No. 51

Patrika

March 2010

Newsletter of the Indian Academy of Sciences

Platinum Jubilee Celebrations 2009

Founded in 1934, the Academy celebrated its Platinum Jubilee year in 2009. A short inaugural function was held on 1st January, 2009 at the IISc during which the traditional lamp was lit by the President and six former Presidents. The activities and initiatives for the Platinum year included monthly lectures, platinum jubilee professorships, special publications, and three meetings and symposia which were held in July, November and December 2009.

PLATINUM JUBILEE MEETING – I

The first Meeting was held at Hyderabad during July 2 – 4, 2009 and was co-hosted by IICT and CCMB. The Welcome Address by the President focused on efforts to mitigate problems of impaired vision. Special lectures were by Lalji Singh and Surendra Prasad. The public lectures were by Narender Luther and W. Selvamurthy. Details of these lectures can be found in 'Patrika' dated September 2009.

PLATINUM JUBILEE MEETING – II

The highlight of the celebrations was the Platinum Jubilee Meeting held at Bangalore during 12 – 14 November 2009, all sessions being arranged at the spacious National Science Seminar Complex of the IISc (J N Tata Auditorium). The inaugural session was a dignified and ceremonial affair. Past Presidents who were able to come for the meeting spoke briefly and were specially honoured.

Two Platinum Jubilee publications – a two-volume ***Directory of Fellows*** and a 600 page volume ***Current Trends in Science*** consisting of specially commissioned reviews of various areas in science – were released. Messages from several science academies across the globe, and from Academy Presidents unable to be present, were read out.

Inside....

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FORTHCOMING EVENTS – 2010

Refresher Courses

- Foundations of physics
  Bengal Engineering and Science University, Shibpur : 17 – 27 May 2010
- Experimental physics, Manipal University, Manipal : 24 May – 9 June 2010
- MBC Bridge course in mathematical methods in physics
  Dayanand Science College, Latur : 1 – 25 June 2010
- Frontiers in atmospheric sciences
  Indian Institute of Tropical Meteorology, Pune : 14 – 25 June 2010
- Experimental physics
  Sree Siddaganga College for Women, Tumkur University, Tumkur : 28 June – 12 July, 2010
- Experimental physics, Bangalore University, Bangalore : 15 – 30 July 2010
- Condensed matter physics, St. Thomas College, Pala : August 2010
- Experimental physics, Shivaji University, Kolhapur : 5 – 20 October 2010
- Experimental physics
  Mahatma Gandhi University, Kottayam : 18 November – 3 December 2010

Lecture Workshops

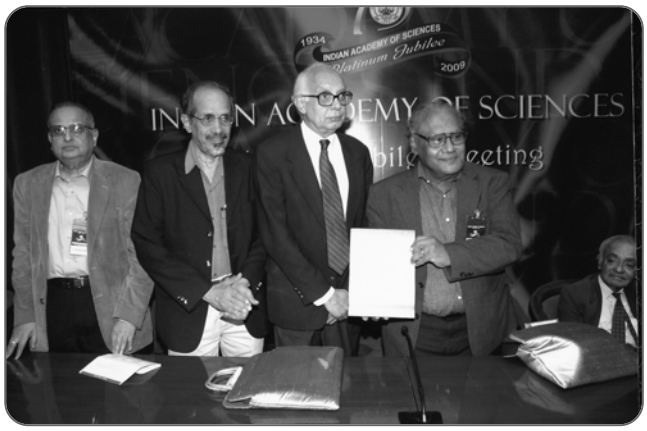
- Current trends in organic synthesis, Bangalore University, Bangalore : 9 – 10 April 2010
- Protein function and dynamics
  Maharani Lakshmi Ammanni College for Women, Bangalore : 9 – 10 April 2010
- Nanoscience and technology
  Don Bosco Institute of Technology, Bangalore : 28 – 30 April 2010
- Genomics and proteomics, Sri Padmavathi Mahila Visvavidyalayam, Tirupati : 17 – 18 August 2010
- Advances in chemistry
  PSGR Krishnammal College for Women, Coimbatore : October 2010

Discussion Meeting

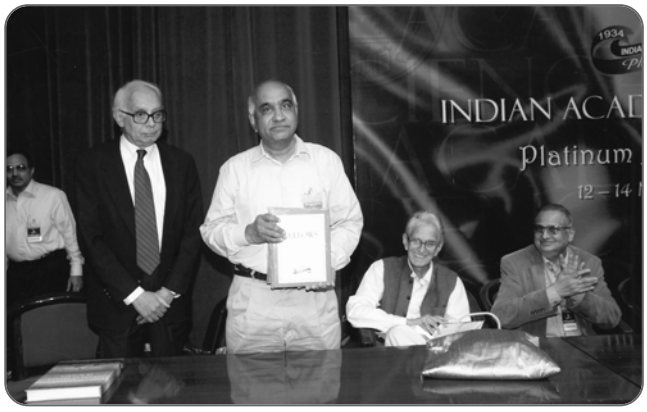
- Hydrogen bonding and other molecular interactions, Orange County, Coorg : 28 November 2010 – 1 December 2010

Academy Platinum Jubilee Meeting, November 2009, Bangalore

The Presidential address titled 'Stem cell biology and an example of its use in vision science' was the third in a set of such addresses devoted to vision – its scientific aspects, treatment strategies for various types of impairments, and models for effective and affordable eye care for our population. The focus was on increasing prevalence of presbyopia among the older generations, and myopia among school children.



Possible new approaches for correcting refractive problems in the lens, and the much more challenging demands of repairing retinal damage, were described.

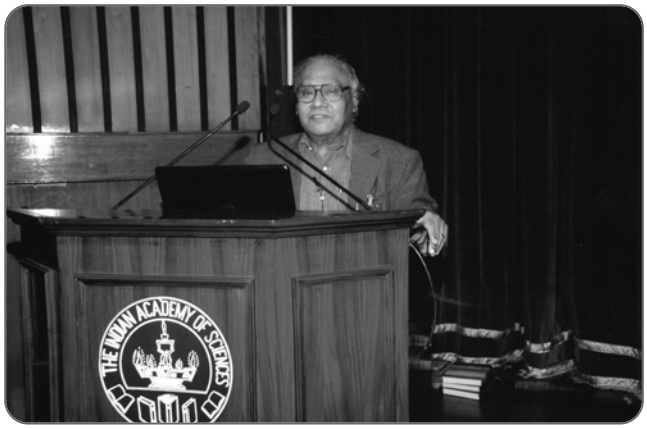


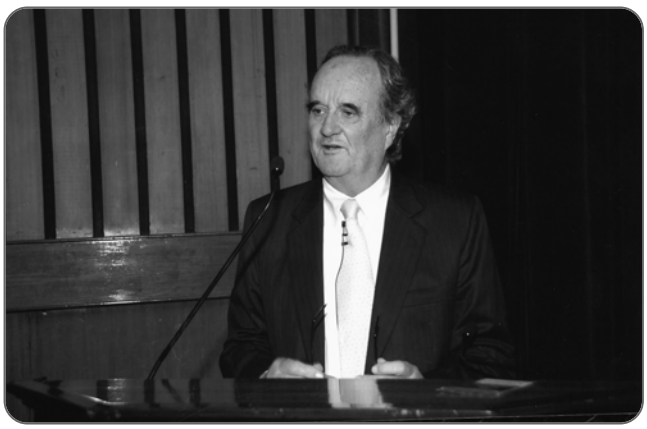
The President's address was followed by a Platinum Jubilee Special Lecture by C N R Rao on 'Emerging India as a great centre of science'. The enormous contributions of C V Raman, Founder of the Academy, and S Ramaseshan, a past President, both to the Academy and to publication of scientific journals were recalled. The general impression that despite better financial support, the quality as well as quantity of science in India have not improved significantly was mentioned. The speaker urged the Academy to do all it could to improve the health of science in India.

The meeting included two public lectures – the first by Nandan Nilekani on India's ambitious 'Unique Identification Project', and the second by Mark Tully on 'The need for balance in an unbalanced world'. Nilekani emphasized that the main aims of this project of unprecedented magnitude are – enabling large

numbers of people to easily prove their identities and thereby obtain various social services and benefits that are legitimately due to them. The many important features of the whole project, ideas under discussion, decisions yet to be made, were presented with remarkable clarity and precision. As the speaker said, “we will be the first country to implement a biometric-based unique ID system for its residents on such a large scale”.

Mark Tully brought out some central features of Indic religions which contrast with others in important ways. The former accept the 'uncertainty of certainty' – as against enlightenment rationalism, the certainties



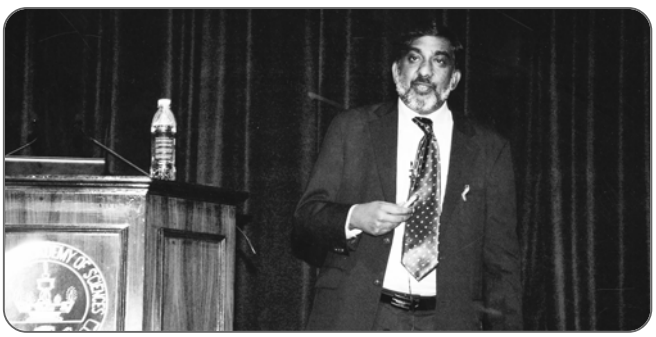


of the semitic faiths, and the more contemporary belief in the existence of science-based answers to all questions. He concluded with an appeal for balance in all discussions and debates on matters of technology, science and individual faiths.

The three Symposia covered 'Climate change: An Indian perspective', 'Navigation and communication – What we

can learn from insects', and 'Raman spectroscopy'. Each of these included many presentations of uniformly high

quality, and presented all the important facets of each topic in complementary ways.



In addition to these special components of the programme, a number of lectures by recently elected Fellows and Associates – 14 in all – were given. The attendance was also very encouraging, as some 200 Fellows and Associates and about 50 teacher invitees were present.

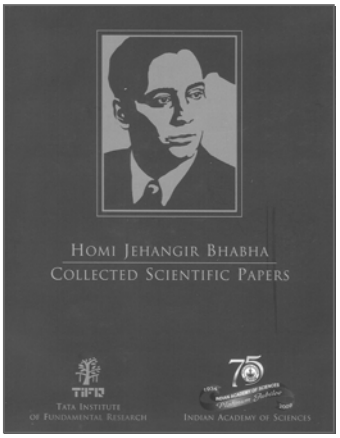
On this historic occasion in the life of the Academy, a series of artistically designed panels displaying texts and photographs from the Archives were created and set up at the venue of the meeting. These exhibits are reproduced in this issue of **Patrika**.

PLATINUM JUBILEE MEETING – III

The third meeting scheduled for the Platinum Jubilee year was held during December 3 – 5 2009 at the Tata Institute of Fundamental Research (TIFR), Mumbai.

The Academy was a co-sponsor – along with INSA, NASI, DAE and the Royal Society, London – of the 'Bhabha Centenary Symposium: Science and Technology at the Frontiers'. The event as a whole was most tastefully organized, one highlight being a slide show titled 'Homi Bhabha: In memoriam' created with artistic elegance and using the archives of the TIFR. Among the many excellent talks given in memory of and to honour Homi Bhabha, some should be particularly mentioned. Those with a historical flavour were by C. N. Yang on 'From the vector potential to connections on a fiber bundle'; M. S. Narasimhan on 'Mathematics in TIFR'; M. G. K. Menon on 'Turning points in Homi's life'; Obaid Siddiqi on 'The beginnings of biology at TIFR – Dr. Bhabha's style of growing science'; and Arnold Wolfendale on 'Cosmic rays and evolution'. Among the technical talks, both W. M. Rainforth and Knut Urban spoke about microscopy and the aftermath of Feynman's 1959 lecture 'There's plenty of room at the bottom'; R. S. Raghavan covered recent developments in neutrino physics; C. N. R. Rao on 'Graphene and beyond'; and Carlo Rubbia on the non-baryonic dark matter problem.

The Symposium as a whole was a magnificent tribute to the amazing vision and talents of Homi Bhabha. These were particularly well captured by the remarks of the Academy President, Prof. D. Balasubramanian in the Academy Session on the second day when he placed Bhabha within the pantheon of supremely gifted individuals the country produced in the late 19th and early-to-mid 20th centuries, in many areas of creative endeavour.



The Academy together with TIFR brought out a special publication titled *Homi Jehangir Bhabha*: *Collected Scientific Papers* which was released at the Bhabha Centenary Symposium.

TWENTY-FIRST MID-YEAR MEETING

2 – 3 July 2010

Programme

2 July 2010 (Friday)

0930 – 1010 **Session 1A – Special Lecture**

T Padmanabhan, Inter-University Centre for Astronomy and Astrophysics, Pune

Gravity: A new perspective

1010 – 1300 **Session 1B – Lectures by Fellows/ Associates**

1010 **G Rangarajan,** Indian Institute of Science, Bangalore

Synchronized extinction of species under external forcing

1030 **A K Kembhavi,** Inter-University Centre for Astronomy and Astrophysics, Pune

Big Data – Is the end of observational astronomy in sight?

