Preface

Protozoan parasites, especially the ones which cause disease, are of tremendous interest to biologists. The reason is that these 'lower eukaryotes' are able to successfully encroach, occupy and not only live-off a 'higher eukaryote', they also cause terrible misery to their unknowing hosts. One such human pathogen is *Entamoeba histolytica*. It invades this special issue of *Journal of Biosciences* at our invitation, unlike its usual *modus operandi*, when it drops in uninvited along with lunch!

These unicellular organisms were referred to as 'primitive eukaryotes' in text books and journals alike, since they (supposedly) lacked 'typical eukaryotic subcellular organelles'. It was commonly believed that they were ancestral to higher eukaryotes which appeared later in evolution. They were also thought to divide by a process of asexual reproduction called 'amitosis' which was not seen in eukaryotes. In the last 15 years, molecular biology has eradicated many of these myths and established that parasitic protozoa are not primitive – but are actually very complex, often exhibiting 'atypical' characteristics when compared to other eukaryotes.

Samuelson's review in this issue effectively argues against the idea that these protists represent ancient, transitional forms. This review shows how amoeba and giardia contain proteins and structures similar to higher eukaryotes, suggesting that they could well serve as models for the common ancestral form. He points to lateral gene transfer as a means whereby parasitic eukaryotes acquired prokaryotic genes. He also raises the intriguing possibility of convergent evolution while comparing amoebic cyst wall lectins with plant and insect lectins. All hint at the innate complexity of parasitic protists.

Entamoeba histolytica has been characterized in the past for its disease-causing ability. It was commonly believed that a single species, *E. histolytica*, varied in its ability to cause disease depending on host factors and other unknowns. In a landmark paper, Clark and Diamond (1993) demonstrated two morphologically identical but genetically distinct species of *Entamoeba* – one which could cause disease, *E. histolytica*, and a non-pathogenic species, *E. dispar*. This crucial discovery changed the earlier idea that *E. histolytica* was primarily responsible for all human infections. Clark's article in this issue sheds more light on intra-species variation and genetic diversity within *E. histolytica*. Diagnostic methods to identify *E. dispar* and *E. histolytica* are reviewed by John Ackers. Jaishree Paul *et al* compare the ribosomal DNA sequences of *E. dispar* and *E. histolytica*.

This special issue of *Journal of Biosciences* also brings together key articles on adhesion, signalling, differentiation, cytopathic molecules, and cell cycle of amoeba. Adherence of the amoeba to the host cell is an essential step controlling progression of disease and the major player which controls adherence is the Gal/GalNAc lectin. Its role in host cell adhesion and subsequent killing is presented in two articles, one by Boettner *et al* and another by Texiera and Mann. Bracha *et al* analyse the role of the 'amoebapore' – one of the major cytolytic amoebic molecules for its virulence properties.

The signals and molecular events controlling differentiation to cyst are poorly understood but happen to be extremely important for disease management. Eichinger unveils a complex model involving the Gal/GalNAc lectin, G-protein coupled receptors and biogenic amines. The (re)discovery of biogenic amines and their receptors may lead to the discovery of unexplored signalling pathways in amoeba in the near future.

With the completion of the genome sequencing projects by The Institute of Genome Research and the Sanger Centre in sight, we are at the threshold of identifying novel gene products and DNA sequences which may explain the elusive behaviour of this organism.

The use of microarrays is still in its infancy but promises to become a potent tool for the study of this organism soon as described by Singh and Shah. Lastly, although *E. histolytica* does not affect an alarming number of humans, unlike HIV or the malaria parasite, molecular and cellular information from this organism promises to yield many of biology's well kept secrets which may be important in understanding human response to disease and survival strategies in adversity.

Anuradha Lohia