In this issue

A fusion of imaging and spectroscopy

Nuclear magnetic resonance (NMR) techniques, based on a phenomenon first observed in bulk matter by Felix Bloch and Edward Purcell in 1946, have today a wide range of applications in fields as diverse as medicine and materials science. This extremely broad spectrum of applications would surely have defied the imaginations of even the most optimistic, early proponents of NMR. High-resolution NMR today is central to the practice of chemistry and is one of the most powerful techniques available for the analysis of complex molecular structures in biology. The field was revolutionized in the seventies by the introduction of Fourier-transform techniques and again in the eighties by the advent of multiple-pulse and multidimensional methods. However, one of the most dramatic and visible applications of the NMR phenomenon is in the field of imaging, where it has blossomed into a major diagnostic tool in clinical medicine. NMR imaging is the method *par excellence* for non-invasive visualization of soft tissue. Because of the unfortunate connotations of the word 'nuclear', clinicians have preferred to use the term magnetic resonance imaging (MRI). Whole-body scanners have now become commonplace in hospitals in the West. In India too, MRI is rapidly becoming a major, although expensive, diagnostic tool.

While the two areas of NMR—spectroscopy and imaging—initially developed separately they appear to have begun to converge in recent times. Two reviews in this issue emphasize the importance of MRI methods used in conjunction with spectroscopy. Narayana and Jackson (**page 340**) describe image-guided *in vivo* proton magnetic resonance spectroscopy (MRS) of human brain. In addition to examining technical aspects of MRS, particularly spatial localization based on MR images, water suppression and pulsed gradient fields, the authors summarize applications in the study of brain in patients with multiple sclerosis and ischaemic brain injury. The potential for detecting resonances of specific metabolites and constituents in local regions of the brain leads the authors to suggest that 'the day may not be too far away when physicians and MR spectroscopists sit side by side at the console to interpret patient studies'.

Sarkar (**page 331**) provides an overview of NMR imaging in drug-discovery research. These methods offer a means of long-term non-invasive monitoring of disease conditions in animals and the effects of pharmacological intervention. The applications of NMR imaging and microimaging are discussed with specific examples of renal, cerebrovascular and tumour studies. The excellent anatomical resolution obtained promises a bright future for NMR imaging in pharmaceutical research. An attractive possibility is that these methods may lead to a reduction in animal use in preclinical research.

Chemical waves

Oscillatory chemical reactions have always been a curious and intriguing phenomenon in chemistry. Among the more popular systems studied is the Briggs–Rauscher reaction involving the iodate–hydrogen peroxide system. This reaction mixture also contains manganese (Mn) ions, which cycle between the Mn(II) and Mn(III) oxidation states. The former is paramagnetic (d^5) and thus provides an electron paramagnetic resonance (EPR) probe. It is precisely this property that has been used by Lalitha *et al.* (**page 352**) to monitor the Briggs–Rauscher chemical oscillator. The authors establish an oscillation of EPR signal intensity that correlates well with EMF profiles.

Cell architecture

Biological structures are frequently formed by association of several macromolecular species. The envelope (membrane) that compartmentalizes the cell nucleus is no exception, the inner surface of the envelope associating with a filamentous protein network of the lamins. Adding to the complexity of the problem, the lamins fall into two groups. A-type lamins are solubilized during mitosis. In contrast, B-type lamins remain anchored to the nuclear membrane, even during the dramatic structural events of mitosis. How is this strong association of lamin B maintained? Fatima and Parnaik (**page 356**) have addressed this issue by using bifunctional cross-linking agents (imidoesters), which can covalently link proximal molecules in a complex structure. Molecular partners that are thus irrevocably tied together are then visualized by two-dimensional SDS-polyacrylamide gel electrophoresis, which permits an estimation of their molecular masses. The lamins are shown to associate with three nuclear membrane proteins (54, 50 and 45 kilodaltons). The authors suggest that a putative lamin-B receptor in mouse liver nuclei is a 54-kDa protein.

Setting the record straight

The recent restructuring of *Current Science* and the introduction of editorial screening of submitted research papers before peer review were intended (i) to reduce the excessive slant in number of research papers towards a few disciplines and (ii) to raise standards of acceptance for publication. As a result, the journal now usually does not accept, for instance, species reports, unless there is fundamental phylogenetic, biogeographic or ecological significance (see also *Current Science*, 1990, **59**, 5–6). These changes in the journal have also raised the question of a schism in biology: is there a 'classical' biology that is not of contemporary interest or importance? On the other hand, is most 'classical'-biology research in India (and elsewhere?) today itself of poor quality? *Current Science* asked a few well-known Indian biologists for opinion. M. K. Chandrashekaran (**page 309**) and M. C. Srinivasan (**page 311**) present views on the question, with suggestions for good biology research in their respective areas.