1050 – 1120 Tea break

1120 **Nitin Chattopadhyay,** Jadavpur University, Kolkata

A facile strategy for the detection and estimation of cyanide ion in water

1140 **T Karthikeyan,** Indira Gandhi Centre for Atomic Research, Kalpakkam

Grain boundary engineering of ferritic steels

1200 **Amit K Patra,** National Atmospheric Research Laboratory, Chittoor

High power radar probing of ionospheric plasma irregularities

1220 **Shally Awasthi,** CSM Medical University, Lucknow

Six – monthly vitamin A from 1 to 6 years of age – DEVTA trial: Cluster-randomized trial in one million children in North India

1240 **Pradip K Chakraborti,** Institute of Microbial Technology, Chandigarh

Understanding mycobacterial N-terminal methionine excision pathway

1300 – 1430 Lunch break

1430 – 1720 **Session 1C – Lectures by Fellows/ Associates**

1430 **S K Khanduja,** Panjab University, Chandigarh

Some extensions and applications of Eisenstein irreducibility criterion

1450 **R Gopakumar,** Harish-Chandra Research Institute, Allahabad

The journey from Maxwell to Faraday

1510 **B S Murty,** Indian Institute of Technology, Chennai

Excitements and challenges in advanced materials research by non-equilibrium processing

1530 – 1600 Tea break

1600 **P K Ghosh,** Central Salt and Marine Chemicals Research Institute, Bhavnagar

Case studies of recent innovations in the area of salt & marine chemicals

1620 **S R Kotha,** Indian Institute of Technology, Mumbai

Development of new synthetic methods

1640 **Gautam Biswas,** Central Mechanical Engineering Research Institute, Durgapur

Understanding drops

1700 **Narendra Tuteja,** International Centre for Genetic Engineering & Biotechnology, New Delhi

A single subunit MCM from pea functions as DNA helicase

1800 – 1900 **Session 1D – Public Lecture**

Shyam Benegal, Mumbai

Communications and culture. Tradition, modernity and post modernity in Indian cinema

3 July 2010 (Saturday)

0900 – 0940	**Session 2A – Special Lecture**
	K N Ganesh, Indian Institute of Science Education and Research, Pune
	Bioinspired chemistry: from PNA ("Pune" Nucleic Acids) to DNA nanotechnology
0940 – 1230	**Session 2B – Lectures by Fellows/ Associates**
0940	**K S Narayan,** Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
	Noise features in the bacteriorhodopsin photocycle
1000	**S Chattopadhyay,** National Institute of Technology, Durgapur
	Z-box binding factor in light signal-controlled plant growth and development
1020 – 1050	Tea break
1050	**Apurva Sarin,** National Centre for Biological Sciences, Bangalore
	Surviving the crash: Mechanisms regulating cell number in the immune (T-cell) repertoire
1110	**R Madhubala,** Jawaharlal Nehru University, New Delhi
	Identification of potential biomarkers for antimony susceptibility / resistance in clinical isolates of L. donovani
1130	**Ashish K Lele,** National Chemical Laboratory, Pune
	Linking macromolecular dynamics to polymer processing: Some case studies
1150	**Tanusri Saha-Dasgupta,** SN Bose National Centre for Basic Sciences, Kolkata
	Understanding physics and chemistry of complex materials: From first-principles calculations to materials modeling
1210	**D Ramaiah,** National Institute for Interdisciplinary Science & Technology, Thiruvananthapuram
	Design of functional molecules for biological applications

2010 ELECTIONS

Fellows

Vidya A Arankalle
National Institute of Virology, Pune
Area: Virology, molecular biology and vaccine; hepatitis viruses; emerging-re-emerging viruses

Shally Awasthi
Chhatrapati Shahuji Maharaj Medical University, Lucknow
Area: Paediatric pulmonology; infectious and parasitic diseases; clinical trials

A K Bag
Indian Journal of History of Science, Indian National Science Academy, New Delhi
Area: History of mathematics, astronomy and technology in India

Purnima Bhargava
Centre for Cellular and Molecular Biology, Hyderabad
Area: Biochemistry and molecular biology; eukaryotic transcription; epigenetics and chromatin

S J Bhatt
Sardar Patel University, Vallabh Vidyanagar
Area: Banach and topological algebra; operator algebras and application; harmonic analysis

Gautam Biswas
Indian Institute of Technology, Kanpur
Area: Enhancement of heat transfer; computational fluid dynamics; bubble growth in film boiling; free surface flows; turbomachinery and turbulence

P K Chakraborti
Institute of Microbial Technology, Chandigarh
Area: Biochemistry and molecular biology; molecular microbiology; prokaryotic signal transduction

B B Chattoo
M.S. University of Baroda, Baroda
Area: Biotechnology, microbial and molecular genetics; genome analysis; bioprocess development

Nitin Chattopadhyay
Jadavpur University, Kolkata
Area: Photophysics and photo-chemistry; time-resolved spectroscopy; fluorosensing; photoacoustic spectroscopy

Debajyoti Choudhury
University of Delhi, Delhi
Area: High energy physics

Amitava Das
Central Salt & Marine Chemicals Research Institute, Bhavnagar
Area: Supramolecular chemistry and assembly; molecular recognition; interfacial electron transfer

S K Das
University of Hyderabad, Hyderabad
Area: Coordination chemistry; metal-oxide based cluster chemistry; inorganic supramolecular chemistry

Indranil Dasgupta
University of Delhi South Campus, New Delhi
Area: Molecular plant-virus interactions; transgenic viral resistance in plants; genome organization in plant viruses

R R Dighe
Indian Institute of Science, Bangalore
Area: Molecular endocrinology; reproductive biology; biochemistry

Aparna Dutta-Gupta
University of Hyderabad, Hyderabad
Area: Insect physiology and biochemistry; invertebrate endocrinology and physiology; comparative physiology and endocrinology

Sanjeev Galande
National Centre for Cell Science, Pune
Area: Chromatin biology; gene regulation; genomics and proteomics

A K Ganguli
Indian Institute of Technology, New Delhi
Area: Solid state and materials chemistry; nanomaterials; superconducting materials

Balaram Ghosh
Institute of Genomics & Integrative Biology, Delhi
Area: Immunology; genomics; gene regulation

Pushpito K Ghosh
Central Salt and Marine Chemicals Research Institute, Bhavnagar
Area: Redox processes; colloid and emulsion science; process research

Rama Govindarajan
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
Area: Fluid mechanics

S A Haider
Physical Research Laboratory, Ahmedabad
Area: Planetary atmospheres; ionosphere of Mars; magnetosphere of Mars

Abhaya Indrayan
University College of Medical Sciences, Delhi
Area: Biostatistics; medical statistics; medical research methodology

S K Khanduja
Punjab University, Chandigarh
Area: Algebra; valuation theory; algebraic number theory

Paramjit Khurana
University of Delhi South Campus, New Delhi
Area: Plant biotechnology; comparative plant genomics; molecular basis of plant differentiation and morphogenesis

Ravinder Kumar Kohli
Panjab University, Chandigarh
Area: Experimental ecology; weed science; plantation forestry and urban forestry

Sambasivarao Kotha
Indian Institute of Technology, Mumbai
Area: New synthetic methods; unnatural amino acids; transition metals in organic synthesis

Anurag Kumar
Indian Institute of Science, Bangalore
Area: Communication networks; stochastic modelling; analysis and optimization of distributed systems

Lalit Kumar
All India Institute of Medical Sciences, New Delhi
Area: Stem cell transplantation; multiple myeloma (haemato-oncology); gynaecologic oncology

Ashish K Lele
National Chemical Laboratory, Pune
Area: Polymer dynamics, rheology and processing; rheology of complex fluids; hydrogels and gelation processes

Kalobaran Maiti
Tata Institute of Fundamental Research, Mumbai
Area: Correlated electron systems; magnetism and superconductivity; electron spectroscopy

Birendra Nath Mallick
Jawaharlal Nehru University, New Delhi
Area: Neurobiology; physiology; sleep-wakefulness

Naba Kumar Mondal
Tata Institute of Fundamental Research, Mumbai
Area: Experimental particle physics; accelerator based and non-accelerator based particle physics and neutrino physics

J Narasimha Moorthy
Indian Institute of Technology, Kanpur
Area: Organic photochemistry; supramolecular chemistry; organic synthesis

Amitabha A Mukhopadhyay
National Institute of Immunology, New Delhi
Area: Cell biology; host-pathogen interactions; drug delivery

D S Nagaraj
The Institute of Mathematical Sciences, Chennai
Area: Mathematics; algebraic geometry; vector bundles

K S Narayan
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
Area: Organic/polymer electronics; device physics; soft matter physics

R R Navalgund
Space Applications Centre, Ahmedabad
Area: Remote sensing; space applications; magnetic resonance

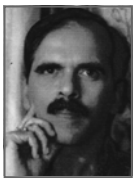
A J Pal
Indian Association for the Cultivation of Science, Kolkata
Area: Organic electronics; device physics; nanomaterials

S K Pati
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
Area: Quantum magnetism; generalized charge transfer; quantum methods development

A K Patra
National Atmospheric Research Laboratory, Gadanki
Area: Ionospheric electrodynamics and plasma instabilities; space weather, radar probing techniques

D Ramaiah
National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram
Area: Photobiology; biophysical chemistry; organic photochemistry

K Ramamritham
Indian Institute of Technology, Mumbai
Area: Databases; real-time systems; use of information and communication technologies for socio-economic development



V Ramamurti
Chennai
Area: Vibrations; stress analysis

Upadrasta Ramamurty
Indian Institute of Science, Bangalore
Area: Mechanical behaviour of materials; advanced materials; nanotechnology

G Rangarajan
Indian Institute of Science, Bangalore
Area: Nonlinear dynamics and chaos; time series analysis; brain machine interface

T S S R K Rao
Indian Statistical Institute, Bangalore
Area: Mathematics; functional analysis; geometry of Banach spaces

V Ravi
NIMHANS, Bangalore
Area: Neurovirology; viral diagnostics; molecular epidemiology of viral infections

Tanusri Saha-Dasgupta
S.N. Bose National Centre for Basic Sciences, Kolkata
Area: Condensed matter physics; computational materials science; electronic structure calculations

Mohammad Sami
Jamia Millia Islamia, New Delhi
Area: Cosmology, higher dimensional gravity; high energy physics

S S Sane
University of Mumbai, Mumbai
Area: Finite geometries; design theory; graph theory

R Sankaranarayanan
Centre for Cellular and Molecular Biology, Hyderabad
Area: Structural biology; translation of the genetic code; enzyme mechanisms

Apurva Sarin
National Centre for Biological Sciences, Bangalore
Area: Immunology; cell biology; apoptosis

S K Satheesh
Indian Institute of Science, Bangalore
Area: Aerosols; radiation; climate

S K Sharma
All India Institute of Medical Sciences, New Delhi
Area: Internal medicine; pulmonary and critical care medicine; sleep medicine

G V Shivashankar
National Centre for Biological Sciences, Bangalore
Area: Biophysics; cell biology; gene expression

Sudeshna Sinha
Indian Institute of Science Education and Research, Chandigarh
Area: Nonlinear dynamics; chaos; complex systems

R Sowdhamini
National Centre for Biological Sciences, Bangalore
Area: Structural bioinformatics; protein domain superfamilies; genome-wide survey and functional annotation of genes

K Subramanian
Inter-University Centre for Astronomy and Astrophysics, Pune
Area: Cosmic magnetic fields; structure formation; cosmology

J S Yadav
Indian Institute of Chemical Technology, Hyderabad
Area: Total synthesis of biologically active natural products; agrochemicals and pheromones; development of new methodologies for sustainable chemistry

SPECIAL ISSUES OF JOURNALS

Emerging and re-emerging infections in India

Guest Editors: C C Kartha and U C Chaturvedi

***Journal of Biosciences,* Vol. 33, No. 4, November 2008, pp. 423 – 628**

Communicable diseases account for nearly 45% of adult disease burden and deaths in Southeast Asia despite the epidemiological transition to an increasing burden of chronic non-communicable diseases and notwithstanding the developments in medical science and technology. Thus, they are of great concern.

What is more disturbing is that in recent times, the pattern and profile of infectious diseases have undergone a sea change in India and other Southeast Asian countries. Re-emerging infections contribute substantially to morbidity and mortality from infectious causes. While tuberculosis, hepatitis, malaria and HIV/AIDS continue to dominate the disease incidence rates, we in India in addition have to cope with the re-emergence of influenza, plague, malaria, dengue, leptospirosis and chikungunya. Also, we are confronted by novel viral infections such as SARS and multi drug-resistant/extensively drug resistant tuberculosis. These diseases adversely impact families, workforce productivity and economic development. They also present a formidable challenge to already resource-limited health systems, and call for an approach based on prevention and health promotion.

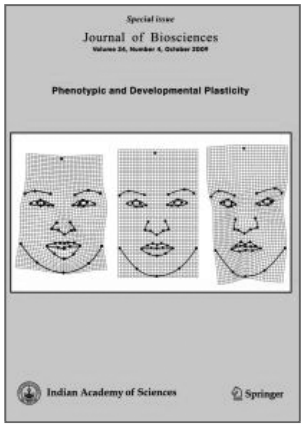
This special issue is an attempt to discuss the burden of selected communicable diseases in India and analyse the causes for the changing pattern of these infections in this country. The causes include genetic mutations in the infectious agent, ecological factors and factors that promote the transmission of infections. Other reasons may be poor surveillance, inadequate understanding of the dynamics of spread of infections, insufficient use of available tools for infection control and inappropriate policy response to epidemics.

The articles in this issue cover a wide spectrum of bacterial, viral and parasitic infections and delineate the challenges for their prevention and control. The authors are experts in their domains and share their opinions on strategies that might hold promise for prediction and control of epidemics, and deliberate on measures for appropriate health system reforms.

Phenotypic and developmental plasticity

Guest Editors: V Nanjundiah and Stuart A Newman

***Journal of Biosciences,* Vol. 34, No. 4, October 2009, pp. 493 – 646**



One of the most exciting areas of research in contemporary biology concerns the attempt to understand the basis of variation in traits exhibited by cells, groups of cells and individual organisms. Until recently, it was taken for granted that the only significant source of variation for evolution, and by implication for all of biology, was genetic variation. Because it was assumed that non-genetic variation was of no relevance for evolutionary change, this attitude persisted in spite of the long-standing evidence for the existence of variation due to environmental causes or alternative developmental pathways. It is becoming increasingly clear that such a viewpoint is no longer tenable. Indeed, what is referred to as the plasticity of the phenotype – multiplicity of biological form and function against a constant genetic background – is coming to occupy centre stage with regard to a large number of major issues in biology.

