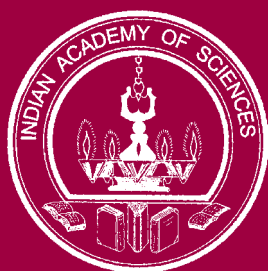


# INDIAN ACADEMY OF SCIENCES

Bangalore 560 080



## 76<sup>th</sup> ANNUAL MEETING

National Institute of Oceanography, Goa  
12 – 14 November 2010

### SPECIAL LECTURES

Venue: Cardium, National Institute of Oceanography, Goa

**12 November 2010 (Friday) 1800–1900**

PUBLIC LECTURE

**C Raja Mohan**

Strategic Affairs Editor, The Indian Express, New Delhi

*India and the Indian Ocean: In search of a strategic role*

As a major source of raw materials, the home to some of the world's most volatile regions, the incubator of violent extremism, the main theatre for the proliferation of weapons of mass destruction, and the location for a large number of failed and failing states, and an arena for great power rivalry, the importance of the Indian Ocean for the global economy and international security has never been in doubt. As India becomes one of the world's leading economies, its ability to shape the environment of the Indian Ocean is growing. To decisively influence the Indian Ocean littoral, amidst the rise of China and the seeming decline of the West, India will need to rethink many of the long held assumptions about its foreign and security policies. The lecture will explore the policy challenges for India in five areas—the tension between strategic autonomy and coalition building, the difficulties of projecting power, the definition of regional and extra-regional, providing security to weaker states, and protecting the maritime commons.

**13 November 2010 (Saturday) 0900–0940**

SPECIAL LECTURE

**A K Singhvi**

Physical Research Laboratory, Ahmedabad

*Synergistic mutualism between geology and physics: The case of luminescence geochronometry*

In recent years, the use of thermally- and optically-stimulated luminescence (TSL and OSL) has occupied centre stage in the studies aimed to understand the evolutionary history of Earth during the past two Million years (My; the Quaternary Era). These radiation damage-based methods offer substantive advantages over other methods like radiocarbon, due to their continuous age range from the present to a My, their applicability to natural ubiquitous minerals like Quartz and Feldspars and their ability to provide ages to a variety of events in the recent geological past. Consequently, these methods now make it possible to assign ages to almost every conceivable geological situation, and have also helped in important aspects of personnel dosimetry, retrospective dosimetry of nuclear accident sites, archeology and meteoritics.

Application of this method to geology has also brought to light new physical phenomena in the solid state. Thus for example, anomalously young ages in volcanic materials indicated the presence of quantum mechanical tunneling of charges between defects. Further, long geological sequences permitted examination of the effects of changes in radiation dose rate over extended dose rate ( $\mu\text{Gy}/\text{year}$ – $\text{Gy}/\text{sec}$ ) and dose regimes in the mineral lattices.

The basic elements of the use of the methods and its application will be discussed, and how the application of this method to geosciences has revealed new physical phenomena will be demonstrated.

**13 November 2010 (Saturday) 1830–1930**

PUBLIC LECTURE

**Kaushik Basu**

Chief Economic Adviser, Govt of India, New Delhi

*Higher education and economic development*

**14 November 2010 (Sunday) 0900–0940**

SPECIAL LECTURE

**Kanury V S Rao**

International Centre for Genetic Engineering and Biotechnology, New Delhi

*The dynamics of host-pathogen interactions in TB infection*

The vast majority of pathogens of the human hosts have co-evolved along with the host so as to be able to successfully infect the target cells, and survive in them. They are able to do so by adapting to the intracellular milieu through complex interplay with host cell machinery. This host-pathogen interplay manifests at every level of cellular regulatory machinery including signaling network, metabolic network and transcriptional regulatory network. Pathogen-derived molecules tend to co-opt these regulatory modules and influence them in a manner that facilitates their survival within the host cell. This is especially true of *Mycobacterium tuberculosis* (Mtb), which has evolved elaborate strategies to survive within the endocytic vesicles of human macrophages. Subversion of the host cell by the microbe has been shown to be mediated through interactions with proteins secreted by the intracellular pathogen. Our thesis, therefore, is that an approach that can disrupt the key molecular interactions that promote this adaptation may provide an alternate strategy for chemotherapy. To explore this, we have adopted a two-phase strategy where the first phase involves the generation of a complete 'parts list' of the host cell regulatory molecules that are either targeted or influenced by the pathogen. For this, we are currently performing a genome-wide siRNA screening of human macrophages infected with Mtb. The information obtained from this screening is also being employed to identify the molecular axis that is involved in regulating pathogen survival. It is our hypothesis that the components of such an axis will also serve as a list of candidate targets for the development of chemotherapeutic strategies aimed at disabling the adaptive mechanisms of the pathogen. Thus our present approach seeks to extend systems biology, towards a translation-oriented exercise that could perhaps be termed as 'systems pharmacology.' The talk will focus on the progress made in these experiments, as well as elaborate on the novel concepts emerging from this screening exercise.

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ALL ARE WELCOME