In this issue

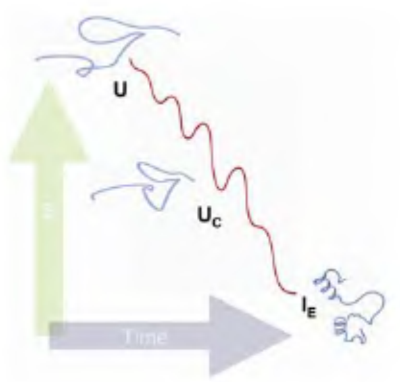
Sediments from the Carlsberg Ridge

The clay mineralogical, geochemical and U–Th isotopic studies show that the sediments from NW Carlsberg Ridge (CR) in the Indian Ocean have high accumulation rate (3 cm/kyr), and are characterized by very low magnetic susceptibility (MS), moderate TOC, high $CaCO_3$ content. The CR sediments have high illite (30–50%) and chlorite (18–35%) similar to the Arabian Sea sediments whereas, high smectite abundance (30–40%) in the axial valley of the CR point towards additional source from the south mainly by the northerly bound equatorial currents. The Si, Al and K down profiles suggest larger detrital input for the deeper samples. The CR sediments have no effect on $CaCO_3$ dissolution. Absence of Mn enrichment, distinct susceptibility peaks and volcanic tephra material indicates that the CR source is non-volcanic. The CR sediments do not hold any signature of hydrothermal activity, and the sharp peaks of Mn at 10, 25, 45, 60 and 80 cm depth appears to be typical of oxidation fronts in the diagnetic system. The down core profiles of MS, Fe, Mn and TOC, and high uranium further supports diagenetic influence in the CR sediments. The study shows that the major sediment sources are continental, biogenic and diagenetic. See **page 1090**.

The first millisecond of protein folding

Living systems very often operate far from thermodynamic equilibrium. The timely execution of a variety of molecular processes is the key to survival of living forms. This is possible because proteins, the workhorses of living cells, fold to functional structures in times that are biologically relevant, regardless of the vast free energy landscape available for conformational sampling. An important part of the conformational search problem is solved during the initial stages of protein-folding reactions.

In this issue Kalyan Sinha and Jayant Udgaonkar review (**page 1053**) the current state of knowledge on events that occur early during protein folding, with emphasis on the sub-millisecond (MS) collapse reactions. The recent developments in ultra-fast methods to initiate folding reactions have resulted in a significant wealth of data on the sub-ms folding transitions. These data highlight two important features of the initial folding



events. First, the species involved, including the starting unfolded form, show high degrees of conformational heterogeneity. Second, the magnitudes of the energy barriers encountered may be marginal and approach about k_BT in magnitude. The authors discuss the implications of these observations in terms of the existence of multiple folding pathways. They discuss the complications that may arise due to the common usage of transition state theory to analyse such complex reactions. An important emerging possibility that is supported by some recent kinetic data is that specific structure may form by gradual transitions, rather than *via* cooperative barrier-limited processes. Such observations suggest that it may become possible to capture the exact sequence of events during the folding reaction of a protein right from the very beginning.

Magnetic field generation in the solar system

When confronting the unknown in science, complexity and confusion first dominate. But, with subsequent discoveries and logical reasoning, that eventually passes, and in its place comes awareness and appreciation of the elegant simplicity which underlies nature. Three decades ago, Marvin Herndon began to confront the unknown, concerning the matter in the solar system, by placing seemingly unrelated observations into logical sequences so that causal relations became evident and understanding started to emerge. As he describes in this issue (**page 1033**), only three processes are responsible for the genesis of planetary matter and only one type of matter is responsible for bulk interiors of the massive-cored planets. The commonality of internal planetary compositions leads Herndon to propose that magnetic field generation in the planets and in their larger satellites results from the same type of energy source and magnetic field production mechanism which he has suggested generates and powers the earth's magnetic field: a nuclear fission reactor at the centre, called the georeactor (*Curr. Sci.*, 2007, **93**, 1485–1487). In the micro-gravity environment of planetary centres, the operating conditions are, as Herndon notes, remarkably similar and lead to feasible circumstances for long-term convection-driven dynamo action in the fluid nuclear reactor sub-shell of each planet and large satellite.