The existence of plasticity in the development and expression of phenotype has ramifications for evolutionary theory, causing a rethinking of some of the premises of the currently prevailing neo-Darwinian synthesis. Theoretical understanding of the genotype-phenotype relationship, the potential of developmental mechanisms to generate novel phenotypes, and notions of robustness and evolvability of development, increasingly invoke plasticity as a fundamental property of living systems. Although plasticity has a longer history in the behavioural sciences, it is gaining new ground in this field as well, in considerations of development and evolution of behaviour.

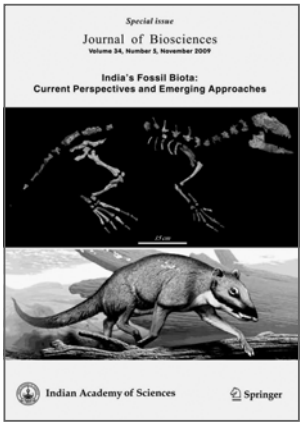
Based on both the increasing interest in plasticity and the new experimental and theoretical approaches to it, a meeting on "Phenotypic and developmental plasticity" was held at Thiruvananthapuram, in December

2007. This special issue contains articles based on most of the presentations made at the meeting as well as one on a similar theme solicited afterward.

India's fossil biota: Current perspectives and emerging approaches

Guest Editors: Sunil Bajpai and Ashok Sahni

***Journal of Biosciences,* Vol. 34, No. 5, November 2009, pp. 647 – 823**



In recent years, research in palaeontology, or the science of fossils, has seen one of the most challenging and exciting phases in its history. The spectrum of scientific issues and themes being addressed using fossils is truly remarkable, encompassing as it does such diverse perspectives as the dating and correlation of rock formations, origin, evolution and extinction of biota, palaeogeography, palaeoclimates, form and function, and many others. More recent approaches involve integration of the fossil data with molecular phylogenetics, evolutionary developmental biology (evo-devo) and biomechanics. Also remarkable is the range of temporal and spatial resolution made possible by the fossil data, with studies ranging from individual organisms to larger taxonomic assemblages; dental and bone microstructure to whole organisms; empirical to theoretical; local to global and qualitative to quantitative.

This year is celebrated as the bicentennial birth of Charles Darwin and also the birth of an idea that has changed the way we look at life, its diversity and its evolving dynamism. One of the pillars that has steadfastly supported the idea of evolution is the fossil record. It provides a dimension so crucial in documenting evolution, the dimension of time. Time does not merely afford information on when lineages diverged but also provides insight into rates of processes, gradual or by fits and starts. In addition there is a spatial dimension of how life spread across the globe and how extinctions result in biotic reorganization tuned to the new world around them.

The Indian subcontinent has a unique fossil history. This is because the Indian landmass, joined as it was to the assembly of southern continents called Gondwanaland, broke free from its moorings with Madagascar about 90 million years ago and drifted rapidly northwards as an isolated, island subcontinent. Later, around 50 million years ago (mya) it crashed into Asia and literally pushed up the great Himalayan Range. The Indian fossil record has immensely contributed to a better understanding of some of the fundamental aspects of biotic evolution that basically underscore the role of major geodynamic events in the earth's history during the course of biotic evolution. This special issue covers glimpses of the Indian fossil record from a variety of perspectives, with some of the articles emphasizing the growing integration of palaeontology with biogeography, molecular phylogenetics and biomechanics.

Theoretical chemistry and electrochemistry

Guest Editors: M V Sangaranarayanan and K L Sebastian

***Journal of Chemical Sciences,* Vol. 121, No. 5, September 2009, pp. 559 – 950**

This special issue contains papers on theoretical chemistry and electrochemistry. These papers have been contributed by friends and former collaborators of S K Rangarajan who passed away in April 2008. SKR has contributed very significantly to these areas and thereby promoted the growth of these disciplines in India. The contributions of SKR extended over a period of more than 50 years, during which he worked at the Central Electrochemical Research Institute, Karaikudi, the National Aerospace Laboratories, Bangalore, the Indian Institute of Science, Bangalore and the Institute of Mathematical Sciences, Chennai.

SKR made significant contributions to (i) theory of Faradaic rectification; (ii) effect of diffuse double layer on electrode kinetics; (iii) accelerated Tafel plots for measuring rates of corrosion; (iv) estimation of the activity coefficients for mixed electrolytes, beyond the Debye-Huckel theory and (v) novel identities for a class of special functions of mathematical physics. As a Homi Bhabha Fellow at NAL during 1970-75, Rangarajan

embarked upon developing a systems analysis approach to all classes of electrochemical experiments (transient and steady state) with diverse input functions (linear and non-linear potential perturbations of diverse genre). This formalism encompasses almost all the individual experimental behaviour arising from chronoamperometry, chronopotentiometry, cyclic voltammetry, impedance spectroscopy, etc. for various electron transfer processes, coupled with mass transfer effects. In addition, he developed a comprehensive theory of electrical double layer employing statistical mechanical models and functional analysis, which occupies a central place in interfacial electrochemistry.

The papers presented in this issue cover a broad spectrum of topics in theoretical chemistry such as electronic structure calculations, quantum dynamics, magnetic properties, solvation dynamics and molecular dynamics. In electrochemistry, a variety of topics like electrochemical nanostructures, photoelectrochemistry, electron transfer, capacitors, etc are discussed. It is hoped that this issue of Journal of Chemical Sciences will be a fitting tribute to the scientific genius of SKR.

2nd International Symposium on Materials Chemistry ISMC-2008

Guest Editors: D Das and V K Jain

***Journal of Chemical Sciences,* Vol. 122, No. 1, January 2010, pp. 5 – 89**

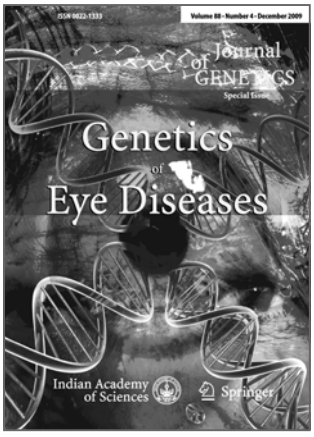
The special issue of this journal is based on the lectures delivered at the 2nd International Symposium on Materials Chemistry (ISMC-2008) held in December 2008 at Bhabha Atomic Research Centre, Mumbai.

There is an ever increasing demand for advanced materials necessitating research and development activities in materials chemistry. The ISMC-2008 covered various aspects of materials chemistry with an emphasis on areas such as nuclear materials, nano materials, functional materials, superconductivity, materials for catalysis and chemical sensors. The ISMC-2008 was regarded as highly successful by international peers and reviewers. The wide range of topics covered in this special issue reflect the trends emerging in materials chemistry.

Genetics of eye diseases

Guest Editors: Chitra Kannabiran and Kunal Ray

***Journal of Genetics,* Vol. 88, No. 4, December 2009, pp. 393 – 527**



This issue features a wide array of articles relating to genetic as well as molecular and cellular aspects of eye diseases. The eye itself is a microcosm in terms of structure, organization and function and hence, the theme of 'eye disease' is necessarily very diverse. It includes diseases that affect a wide range of tissues that together perform the function of vision – from the highly specialized, multiple types of neurons that constitute the retina which is the light sensitive layer, the pigmented cells of the choroid, the supporting vasculature, to the transparent refractive structures of lens and cornea – varied yet complementary in their roles. The field of ophthalmic genetics encompasses this diversity not only in the location and manifestation of different eye diseases but also in the spectrum of genetic causation. While the field has been predominantly concerned with rare Mendelian or single gene disorders in the past, the current decade has seen a burgeoning of the genetics of the more common complex eye diseases. This trend reflects that of human genetics as a whole. Technological advances over the late 20th century have made it feasible to dissect genetic components of varying magnitudes that make up the etiology of complex diseases. Questions relating to the role of genes in the etiology of common complex diseases are as yet largely unanswered and the current challenges facing ophthalmic genetics are in understanding of the nature of genetic variations as well as their role in causation of complex eye diseases such as adult-onset glaucoma, age-related macular degeneration and age-related cataract. On the other hand, the tools that have been established and currently available for studying Mendelian disorders have resulted in the identification of a large number of genes underlying various forms of the inherited ocular disorders such as corneal dystrophy, congenital cataract, retinal degeneration and congenital and juvenile glaucoma. The rapid growth in identification of genes in this group of eye diseases is illustrated very clearly in the case of retinal degenerations, which are a large group of very heterogeneous diseases of the retina, for which the number of mapped and/or identified genes grew from

none to almost 200 spanning most of the last three decades.

Since the goal of all gene identification endeavours is ultimately to understand the pathogenesis of the disease, a major task accompanying gene discovery is functional genomics. This involves investigation of functions and interactions of the proteins involved and the consequences of mutation at the biochemical and sub-cellular levels. This is a continuous effort as more genes are identified for ocular diseases.

In this issue, the theme of genetics of eye diseases is covered by articles that review the genetics of several disorders and also highlight areas of current interest in molecular pathogenesis and therapy in relation to eye diseases.

DISCUSSION MEETING

Indo-Swedish 3rd meeting

Orange County, Coorg

25 – 27 February 2010

Speakers:

1) Olof C Karis
2) Satyabrata Raj
3) Somnath Jana
4) Srimanta Middey
5) Milan K Sanyal
6) Krishna K Menon
7) John W Freeland
8) Ronny Knut
9) Subham Mazumder
10) Anil K Puri
11) Pralay K Santra
12) Anirban Chakraborty
13) Sumanta Mukherjee
14) Debraj Choudhury
15) Per Nordblad
16) Sugata Ray
17) Matthias Hudl
18) Biplab Sanyal
19) Abhijit Hazarika
20) D D Sarma

Titles of lectures:

(1) High kinetic energy photoemission in basic and applied research;
(2) Electronic structure of alkali doped tungsten oxides, A_xWO_3;
(3) Mn-doped ZnS nanocrystals: a unique testing ground for high temperature dilute magnetism;
(4) $Ba_3Fe_{1-x}Ru_{2+x}O_9$: A magnetic study on a series of hexagonal ruthenates;
(5) Neutron reflectivity study of a two-dimensional heterogeneous magnetic phase;
(6) Antiferromagnetism at simple oxide surfaces probed by magnetic spectro-microscopies;
(7) Manipulating orbital symmetry and covalency in ultrathin complex oxide superlattices;
(8) Variation of exchange interactions and magnetism with uniaxiality in MnAs thin films;
(9) Magnetic and transport studies on the quasi one dimensional spin-chain oxides Sr_3MPtO_6 (M=Cu, Nl);
(10) Cationic disorder and magnetic glassiness in $La_{2-x}Sr_xCuRuO_6$ (0 x 1) compounds;
(11) Unraveling the internal structure of complex nanocrystals: Spectroscopy beyond microscopy;
(12) Metal-insulator transition in sodium tungsten bronze;
(13) Drying mediated assembly of colloidal silica particles;
(14) From disappearance and appearance of ferro-electricity in some transition metal oxides;
(15) Disorder, competing interaction and glassy magnetisation behaviour;
(16) $LaSrVMoO_6$: the story of a proposed half-metallic antiferromagnet;
(17) High-pressure Raman study of $LiCu_2O_2$ multiferroic cuprate;
(18) Tuning the properties of graphene by defects;
(19) Scanning tunneling microscopy: beyond imaging;
(20) New candidates for orbital ordering -p band oxides.

RAMAN PROFESSOR

Marc Fontecave, Professeur au College de France, Chaire De Chimie Des Processus Biologiques, Membre de 1' Academie des Sciences, Cedex, the Academy's twenty-sixth Raman Professor, was in India in April 2009 for three weeks to take up the Chair. He visited IIT, Chennai and IICT, Hyderabad and delivered an Academy public lecture on **Hydrogen: Water, sun and catalysts** on 22 April 2009 in Bangalore.

He was in India for three weeks in October-November 2009 to complete his assignment. He also visited and delivered lectures at Delhi, Mumbai, Pune and attended the Academy's Platinum Jubilee Meeting in November 2009.

ACADEMY PUBLIC LECTURES

Time, Einstein and the coolest stuff in the universe

William D Phillips

National Institute of Standards and Technology, Maryland, USA

23 January 2010, Indian Institute of Science, Bangalore

At the beginning of the 20th century, Einstein changed the way we think about Nature. At the beginning of the 21st century, Einstein's thinking is shaping one of the key scientific and technological wonders of contemporary life; atomic clocks, the best timekeepers ever made. Such super-accurate clocks are essential to industry, commerce, and science; they are the heart of the global positioning system which guides cars, airplanes, and hikers to their destinations. Today, atomic clocks are still being improved, using atoms cooled to incredibly low temperatures. Atomic gases reach temperatures less than a billionth of a degree above absolute zero, without freezing. Such atoms are at the heart of primary clocks accurate to better than a second in 80 million years as well as both using and testing some of Einstein's strongest predictions.

This lecture included experimental demonstrations and down-to-earth explanations about some of today's most exciting science.

