations. The reasons for the large inter-individual and inter-population differences in average Lp(a) levels in plasma are not known.

Much progress has been made in recent years in the understanding of the structural properties of this lipoprotein, factors controlling the expression of the apo(a) gene, its biosynthesis and biology. K. Luthra *et al.* review (**page 1553**) the current knowledge on the biochemical features and clinical significance of Lp(a).

Lp(a) is especially noteworthy for Indians. People from the subcontinent have Lp(a) levels that are higher than the levels seen in white Caucasians. Why this is so is unclear. Also not known are the normal functions of Lp(a), molecular mechanisms underlying differences in genetic Lp(a) trait among human populations and regulation of apo(a) levels.

C. C. Kartha

Aerobic Antarctic bacteria shun oxygen

Strange are the ways by which life forms adapt to the environment. Some like it hot and are happy at temperatures above 100°C and in contrast some like it cold as the cold loving bacteria from Arctic, Antarctica, ocean beds, permafrost regions, etc. During the last decade attempts have been made to culture the extreme thermophiles and understand the molecular basis of adaptation, a task still undone. In comparison, more is known about adaptation of microorganisms to cold temperatures like their ability to sense temperatures and modulate membrane fluidity, ability to transcribe genes at low temperatures, ability to upregulate certain genes at low temperatures and the role of cold stress proteins. But, from time to time we also encounter totally unexpected strategies to counteract or adapt to stress. Loka Bharathi *et al.* (**page 1585**) working on Antarctic bacteria observed that the surface lake waters in Antarctica which have high dissolved oxygen content paradoxically supported higher numbers of anaerobic bacteria than aerobic bacteria. It is suggested that this phenomenon could be a strategy adopted by bacteria to express viability under reducing conditions when the dissolved oxygen in the surrounding waters has high/saturating concentrations of oxygen.

This is an attractive hypothesis and needs to be understood with respect to the molecular basis of cold adaptation.

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