Cold atoms: Strongly correlated bosons

Gianni Blatter

ETH Zurich, Switzerland

10 February 2010, Indian Institute of Science, Bangalore

The phenomena of condensation, superfluidity, and superconductivity, as well as the more speculative supersolid state are among the most fascinating topics of cold matter physics, be it in atomic or condensed form. The speaker reviewed these phenomena and their interrelation and proceeded with a discussion of the youngest member in the family, the atomic Bose gas pushed into the strong correlation regime with the help of an optical lattice. The speaker discussed the phase diagram of the system, its excitations, and their relation to weakly interacting bosons, making use of various theoretical approaches. Emphasis was given to the relation to superfluids in condensed matter. The lecture was concluded with a short discussion of a non-equilibrium system, the strongly correlated polariton gas.

SUMMER RESEARCH FELLOWSHIPS PROGRAMME

Summer Research Fellowships Programme is run jointly by the three national Science Academies of the country (IASc, Bangalore; INSA, New Delhi; NASI, Allahabad) since 2007. From small beginnings at IASc in 1995 when only 3 fellowships were awarded, the programme

has grown both in size and stature, and includes both students and teachers.

The following figures for the years 2007, 2008 and 2009 indicate the steady growth of this programme.

	Students			Teachers		
Year	Applied	Offered	Availed	Applied	Offered	Availed
2007	3884	336	318	315	102	76
2008	5210	529	412	372	88	65
2009	7606	822	639	419	111	70

In 2010, the number of applications received was 11,082 and after a rigorous scrutiny by expert committees representing the three Academies and different disciplines, a total of 1543 candidates have been selected (185 teachers, 1358 students).

The following is a subjectwise break-up of the figures for 2010.

	Applications received		Fellowships offered	
Subject	Students	Teachers	Students	Teachers
Life Sciences + Agriculture	4059	248	442	42
Engineering	2906	103	242	23
Chemistry	1566	126	265	41
Physics	1013	122	159	60
Earth Sciences	467	11	139	7
Mathematics	418	43	111	12
Total	**10429**	**653**	**1358**	**185**

The success of this Programme is mainly due to the assistance received from scientists in various institutions across the country who have most willingly offered to guide the summer fellows. The heads of these institutions also helped by extending the necessary facilities enabling the students and teachers to carry out their project work and contributing to the growth and improvement of science education in the country.

All the day-to-day work connected with this Programme is handled at IASc, Bangalore. Also, most of the tasks connected with this Programme such as receipt of applications, correspondence with the guides and summer fellows as well as fellowships payable to students and teachers are now handled either online or through email.

In the next issue of Patrika, we hope to give some analysis of the fellowships offered in 2010.

REFRESHER COURSES

Jointly sponsored by IASc (Bangalore) INSA (New Delhi) and NASI (Allahabad)

A brief outline of the refresher course in Experimental Physics which was initiated in 2001, with the specific objective of developing simple, but effective, experiments at low cost with the aim of improving the laboratory programs in colleges and universities across India, and to impart training in doing advanced experiments in Physics. Over the years, new experiments have been added and improvements to first circuits have been made. The Refresher Course in Experimental Physics, has been well accepted in various universities across India, and many universities have introduced these experiments in their curriculum.

1. Experimental Physics – XVI

Osmania University, Hyderabad
26 June – 11 July 2009

No. of participants: 20

Course Director: R Srinivasan (Bangalore)

Course Co-ordinator: P Kistaiah (Osmania University, Hyderabad)

Resource Persons: N Satyavati, M Nagabhushanam, G Prasad, R Sayanna, M V Ramana Reddy, M Laxmipathi Rao, P Venu Gopal Reddy and K Narasimha Reddy (Osmania University, Hyderabad)

Seventeen lectures on how to perform experiments, the theory behind the experiment, the calculations and final conclusions and 3 special lectures were given. Feedback was collected from all participants at the end of the course.

2. Experimental Physics – XVII

Carmel College for Women, Nuvem, Goa
26 October – 9 November 2009

No. of participants: 31

Course Director: R Srinivasan (Bangalore)

Course Co-ordinator: Efrem D'Sa (Carmel College, Nuvem, Goa)

Resource Persons: K R S Priolkar, S M Sadique, Manohar Naik, Efrem D'Sa (Carmel College, Nuvem, Goa)

In this refresher course, two new experiments were introduced for the first time, namely Young's modulus by vibrating cantilever and B-H curve which were performed in a totally simple and easy method. The participants performed a total of 16 experiments along with necessary calculations. Four special lectures were delivered. An evening talk on "Rivers Mandovi and Zuari" was also delivered by Satish Shetye (NIO, Goa).

An experimental kit on behalf of the three academies was presented to the Principal of the host College.

3. Experimental Physics – XVIII

University of Calicut, Calicut
23 November – 8 December 2009

No. of participants: 29

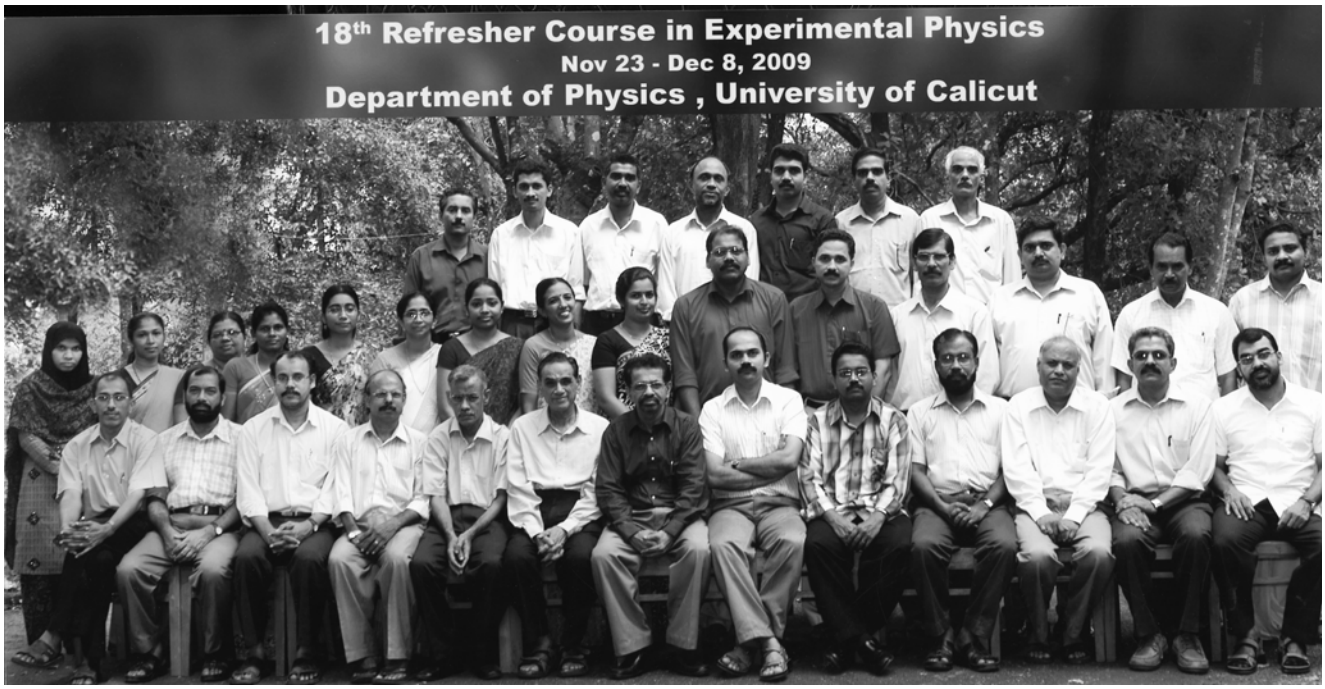
Course Director: R Srinivasan (Bangalore)

Course Co-ordinator: Antony Joseph (University of Calicut, Calicut)

Resource Persons: Antony Joseph, P P Pradyumnan, M M Musthafa, C D Ravikumar (University of Calicut, Calicut)

In his key note address, Prof. Srinivasan explained the purpose and plan of the course.

Seventeen laboratory sessions were conducted during which the participants carried out 15 experiments. There were 3 discussion sessions in which R Srinivasan answered the questions from the participants and explained the salient aspects to be taken care of in designing some of the experiments. In addition to this, three special lectures were delivered by the faculty of the department.



4. Theoretical Physics

Bishop Moore College, Mavelikara
7 – 19 December 2009

No. of participants: 49

Course Director: M Lakshmanan (Bharathidasan University, Tiruchirapalli)

Course Co-ordinator: Thomas Kuruvilla (Bishop Moore College, Mavelikara)

Resource Persons: S Chaturvedi (University of Hyderabad, Hyderabad), A V Gopala Rao, K S Mallesh (University of Mysore, Mysore), R Jaganathan, R Simon (Institute of Mathematical Sciences, Chennai), N Mukunda (Indian Institute of Science, Bangalore), M Lakshmanan (Bharathidasan University, Thiruchirappalli).

During the course M Lakshmanan gave an overview of classical mechanics and its various formulations. He explained the effect of nonlinearities on dynamical systems and explained how to study the nonlinear problems. The models like logistic map and nonlinear oscillators were discussed in depth and he explained the sensitive dependence on initial conditions. He also explained how the linear systems can give rise to solitary waves and solitons and discussed the basic theory of solitons.

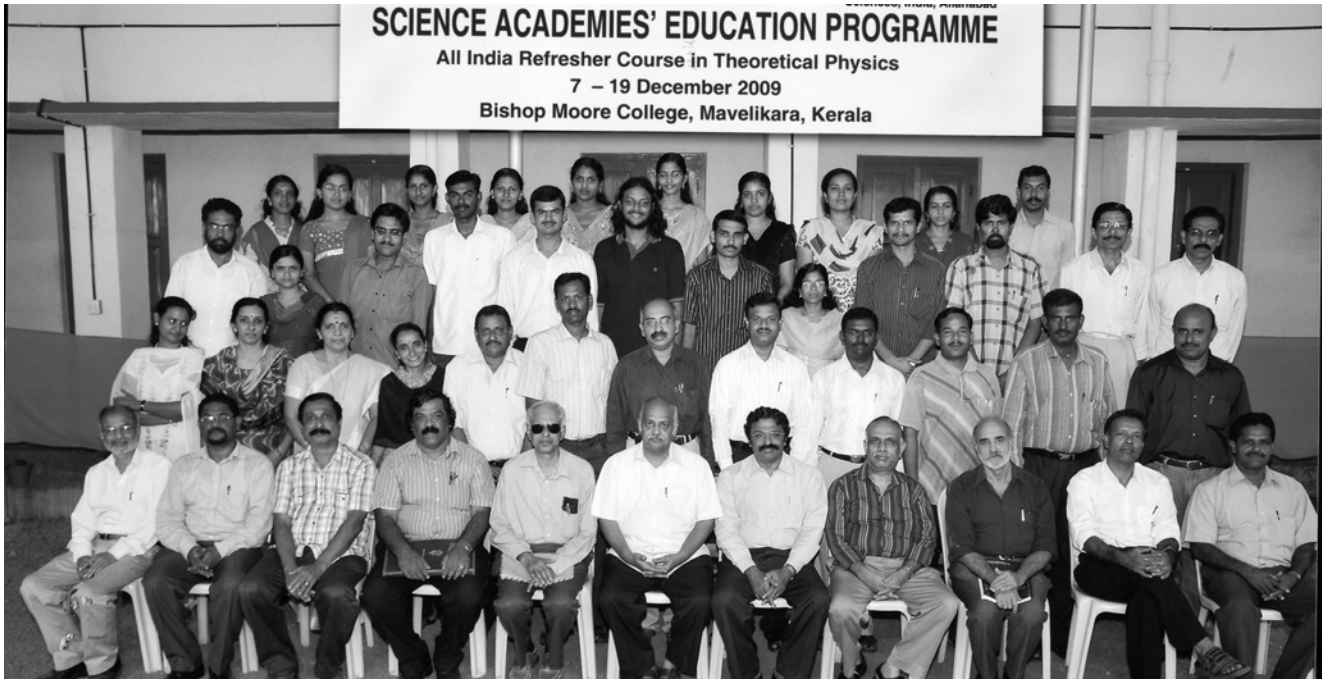
P M Mathews gave a series of lectures on how classical mechanics, especially rotation dynamics, can be applied to the earth dynamics and how various geographical phenomena and observational data can be explained systematically through careful theoretical analysis.

R Jaganathan discussed how linear partial differential equations can be variable separated and solved. The situations under which ordinary differential equations can be obtained were also discussed. He also explained how homogenous differential equations with non-homogenous boundary conditions can be transformed to nonhomogenous differential equations with homogenous boundary conditions. The solution of nonhomogenous differential equations using Green's function was also explained with examples.

Simon discussed quantum entanglement in two level systems, building the logic of analysis from fundamental postulates of quantum mechanics. He explained how teleportation is not violating the uncertainty principle. He also discussed the polarization optics taking two orthogonally polarized states as qubits and its significance to quantum computation.

A V Gopala Rao of Mysore University lectured on relativistic electrodynamics. He gave a series of lectures on the Minkowski space and relativistic particle mechanics. He clearly explained the basic features of relativity theory and its various consequences. He also concluded the tutorial sessions.

S Chaturvedi gave a series of 8 lectures on statistical mechanics and thermodynamics. In addition he conducted tutorial sessions also. Chaturvedi explained very lucidly the basic principles underlying the development of statistical mechanics, the methodologies involved and the consequences thereof. He cleared many of the doubts on the fundamentals for both the teachers and students.



N Mukunda delivered several illuminating lectures on vector spaces, tensors and group theory. He explained lucidly the various symmetry groups and their significance with the teachers.

K S Mallesh gave an elaborate account of quantum mechanical perturbation theory, with particular reference to time dependent systems.

Books on Mathematical methods by Arfken and quantum computation by Nielsen, were distributed to all the participants. One of the following sets of books were distributed to the MSc student participants viz. Feynman Lecture Series; University Physics by Zemansky Sears; Vignettes in Physics series by G Venkataraman.

5. Experimental physics – XIX

Karnatak University, Dharwad
4 – 20 January 2010

Course Director: R. Srinivasan

Course Co-ordinator: N Sankeswar
(Karnatak University, Dharwad)

6. Biotechnology and modern molecular biology techniques

Manipal Life Sciences Centre, Manipal University, Manipal

11 – 23 January 2010

No. of participants: 21

Course Director: V. Nagaraja (IISc, Bangalore)

Course Co-ordinator: K. Sathyamoorthy, Manipal Life Sciences Centre, Manipal University, Manipal

Resource Persons: P N Rangarajan, V Nagaraja, K P Gopinathan, P Kondaiah, Kumaravel Soma-sundaram (IISc, Bangalore), U V Shenoy, Girish Katta, M R Kumar (Kasturba Medical College, Manipal), Indrani Karunasagar (College of Fisheries, Mangalore), Ullas Kamath (Melaka Manipal Medical College, Manipal), Kemparaj, K Satyamoorthy, P M Gopinath, A Muthusamy, T S Murali, Reena Reshma D'Souza, B S Satish Rao, Shyamaprasad Sajankila, Kamlesh Mumbrekar, K P Guruprasad, Bharath Prasad, M Rajashekar, Premalatha Shetty, Herman D'Souza, Padmalatha S Rai, T G Vasudevan, Roopa Nayak, K S Babitha, K K Mahato, Vidhu Sankar Babu, Saadi Abdul Vahab, K Shama Prasada, Prashantha Hebbar, K Manoj Bhat (Manipal Life Sciences Centre, Manipal), Vishal G Warke (Mumbai).

The main aim of the course was to provide the participants the opportunity to sharpen their skills and

improve their basic knowledge and teaching skills. It was planned with the purpose of exposing them to the modern techniques of biotechnology and molecular biology. After a brief introduction to molecular biology and biotechnology, the following lectures were delivered: 'Why study restriction enzymes'; 'Meta-genomics: a fascinating area of microbiology'; 'Genomics and ethics of human cloning'; 'Gene expression analysis'. 'the applications of laser biology and medicine'; 'Genetics and human diseases' and 'Introduction to stem cell and applications'; and various aspects of PCR techniques were explained.

Demonstrations and hands-on experiments were also conducted for the participants during this course. They include genomic DNA; bacterial culture and plasmid isolation; chemical transformation and electroporation experiments; micronucleus assay; chromosomal aberration assay; comet assay; H2AX assay; flow cytometry; cell-cycle analysis and immune-phenotyping experiments; dye exclusion assay; MTT assay; clonogenic assay or colony formation assay; LDH leakage assay; cell culture techniques; karyotype preparation from peripheral blood; isolation and estimation of proteins; plant tissue culture.

LECTURE WORKSHOPS

Jointly sponsored by IASc (Bangalore), INSA (New Delhi) and NASI (Allahabad)

1. Recent trends in mathematics and its applications

Bishop Cotton Women's Christian College, Bangalore
9 October 2009

Convener: Mythily Ramaswamy, TIFR-CAM, Bangalore

Co-ordinator: G. Muniraj, Bishop Cotton Women's Christian College, Bangalore

Speakers: Mythily Ramaswamy, C S Aravinda, Amit Apte (TIFR-CAM, Bangalore), M V Deshpande (JNCASR, Bangalore).

Participants: 150.

Topics covered: Story of optimization; nonlinear differential equation; applications of differential equations; milestones in the evolution of geometry from Euclid to Perelman.

2. Biotechnology in modern medicine

PES College, Bangalore
23 – 24 October 2009

Convener: V. Nagaraja, Indian Institute of Science, Bangalore

Co-ordinator: S L Shantha, PES College, Bangalore

Speakers: G. Padmanaban, Saumitra Das, Arun Kumar, P N Rangarajan, V Ravi, P Kondaiah, Annapoorni Rangarajan, Dipshika Chakravorty, Parag Sadhale, V. Nagaraja (IISc, Bangalore)

Participants: 250

Topics covered: Molecular medicine; viral therapeutics; analysis of human genetic disorders; traditional, modern and futuristic vaccines; viral diagnostics and swine flu; biomarkers in diagnosis and prognosis of cancer; stem cells and cancer; strategies to counter bacterial infections; diagnosis and control of fungal infections; strategies to counter resurgent TB.

3. Nano-materials and technology in chemistry and green chemistry

Sikkim Manipal Institute of Technology, Sikkim
23 – 25 October 2009

Convener: Mihir K Chaudhuri, Tezpur University, Sikkim.

Co-ordinator: Amlan Kumar Das, Sikkim Manipal Institute of Technology, Sikkim.

Speakers: Mihir Kanti Chaudhuri, Pritam Deb (Tezpur University, Sikkim), Sanjay Bhar (Jadavpur University, Kolkata), B C Ranu, S Ghosh (IACS, Kolkata), Ajay Jha, Sushobhan Choudhury, Sanjay Dahal, Sangeeta Jha (SMIT, Sikkim), Panchanan Pramanik (IIT, Kharagpur), Arun Chattopadhyay, B K Patel (IIT, Guwahati), R K Sharma (Delhi University).

Participants: 89.

Topics covered: Imperatives of green chemistry – practices in teaching, research and industries; organic reactions in the perspective of green chemistry; green chemistry in research and teaching; high performance polymeric nano composite and nano adhesive and its performance under space environments; palladium and copper nanoparticles as efficient, green and selective catalysts for organic reactions; nano-particles and their pharmaceutical applications; cooking nanomaterials for tomorrow; soft chemistry for nanomaterials; multifaceted opportunities in nanoscale science and technology; green chemistry with iodine, Cu and OATB; application of functionalized magnetic and optical nano-particle for diagnostics and separation methodologies; carbohydrates as renewable feedstocks; investigation on mechanical and electrical properties of carbon nanotube and other nanostructured materials; green

chemistry education; metal organic frameworks; green chemistry experiments; nanomaterials-current and future technological applications.

4. Capacity building for canopy science research in India

Ashoka Trust for Research in Ecology and the Environment, Bangalore
31 October – 2 November 2009

Convener: K N Ganeshaiah, UAS, Bangalore.

Co-ordinator: M Soubadra Devy, ATREE, Bangalore.

Speakers: Jan Wolf (Holland), Roger Kitching (Australia), Margaret Lowman (USA), Jagdish Krishnaswamy (ATREE, Bangalore), Nathan Philips (Boston University), Tim Kovar (North-West Tree Climbing).

Topics covered: Canopy science; epiphytes in the canopy; canopy arthropods; research design in canopy; eco-physiology studies; methods of safe access and working in the canopy.

5. The idea of evolution

Indian Institute of Science, Bangalore
24 November 2009

Convener: V Nanjundiah, IISc, Bangalore.

Co-ordinators: Najla Arshad, Subash Chandra Verma (IISc, Bangalore).

Speakers: V Nanjundiah, Rohini Balakrishnan, Renee Borges (IISc, Bangalore), Ashok Sahni (Punjab University, Chandigarh), K N Ganeshaiah (UAS, Bangalore), S G Kulkarni (University of Hyderabad, Hyderabad).

Participants: 180.

Topics covered: Where are we today?; planet earth: an oasis in space; behaviour in plants: what would be Darwin's response?; Darwin, mind and emotion; the descent of man; the texture of Darwinian theory.

6. Planet G

Jai Hind College, Mumbai
24 – 25 November 2009

Convener: Tarala D Nandedkar

Co-ordinator: Yasmina Dordi Avari

Speakers: L S Shashidhara (IISER, Pune), Roshan Colah (NIIH, Mumbai), P S Amare (TMH, Mumbai), Shubha Tole (TIFR, Mumbai), Nishigandha Naik (Mumbai), Deepak Modi (NIRRH, Mumbai).

Participants: 325.

Topics covered: Transgenic approaches to understanding brain development; antisense therapy – mission possible or impossible?; RNAi and its applications; recent advances in cytogenetics; genomic and proteomic approaches to understanding organ development in Drosophila; thalassaemia: a genetic disorder.

7. Contemporary issues in biology

University of Mysore, Mysore
3 – 4 December 2009

Convener: H A Ranganath, NAAC, Bangalore and J Nagaraju, CDFD, Hyderabad

Co-ordinators: S R Ramesh and N B Ramachandra, University of Mysore, Mysore

Speakers: Daniel L Hartl (Harvard University, USA), J Nagaraju (CDFD, Hyderabad), Umesh Varshney, Usha VijayRaghavan, P N Rangarajan (IISc, Bangalore), R S Gupta (McMaster University, Canada), Mewa

Singh (University of Mysore), T Kundu (JNCASR, Bangalore).

Participants: 450.

Topics covered: Microorganisms, genomes and the history of food; sex matters; mechanism of protein synthesis in Eubacteria; genome sequences and the outlines of bacterial evolution; regulation of gene expression in humans: implications in disease and therapeutics; the making of a flowering stem: lessons from molecular genetic analysis of flowering in model plants; development of recombinant vaccines for hepatitis B and rabies – the IISc experience; discerning ecological principles from species diversity and spatiotemporal distribution.

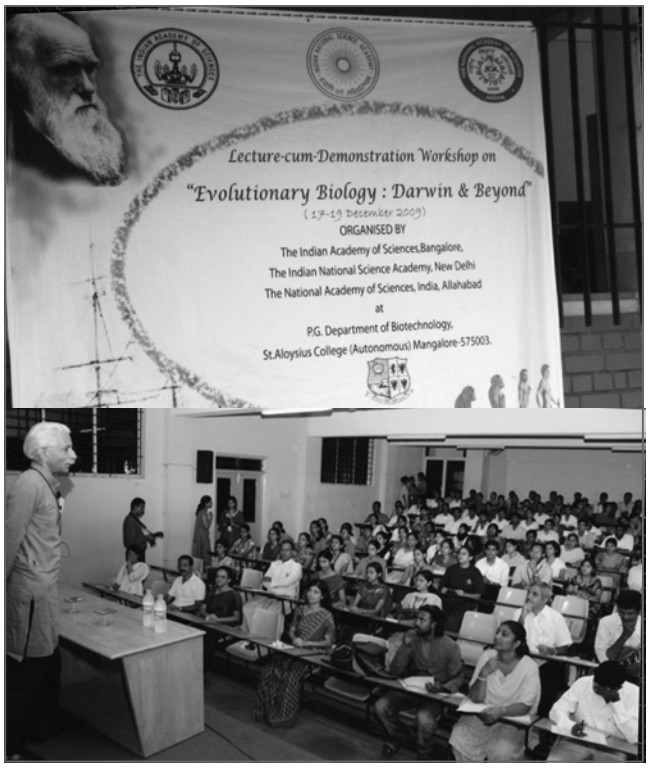
8. Evolutionary biology: Darwin and beyond

St. Aloysius College, Mangalore
17 – 20 December 2009

Convener: V Nanjundiah, IISc, Bangalore.

Co-ordinator: Monika Sadananda, St. Aloysius College, Mangalore.

Speakers: V Nanjundiah, S Mahadevan, Ratna Ghosal, Mahua Ghara, Santhosh Sathe, Subhash Verma, Jahnavi Joshi (IISc, Bangalore).



Participants: 123.

Topics covered: How we understand evolution; the origin of variations; spontaneous mutations and natural selection; development and social behaviour in cellular slime moulds; mutalism; proximate vs ultimate principles underlying animal behaviour; phylogeny and character evolution; molecular biology and evolution.

9. Recent advances in spectroscopy: theory, instrumentation and applications

Lady Doak College, Madurai
18 – 19 January 2010

Convener: E Arunan (IISc, Bangalore).

Co-ordinator: Geetha Sivasubramanian (Lady Doak College, Madurai).

Speakers: K L Sebastian, E Arunan, S Umapathy (IISc, Bangalore), Mangalasunder K (IIT, Chennai), Anunay Samanta (University of Hyderabad, Hyderabad), Wategaonkar (TIFR, Mumbai).

Participants: 127.

Topics covered: Quantum states; why molecules absorb/emit radiation; study of short-lived species: electronically excited molecules and photochemical transient fundamentals; spectroscopy of molecules and clusters: neutrals; femtosecond spectroscopy; spectroscopy of molecules and clusters: ions; rotational vibrational interactions; wave packet formalism in spectroscopy; molecular beam microwave spectroscopy.

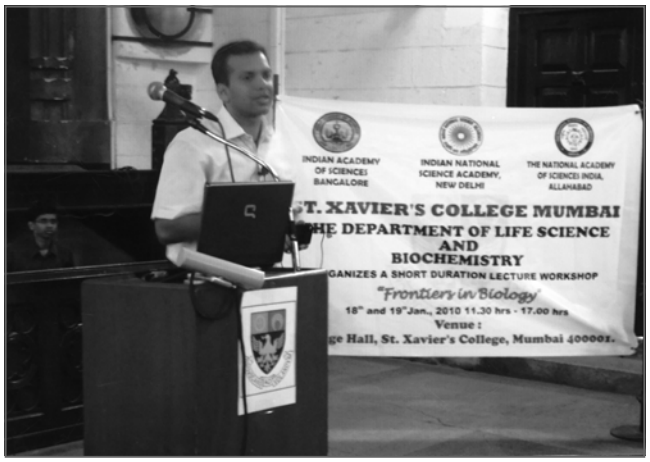
10. Frontiers in biology

St Xavier's College, Mumbai
18 – 19 January 2010

Convener: Shobhona Sharma, TIFR, Mumbai.

Co-ordinator: Sheela Donde, St Xavier's College, Mumbai.

Speakers: Shubha Tole (TIFR, Mumbai), Swati Patankar (IIT, Mumbai), Chaitanya Purandare (Pune), L S Shashidhara (IISER, Pune), Narendra Jawali (BARC, Mumbai), Rita Mulherkar (ACTREC, Mumbai), Vidita Vaidya (TIFR, Mumbai).



Participants: 208.

Topics covered: The blueprint for building the brain; molecular markers and their applications in plant biology; regulation of gene expression in P. falciparum; gene therapy: an emerging modality for treatment of cancer; stem cell therapy; the emotional brain: imprints of life history; behavioural adaptation and evolution.

11. Structure, function and design of biomolecules

Bharathiar University, Coimbatore
28 – 29 January 2010

Convener: D N Rao, IISc, Bangalore.

Co-ordinator: N Sundara Baalaji, Bharathiar University, Coimbatore.

Speakers: D N Rao, M R N Murthy (IISc, Bangalore), Jayant B Udgaonkar, M K Mathew (NCBS, Bangalore), S Krishnaswamy (MKU, Madurai), P Gautam (Anna University, Chennai), A Arockiasamy (ICGEB, New Delhi), Amitabha Chattopadhyay (CCMB, Hyderabad).

Participants: 260.

Topics covered: Restriction enzymes as model systems to study protein-DNA interactions; how do proteins unfold; form and function in a membrane protein: voltage-driven transitions in a potassium channel; structure and assembly of sebania mosaic virus; structural studies on enterobacterial membrane proteins; molecular dynamics simulation of lipases; crystal structure of a plasmid fertility inhibition factor and its implications in horizontal gene transfer in bacteria; the world of membrane proteins.

12. Projections 2010: A workshop in mathematics

St. Joseph's College, Bangalore
5 – 6 February 2010

Convener: Mythily Ramaswamy, TIFR-CAM, Bangalore

Co-ordinator: Renee D'Souza, St. Joseph's College, Bangalore

Speakers: Seema Nanda, Mythily Ramaswamy, C S Aravinda (TIFR-CAM, Bangalore), Siva Athreya (ISI, Bangalore), Sujatha Ramdorai (TIFR, Mumbai).

Participants: 94.

Topics covered: Mathematical biology; random walks; topology; groups and equations; geometry.

13. Animal biology and biotechnology

S N Vanita Maha Vidyalaya, Hyderabad
8 – 9 February 2010

Convener: A S Raghavendra, Aparna Dutta Gupta, University of Hyderabad, Hyderabad.

Co-ordinator: G Y Bhargavi, S N Vanita Maha Vidyalaya, Hyderabad.

Speakers: D Balasubramanian (LVPEI, Hyderabad), P Prakash Babu, Aparna Dutta Gupta (University of Hyderabad), Mahtab S Bamji (Hyderabad); P Judson, Shobanaditya (Osmania University, Hyderabad).

Participants: 371.

Topics covered: History of genetics – past and present; Nobel Prizes-2009 diet, nutrition and health – challenges

and opportunities; changing world of poisons; recent advances in stem cell research; molecular targets for eco-friendly insect pest management.

14. Modern trends in chemistry

St. Joseph's College, Irinjalakuda
24 – 25 February 2010

Convener: K George Thomas, NIIST, Thiruvananthapuram.

Co-ordinator: Rosabella K Puthur, St. Joseph's College, Irinjalakuda.

Speakers: Suresh Das, D Ramaiah (NIIST, Thiruvananthapuram), Kana M. Sureshan (IISER, Thiruvananthapuram), K L Sebastian, A G Samuelson (IISc, Bangalore).

Participants: 138.

Topics covered: Photoresponsive materials; design of functional systems for biomolecular recognitions; reaction mechanisms in organometallic chemistry; dynamical processes in chemical biology: is the boundary between chemistry and biology fading?

15. Frontiers in bioinorganic chemistry

Bharathidasan University, Tiruchirappalli
25 – 27 February 2010

Convener: M Palaniandavar, Bharathidasan University, Tiruchirappalli.

Co-ordinator: C Sivasankar, Bharathidasan University, Tiruchirappalli.

Speakers: M Palaniandavar (Bharathidasan University, Tiruchirappalli); T K Chandrashekar (NISER, Bubaneswar); S Sarkar, R N Mukherjee (IIT, Kanpur); C P Rao (IIT, Mumbai); S Mazumdar (TIFR, Mumbai); B U Nair, V Subramanian (CLRI, Chennai); A Raja (Leiden University, The Netherlands).

Participants: 175.

Topics covered: Evolutionary bioinorganic chemistry; bioinorganic chemistry: an introduction; metallo-proteases; metal-coordinated radicals; photodynamic therapy; modelling phosphate ester hydrolysis; molecular modelling of bioinorganic system; nickel containing enzymes and conjugates of carbohydrates and calyx [4] arene.

16. Diffraction and scattering

University of Mysore, Mysore
26 – 28 February 2010

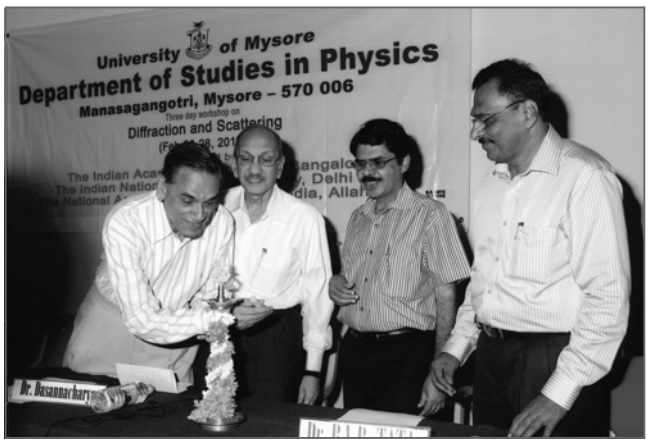
Convener: R Srinivasan (Bangalore)

Co-ordinator: L Paramesh, University of Mysore, Mysore

Speakers: B A Dasannacharya (Mumbai), B V R Tata (IGCAR, Kalpakkam), M R N Murthy (IISc, Bangalore)

Participants: 100.

Topics covered: Neutron diffraction and their applications from materials; light scattering from



materials; X-ray diffraction and crystal structure protein crystallography.

17. Research paradigms in communication and data engineering

Dr G R Damodaran College of Science, Coimbatore
18 – 19 March 2010

Convener: Ashok Jhunjhunwala, IIT, Madras.

Co-ordinator: K Vanitha Sidambaranathan, Coimbatore.

Speakers: M V Pitke (Mumbai), T Devi (Bharathiar University, Coimbatore), V S Patwardhan (Opsim Software, Pune), V Saravanan (Dr NGP Institute of Technology, Coimbatore), K Giridhar (IIT, Madras), D S Nagaraj (IMSc, Chennai), T Senthilkumar (Amrita School of Engineering, Coimbatore), V Thavavel (Karunya University, Coimbatore)

Participants: 100.

Topics covered: Next generation network research issues; research issues in data engineering; design and development of process simulators; inclusive computing using data mining; wireless broadband networks; computational modeling; NS2-principles and hands on training; data mining using matlab & polyanalyst and hands-on training.

18. Aspects of theoretical chemistry and spectroscopy

Sree Neelakanta Govt. Sanskrit College, Pattambi
25 – 26 March 2010

Convener: K L Sebastian, IISc, Bangalore.

Co-ordinator: M R Resmi, SNGS College, Pattambi.

Speakers: E Arunan, K L Sebastian (IISc, Bangalore), K Mangala Sunder (IIT, Madras), Ayan Datta (IISER, Thiruvananthapuram)

Participants: 134.

Topics covered: Basic principles of spectroscopy – I & II; theoretical aspects of spectroscopy – I & II; the strange and beautiful world of quantum mechanics; tunneling in organic and organometallic reactions; molecular motors; understanding structures of cavities at the nanoscale.

19. Contemporary issues in chemistry

Visveswarapura College of Science, Bangalore
26 – 27 March 2010

Convener: H A Ranganath, NAAC, Bangalore

Co-ordinator: K G Srinivasamurthy, Visveswarapura College of Science, Bangalore

Speakers: G Padmanaban, E N Prabhakaran, K J Rao, S Chandrasekaran (IISc, Bangalore), Hema Balaram, Subi Jacob George, Tapas K Kundu, M Eswaramurthy (JNCASR, Bangalore).

Participants: 211.

Topics covered: Chemistry-biology interface; peptides and small molecules in nano-technological applications; protein engineering; one dimensional nano tubes and their applications; green chemistry Copenhagen meet on climatic changes; supra molecular synthesis; chemical biology and nano technology approach to understand human gene expression – implications in disease and therapeutics; green chemistry in catalysis.

PLATINUM JUBILEE PROGRAMMES

Platinum Jubilee special publication

To mark the historic Platinum Jubilee year 2009, the Academy invited several of its distinguished Fellows from different areas of specialization to put together expert reviews on chosen themes, giving a snapshot of the state of science. The 42 articles in this special issue titled **"Current Trends in Science"** cover seven major areas, all of them written and edited with care. (The 5 contributions in Physics have additionally appeared in a special issue of Pramana, so as to increase their visibility).

Platinum Jubilee Lectures

1. WALTER KOHN (Department of Physics, University of California, Santa Barbara, USA).

'A world predominantly powered by solar and wind energy'.

23 October 2009, Indian Institute of Science, Bangalore.

Summary: It is widely recognized that the fossil fuels, oil and natural gas, which currently provide almost 60% of the world's energy consumption, will be largely exhausted in a few decades. At the same time, world population will have increased by an estimated 30 to 40

per cent by mid-century. To avoid a catastrophic energy shortage by mid-century, these fuels must be replaced by ecologically acceptable and sustainable alternatives. Solar and wind power appear to be the most promising candidates. Although, at the present time they constitute only ~ 2 per cent of the global energy consumption, their production has recently been rising by a spectacular 30 to 40% per year, or a factor of 15 per decade and 225 in 20 years. This arithmetic suggests that the entire deficit stemming from the impending exhaustion of oil and gas might be compensated in about 10 to 20 years by continuing aggressive commitment to solar and wind energy. The lecture examined this speculation. It provides useful guidelines for the second half of the century and beyond. At the same time, there is a very serious energy deficit during the one to two decades of transition from the present (oil-gas)-era to the (sol-wind)-era, which will require additional measures.

2. MADHAV GADGIL (Agharkar Research Institute, Pune).

'Major transitions in evolution'.

29 October 2009, UGC Academic Staff College, Mizoram University, Aizawl.

4 November 2009, West Bengal State University, Barasat.

Summary: For the last 3.8 billion years, life has flourished on planet earth, expanding and diversifying. It has led to the evolution of ever more complex organisms, and animal societies, along with evolution of new forms of replicating entities, memes and artefacts. Its culmination in the present day information and communication technology, has brought us to the threshold of another major transition, that to human societies with global access to entire stock of human knowledge.

3. JÉRÔME LAVE (Centre de Recherches Pétrographiques et Géochimiques, Nancy, France).

'Mountain building: life and death of mountain range'.

5 November 2009, Indian Institute of Science, Bangalore.

Summary: How do mountain ranges grow and decay? How long do their topographies last? What sets the elevation of the high peaks of the Himalayas and of the other mountains on Earth? How do large orogenic plateaus like the Tibetan plateau form, and why some

other ranges are much narrower? If the emergence of the plate tectonics theory in the 60s has permitted explanation of the primary engine or internal forces that contribute to building topographies, the progressive recognition in the 90s of the role of erosion in the evolution of the mountain ranges has revolutionized the tectonics and geomorphology fields. The erosion not only creates relief with deep valleys and sharp peaks, it also contributes during the active phase of mountain building to stabilize the topography toward a dynamic equilibrium through several negative feedback loops or coupling between internal and external processes. This coupling arises because erosion depends on topography while denudation influences tectonic processes by modifying the Earth's surface through mass redistribution i.e., by changing the stress state in the orogenic wedge, which in turn induces an internal (or tectonic) response to try to restore the initial wedge geometry. The evolution of a mountain range, its mean and maximum elevation, as well as its width or its eventual shape asymmetry, are all dictated by this subtle balance or imbalance between mass addition from tectonic processes and mass removal from erosion. As a consequence, the characteristics of any mountain range not only reflect the tectonic convergence rates across the collision zone and the thermal state of the deforming crust, but also the climate intensity, the precipitation distribution, the type of rock exposed at the surface. For twenty years, major advances in characterising the physics of erosion processes, in measuring denudation rates and in numerical modelling have brought new quantitative understanding on how mountain ranges evolve modulated by the feedbacks between tectonics, climate and erosion. These most recent views, putting a particular emphasis on the Himalaya-Tibet collision zone, were presented.

4. RÜDIGER WEHNER (University of Zurich, Switzerland).

'Desert ant navigation: mini brains – mega tasks – smart solutions'.

10 November 2009, Indian Institute of Science, Bangalore.

Summary: How does a 0.1 mg brain housed in a 10 mg insect solve complex computational tasks, which we humans would be able to accomplish only with GPS devices? In trying to answer this question the talk focussed on the extraordinary navigational skills of visually guided desert ants, Cataglyphis. What does the compass and the odometer that the ant employs look like? Is the spatial information provided by the ant's path integrator and landmark guidance routine integrated into a cognitive map? A multi-disciplinary approach combining behavioural and neurophysiological studies with computer simulations and robotics implementations is used to tackle such questions. The result is that Cataglyphis uses a number of dedicated neural systems that deal with particular aspects of the animal's overall navigational task. One of these navigational toolkits is the path integrator by which the ant is continually informed about its current position relative to the starting point of its journey. In addition to path integration, Cataglyphis employs various mechanisms of landmark guidance

such as snapshot matching and visual route following. Finally, however, these various kinds of information acquired by the path-integration and landmark–memory routines are not knitted together in a static metric map, but are flexibly used in context-dependent ways. To employ procedural rather than positional knowledge of its environment – to know what to do when encountering a given signpost rather than where this signpost is within a survey map – is the insect's way of getting around in its visual world.

5. DANIEL L HARTL (Higgins Professor of Biology, Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, USA)

(a) 'Microorganisms, genomes, and the history of food'.

3 December 2009, Rani Bahadur Auditorium, University of Mysore, Manasagangotri, Mysore.

Summary: An overview of major innovations in the history of food, including cooking, social rituals, domestication, selective breeding, trading, global exchange, agribusiness, and genetic modification was presented. Microorganisms have long been essential in the production of and preservation of foods, and the focus is on the special role of budding yeast Saccharomyces cerevisiae in producing ethyl alcohol, whose mind-altering, analgesic, disinfectant, and preservative properties made it the most widespread drug and medicine of antiquity.

(b) 'Natural history of the malaria parasite and its genome'.

7 December 2009, DST Auditorium, University of Hyderabad, Hyderabad.

Summary: Malaria is endemic in tropical regions of many countries with a population at risk of 3.3 billion. A history of the disease from its origin in primate ancestors through its earliest recorded presence in humans to the present was presented. High levels of genetic variation allow the malaria parasite to overcome drugs and escape vaccines. Results with next-generation DNA sequencing and genotyping technologies demonstrate the potential to discover drug resistance before it spreads.

6. H EUGENE STANLEY (Departments of Physics and Chemistry, Boston University, Boston, USA).

(a) 'Liquid water, the most complex liquid'.

17 December 2009, Tata Institute of Fundamental Research, Mumbai.

Summary: The strange properties of water, the most complex liquid were discussed. Recent progress in understanding some of its anomalous properties has been achieved by combining information from recent experiments and simulations on water in bulk, nanoconfined, and biological environments. The unusual behaviour of water in biological environments, and whether liquid water can exist in two different phases; and the useful analogies between water and other liquids, such as silicon, silica, and carbon, as well as metallic glasses were also discussed.

(b) 'Economic fluctuations and statistical physics: quantifying extremely rare and much less rare events'.

18 December 2009, Indian Institute of Science, Bangalore.

Summary: Recent analysis of truly huge quantities of empirical data suggests that classic economic theories fail not only for a few outliers, but that there occur similar outliers of every possible size. If one analyzes a small data set, then outliers appear to occur as rare events. However, when we analyze orders of magnitude more data, we find orders of magnitude more outliers – so ignoring them is not a responsible option. We find that the statistical properties of these outliers are identical to the statistical properties of everyday fluctuations, suggesting the existence of a single underlying mechanism for fluctuations of any size.

ACADEMY – SPRINGER CO-PUBLICATION AGREEMENT

The agreement with Springer for co-publication of the 10 journals of the Academy came to an end in December 2009. A fresh agreement for the 5-year period 2010 – 2014, basically along the same lines as the earlier one, was signed by the Academy and Springer in July 2009. The new draft agreement prepared with legal assistance ensures as before, the interests of the Academy such as ownership, copyright, editorial operations, acceptance and rejection of papers, printing hard copies for domestic circulation, etc. The reach and visibility of each journal and the number of downloads from each journal have improved significantly during the period 2007 – 09. We hope these trends will continue. Fellows and other scientists should consider contributing a significant share of their research papers to the Academy journals since their visibility worldwide has much improved.

BUILDING – ACADEMY GUEST HOUSE AT JALAHALLI

The Academy has been facing difficulties in accommodating teachers and students selected for Summer Research Fellowships assigned in Bangalore, for some years now. The 3-floor guest house facility, situated in Jalahalli about 8 kms from the Academy office, is far from adequate to meet the requirements, especially since the numbers selected have been growing year after year. An additional floor comprising 12 rooms constructed recently along with some changes made in some rooms on the ground floor will ease the situation to some extent as it can accommodate an additional 40 or so persons.

Keeping the future requirements in view, the Academy has acquired a plot of land measuring about 10,000 sq.ft. adjacent to the existing guest house building.

The assistance rendered by the Director and Staff of Raman Research Institute in preparing the plan and construction of additional floors and in acquiring the land is acknowledged with gratitude.

OBITUARIES

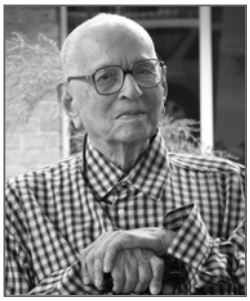
Dhanonjoy Nasipuri (1925-2009) an outstanding researcher and an inspiring teacher, was born on 01 April, 1925 into a family of very modest means in the district of Birbhum, West Bengal. His inherent academic brightness was apparent from very early years. He was a rank-holder in Matriculation and I.Sc and in both B.Sc. (Chemistry Honours) and M.Sc. he stood first – all from Calcutta University. After a short stint as a chemist in the Institute of Jute Technology, Calcutta, he joined the Department of Pure Chemistry in the College of Science at Calcutta University as an Assistant Lecturer in 1951. This gave him the opportunity to start his doctoral research in synthetic organic chemistry under the supervision of J. C. Bardhan. He received his Ph.D degree in 1955. Subsequently, he was a postdoctoral research scientist under the Colombo Plan (1957-58) and studied metal-ammonia reduction of monobenzoid compounds with A. J. Birch, at the University of Manchester. One of the two papers published during this time elaborated the final mechanism of Birch reduction. Later (1963-65) he collaborated with E. L. Eliel of the University of Notre Dame, as a Fulbright Fellow, on the study of stereospecific hydride transfer to ketones from some alkoxyaluminium dichlorides. He was awarded the D.Sc. degree of Calcutta University in 1964 on the strength of his published papers. Nasipuri served as a faculty member at the Calcutta University for many years (1951-69) and in April 1969 he moved to the Indian Institute of Technology, Kharagpur as Professor of Chemistry. After retirement (1985) he was associated with the Indian Institute of Chemical Biology, Calcutta as INSA Senior Scientist and CSIR Emeritus Professor.

His achievements in stereochemical research were internationally recognized and he was invited twice as Session Chairman in Gordon Conferences – asymmetric synthesis (1975) and organic stereo-chemistry (1990). He published the well-known book *Stereochemistry of Organic Compounds : Principles and Applications* (Wiley Eastern) first in 1991 and a revised second edition appeared in 1994. As a comprehensive text of modern organic stereochemistry it has few parallels and it compares well with the treatise of Eliel *et al*.

Nasipuri was offered academic positions by many distinguished universities and research institutes. He was a Senior Royal Society Bursar Fellow in Dyson-Perrins Laboratory, Oxford University, Leverhulme Visiting Fellow in the University of New South Wales, Visiting Professor in the University of Toronto, Visiting Scientist in the University of North Carolina, Chapel Hill, USA, invited lecturer in the Polish Academy of Sciences, in the University of Tokyo and in the University of Hong Kong. As a UGC Guest Professor (1990-91) he delivered lectures in several Indian universities.

He was elected to the fellowship of the Royal Society of Chemistry, England (1965), Indian Academy of Sciences, Bangalore (1976) and the Indian National Science Academy, New Delhi (1978). He was the President of the Indian Chemical Society, Calcutta during 1994-95. In appreciation of his contributions to organic chemistry a one-day seminar on 'Synthesis and Stereochemistry of Organic Compounds' was held on 15 December, 1995 in Calcutta.

Nasipuri passed away on December 28, 2009. He is survived by two sons and a daughter.

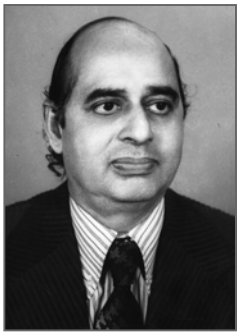


Sripadrao Kilpady (elected 1953), the oldest living Fellow, passed away on 22 December 2008 in Australia. This centenarian was born on 13 November 1906 at Kundapur in Karnataka. His undergraduate studies were in natural sciences (geology, botany and zoology) from the Central College, Bangalore and he viewed it as the turning point in his academic life. He topped the final examination in all the three subjects and became eligible for scholarship/freeship. He opted for geology which later turned into a profession and charted his entire future. He passed B.Sc. (geology) in 1928 with a first class and distinction. He obtained his M.Sc. (geology) in 1932 from the Mysore University and passed out with a first class. Soon after M.Sc. he undertook research work at the Central College itself.

For a period of five years, Kilpady worked as a temporary Demonstrator in geology on a salary of Rs. 175 p.m. He presented his first original paper to the Indian Science Congress in 1930 and was complimented by its then president D. N. Wadia. By 1941, he had published 20 research papers in geology. However, there was a brief lull in his research career when he was transferred to the Tumkur Intermediate College for five years with absolutely no facilities to carry out research work. In 1946, he joined as Reader and Head of the newly started Geology Department of the Nagpur University, worked there for 21 years and was instrumental in establishing one of the finest geology departments in the country.

After nearly four decades of service in the universities of Mysore and Nagpur, Kilpady had to his credit 70 research publications, a senior fellowship of the Geological Society of London and a fellowship of the National Academy of Sciences. His research work included optical, differential, thermal and X-ray powder-diffraction studies of manganese; micropaleontological studies of Cretaceous, Palaeocene and Eocene algae and charophyta which substantially contributed to fixing the age of the Deccan Traps and identification of certain horizons of the early Tertiary formations of the Salt Range.

Kilpady's favourite means of entertainment were movies and music – devotional, ghazals, classical and Lata Mangeshkar's popular hits. He was extremely fond of detective fiction authored by Arthur Conan Doyle, Agatha Christie and Stanley Gardner. He was greatly interested in photography and it continued to be a 'chronic addiction' (in his own words) even after retirement. He is survived by his son Uday Kilpady.

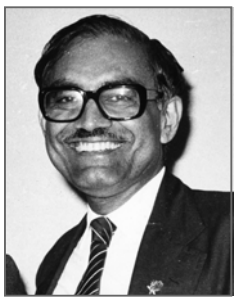


Sukumar Biswas. India lost one of its leading solar physicists when Biswas passed away on 16 November 2009. He had the unique distinction of having worked closely with two of the leading physicists, who built major scientific research institutions in independent India – Homi Bhabha and Meghnad Saha.

He was born on 1 July 1924 in Jalpaiguri in West Bengal. All through his school and university education, he was a distinguished student. After his graduation from Calcutta University, he continued his research in physics with Meghnad Saha in Calcutta. When V. D. Hopper of the University of Melbourne offered him the opportunity to work with him for his second Ph.D., he accepted and distinguished himself in Australia with his research in nuclear physics. When Bhabha started the Atomic Energy Programme, Biswas moved to work with him to Mumbai. He was with the Tata Institute of Fundamental Research almost from its start until he retired as Senior Professor in 1989. Then he continued there until 1992 as Emeritus Professor.

His research career, spanning more than four decades, brought out several unique contributions from him. Using the nuclear emulsion techniques, his earlier contributions to discovering new particles are well known to experimental particle physicists. Later on when he went to work in Minnesota, he turned his attention to cosmic ray composition studies using nuclear emulsions. He was a member of the group which detected nuclei heavier than helium in cosmic rays. After his return to TIFR, he concentrated on the composition of cosmic rays using nuclear emulsions. His contributions to the heavy primary cosmic ray work brought new laurels to India in this field. He then moved on to interpretations of the propagation of cosmic ray nuclei. One of his major achievements is the development of space-borne detector 'Anuradha' to detect the solar cosmic ray composition. This was his last contribution to cosmic ray research.

He was the recipient of several honours including the membership of the three science academies in India as well as the membership of American Physical Society. He was one of the earliest awardees of the UNESCO Fellowship. The Anuradha experiment fetched him the NASA Public Service Group Achievement Award. He received the C V Raman Award in 1984. He had the distinction of becoming an academician of the International Academy of Aeronautics.



Kappiareth Gopal Nair who passed away on 12 March 2010 was an outstanding cardiologist, master teacher, and investigator par excellence. Born in Kollengode, Kerala in 1931, he completed schooling in St. Vincent's High School, Pune, and Inter Science in Fergusson College, where he topped the class and won many prizes. Drawn early to a physician's calling, he joined the Seth G. S. Medical College, Mumbai where he had a brilliant academic career, culminating in the receipt of MBBS and MD degrees from the Bombay University. The nineteen fifties, when he graduated in medicine, was an exciting decade in the development of cardiology worldwide, and Bombay was witness to the endeavour of pioneers in the new discipline led by Vakil and others. Given his love for the practise of medicine and equal passion for investigative medicine, it was inevitable that Nair should find the pull of cardiology irresistible during that exciting period. In contrast to the previous decade which offered little for the care of cardiac patients, he saw in the fifties a glorious chapter ahead when electrophysiology, haemodynamic studies, coronary care units, and advances in cardiac surgery promised to revolutionise the science and practise of cardiology. The turning point came when he received a Rotary Foundation Fellowship to serve under the legendary Paul White at the Massachusetts General Hospital (MGH). His clinical skill and keen mind blossomed in the vibrant environment of MGH, where he was appointed as an Assistant Professor of Medicine of the Harvard University. During this period he was mainly involved in the study and applications of vector cardiography. His scientific talent and promise were soon spotted by Rabinowitz who invited him to his laboratory in the University of Chicago where he obtained a Ph.D. in Physiology – an unusual distinction for a practising cardiologist. His doctoral work involved the purification of AMP (adenosine monophosphate) by the hydrolysis of cyclic AMP, which received wide attention, and he was invited to join the National Institute for Medical Research in London as a Visiting Scientist. His paper on the study of ribosomes during the visit and subsequently in Chicago appeared in Nature (1966) and confirmed his dual status as a basic scientist and cardiologist of a high order. In the later part of his long association with Rabinowitz in Chicago, he took up the study of cardiac hypertrophy and became a pioneer in looking at the molecular basis of this phenomenon. The seven papers which his group published on this important topic between 1966 and 1970 broke new ground in the study of cardiac hypertrophy which continues to be a thrust area for research in cardiology.

On his return to India in 1971, Nair joined his alma mater, Seth G. S. Medical College, as Director-Professor of Medicine, when he introduced the DM programme in cardiology and a Ph.D. programme in Applied Biology in that venerable institution. He quickly earned a name as a brilliant teacher and academician, and influenced the professional development of hundreds of young physicians over 10 years before moving to the Jaslok and later, Hinduja Hospital as Honorary Cardiologist. His high repute as a practising cardiologist did not diminish his interest in research, which led to his studies on the role of allopurinol and adenosine in cardiac surgery; of taurine in cardiomyopathy; and the genetic basis of hyperlipidemia; and polymorphisms in the ACE and angiotensinogen gene. He had a genius for combining clinical practice and basic research in the right proportion, which characterized his entire career and made him a complete physician of our times.

Nair was a recipient of many honours and awards including the Fellowships of the National Academy of Medical Sciences, American College of Cardiology and

International College of Angiology. He was also elected the President of the Association of Physicians of India, Cardiological Society of India, and Indian Society of Electrocardiology. Thanks to his excellence as a physician and investigator, he was much in demand as a speaker, examiner, mentor, and an effective member of various official committees. He was a lover of music and often found solace in the sound of the sitar.

Nair is survived by his wife Sumati, son Rajeev who is a surgeon, and daughter Sunita who is an astrophysicist.

T C Anand Kumar (elected 1981) the pioneer of India's first scientifically documented test-tube baby, passed away on 26 January 2010 at the age of 74. A reproductive biologist of international repute, he will always be remembered for his diverse contributions to the field such as the role of the neuro-endocrine system in reproduction; developing the means of administering hormones via the nasal route and spear-heading the team that produced India's first test-tube baby at the ICMR's Institute for Research in Reproduction and the KEM Hospital, Mumbai in 1986. After his retirement as the Director of the Institute for Research in Reproduction, Mumbai, he founded the Hope Infertility Clinic in Bangalore in 1991 where many of the first generation of ART C specialists in the country were trained and started their careers in this field.

A graduate from Bangalore, he attained his doctorate from the University of Jodhpur and then went on to Birmingham, UK to pursue his studies. Despite several job opportunities provided to him in the UK, he was committed by the national spirit and returned to India to participate in the growth of science in the young nation. It was then that he started the electron microscopy laboratory at the All India Institute of Medical Sciences in 1970 which is still functional even today. He served at the premier All India Institute of Medical Sciences from 1969 to 1982 where he was committed to teaching medical students and also started the neuro-endocrine research laboratory.

He founded the Indian Society for the Study of Reproduction and Fertility in 1988 comprising members representing distinguished scientists, public health executives, programme managers and clinicians from the field of reproductive sciences which is an active and flourishing society today.

He continued sharing his wisdom and experience with the younger generation of scientists by serving as an adviser on many committees – World Health Organization, Department of Science and Technology, Council of Scientific & Industrial Research, Government of India; Department of Biotechnology, Government of India and the Indian Council of Medical Research till September 2009.

His work was recognized by his peers and he received the Shanti Swaroop Bhatnagar Award, the highest scientific award in the country; the Sanjay Gandhi National Award, and was Fellow of the National Academy of Medical Science (India) and Fellow of the Gonville and Caius College, Cambridge.

The visionary in Anand Kumar was equally concerned about the welfare of his patients seeking treatment with newer reproductive technologies. When the first scientifically documented test-tube baby was born, he was always questioned whether an overpopulated country needed test-tube babies. With this modality of treatment gaining acceptance and hundreds of clinics operating in India, he took a lead in formulating national guidelines for accreditation, supervision and regulation of ART clinics in India.

A man who stood for truth had the greatness to give away his fame and glory of being the pioneer of India's first test-tube baby when he discovered all the handwritten notes of Subhas Mukerjee. Mukerjee from Kolkata had claimed to have created a test tube baby in 1979 (the second in the world) but his claims were neither substantiated nor recognized by scientists or the authorities, leading to the man ending his life prematurely. Anand Kumar had the courage to research his predecessors' findings and scientifically present it to the world giving Mukerjee his due place in medical history. Such generosity and honesty is a very rare and precious attribute.

Anand Kumar's love for science and the search for truth will always be remembered. His students who are now highly placed all over the world would always cherish their mentor. He is survived by his wife, a son and a daughter.

Mihir Kumar Bose (elected 1981) a distinguished teacher and an eminent earth scientist passed away on 1 October 2009, after a brief illness. He was born on 1 September 1933 in Calcutta (now Kolkata). He had a distinguished academic career and obtained B.Sc. (Honours) and M.Sc. degrees from

the University of Calcutta. He joined the Department of Geology, Presidency College in 1956 as a lecturer and spent his entire professional career there. After superannuation he continued his teaching and research as a CSIR Emeritus Scientist and INSA Honorary Scientist. He worked on the magmatic rock complexes around Koraput, Orissa under the supervision of S. Ray and obtained the doctorate degree from the University of Calcutta in 1965. Subsequently, he received Post-doctoral Fellowship from the University of Oslo, Norway and worked with the renowned petrologist, T. F. W. Barth. There he carried out intensive petrological-mineralogical research on parts of Oslo igneous complex of Norway. Bose carried out studies on petrology, mineralogy and structural history of a number of magmatic complexes, particularly the alkaline rocks of the Eastern Ghats and the Deccan Volcanic Province. He has made fundamental contributions to the understanding of the evolution of the Indian shield, particularly the checkered tectono-magmatic history of the country. He made seminal contributions to the petrology-geochemistry-tectonic setting of the Dalma Volcanics in the Proterozoic Mobile Belt of North Singhbhum. His model of a back-arc setting for the Proterozoic Singhbhum Basin has received wide recognition. He was one of the pioneers in India who introduced geochemical modelling and numerical analysis of geochemical data to elucidate petrogenetic processes. He has a long list of publications in peer-reviewed Indian and foreign journals and is the author of a widely acclaimed text-book on igneous petrology.

Bose was awarded the S.S. Bhatnagar Prize in Earth Sciences (1976) for his outstanding and innovative research in petrology and mineralogy. He was elected Fellow of the Indian National Science Academy. He received the P. N. Bose Memorial Gold Medal (2006) of the Asiatic Society and the National Mineral Award (1972). He was a Fellow of the Geological Society of India, and the Geological Mining and Metallurgical Society of India.

Bose served as a member of the Subcommission on Systematics and Nomenclature of Igneous rocks, instituted by the International Union of Geological Sciences (IUGS). He chaired a joint session (Mineralogy and Alkaline Rocks) of the 24th International Geological Congress, Montreal, Canada (1972). He was a member of the National Committees for a number of IGCP programmes (International Geological Correlation Programme) and a member of the National Committee on Science and Technology (NCST). Bose was the editor (1972-79) of the Indian Journal of Earth Sciences, the President (2004-2006) of the Geological Mining and Metallurgical Society of India, and the Vice-President of the Indian Association of Geochemists.

Samavedam Srinivasa Sriramachari (elected 1967) popularly known as Chari, passed away on 25 December 2009. He was one of India's celebrated medical scientists born in the era of colonialism when medical history in India was marked not only for discoveries of the malaria pathogen by Ronald Ross but was also an age when diseases peculiar to the subcontinent were grouped generically as 'tropical diseases'. History got rewritten when a band of post-independence medical doctors such as Chari investigated the local diseases with fresh minds.

Chari was born on 25 June 1925 into a scholarly Tamil family settled in Andhra Pradesh. His early education was in St Joseph's Convent, Waltair and Maharaja's Collge, Vizianagaram followed by Andhra Medical College, Visakhapatmam where he obtained MBBS and MD degrees in 1948 and 1955, respectively. Chari acknowledged the influence of M D Anantachari in arousing his interest in liver diseases during this period, an interest that lasted a life time. He joined the Nutrition Research Laboratories (ICMR) in Coonoor in 1951. It was here that some of the best work on Kwashiorkor and protein calorie malnutrition was undertaken by the triumvirate of V. Ramalingaswami, C. Gopalan and Chari. They laid the foundation for the understanding of malnutrition and gave remedial and preventive guidelines to the nation. Chari moved to Delhi in 1962 on deputation to the ICMR head office and never left it without serving the organisation in various capacities. Chari was an institution builder. Seeing the need for pathology research in India and having observed the impact of disease data bases abroad, he founded the Registry of Pathology in 1965 in two rooms of Safdarjung Hospital. With unstinting efforts, he developed it into the current six floor Institute of Pathology (IOP) which conducts research in cancer, leishmania, chlamydia and placental models for pollutant monitoring. He was appointed as the first Additional Director General of ICMR and returned to IOP and worked there till his death. He continued to nudge the ICMR for appropriate interventions at times of national crises.

One is enriched and amazed at the breadth of investigative pathology undertaken by Chari, traversing as it did nutritional, liver, muscle and bone pathology with ease not to mention his interest in colour photography. His publications cover kwashiorkor, varieties of fatty liver, Indian childhood cirrhosis on which he was an authority, noncirrhotic portal fibrosis/hypertension – another disease of the subcontinent brushed off earlier

as 'tropical' disease, effects of Vitamin D on bone mineralization, fluorosis, types and causes of cerebral edema and neurolathyrism. What distinguished Chari's approach to diseases was not only the questions asked but the innovative techniques he would develop to answer them. He did not limit himself to biomedicine but crossed into disciplines that were not in the purview of most doctors. He would use chemical and physical principles to understand medical problems much to the surprise if not criticism by the conventional pathologists of that time. Chari is reputed to have been the first to do large scale liver biopsies and liver function tests. He was one of the earliest to develop histochemical staining to study the chemical alterations in cells and experimental animal models to not only understand the disease process but also to reverse the pathology and thereby provide a solution for amelioration. He looked at rat and monkey models to understand liver damage and effects of malnutrition which continue to plague us even now. He showed that though there was fat in the liver cells in both childhood cirrhosis and protein deficiency, in the former it led to the serious condition of cirrhosis whereas in the latter only mild fibrosis/ scarring was noted. He was also able to show that these were reversible by appropriate dietary replacements.

Chari combined good science with intense nationalism, the latter would perhaps be considered old fashioned in today's world of career-based science. He was at the forefront whenever the country faced adversity. He was called to Delhi by C. G. Pandit, the Chief of the ICMR when Sino-India war broke out to institute research in high altitude related problems of our soldiers. He investigated the deaths following the Kanishka Air Crash as well as the death of Sivarasan who was involved in Rajiv Gandhi's assassination. Similarly when there was public concern about the ill-understood child deaths in Nagpur in the summer months of the seventies, Chari, established the presence of brain-edema through his autopsy studies and furthermore linked it to heat pyrexia and not encephalitis. He went on to develop monkey models to prove this association and demonstrated that cerebral-edema was a critical but reversible factor not only in heat strokes but also in head injuries. His desire to produce affordable teaching slides and save the depleted foreign currency of that time made him spend many years perfecting a teaching set of pathology slides for medical colleges of India. Even here his curiosity and lateral thinking overtook him to investigate the principle of colour reproduction and the influence of light and dyes that would give the best results.

Perhaps, Chari would be best remembered for his research on the infamous Bhopal Gas Tragedy and the worst industrial disaster of the world that hit the Union Carbide factory in Bhopal on 3 and 4 December 1984. He was one of the early scientists to reach Bhopal and along with the late legendary Heeresh Chandra conducted hundreds of autopsies. 'Cherry red' colouration of organs during the immediate aftermath of exposure to methyl isocyanate (MIC) strikingly observed by Chandra was suggestive of cyanide poisoning. Though this was hotly disputed by Union Carbide, clinical improvement with an injectable cyanide antidote of sodium thiosulphate brought by Munich based Max Daunderer, supported the theory. Furthermore, Chari showed unequivocally the excretion of sodium thiocyanate, a metabolic product of cyanide in the urine of the patients. Following double blind clinical trials, ICMR formally recommended thiosulphate treatment to the surviving victims. However, 30% of the patients showed relapses and the degree of lung damage was not sufficient to explain the symptoms. These patients responded well to subsequent administration of sodium thiosulphate. Even though Union Carbide declared that MIC does not cross the alveolar barrier in the lungs, Chari showed that MIC bound to the blood/haemoglobin and tissues by a process of N-carbamylation of amino acids and thereby reduced the oxygen affinity. He further showed that the chronic symptoms of muscle weakness and respiratory problems was explainable by endogenous release of cyanide occurring through S-carbamylation of glutathione, leading to impairement of enzymes such as rhodanase and esterase. The work of the Indian investigators broke the earlier myths about MIC effects on tissues. In the later years along with his colleagues in IOP, he was preoccupied in developing better tools for toxicology. Jain and he were exploring the uses of placental tissue for the detection of environmental pollutants as it seems to be a store house which is easily available since it is discarded after child birth. Till his death Chari continued to feel that more research was needed on long term effects of MIC and worried about the future of the survivors.

When the world and the country were making ceremonial tributes for the 25 anniversary of the Bhopal tragedy, Chari spent the terminal period of his life driving himself to complete the ICMR report. Worried about Chari's health but nevertheless wishing to pay homage to the victims of the gas tragedy, ICMR and Vijayan, the Director of V. P. Chest Institute who was also his treating physician held a special function on the premises of the hospital in Delhi on 3 December 2009. It seemed as if Chari had willed himself to live for that day and he gave a memorable lecture sitting in a wheel chair connected to oxygen supply and surrounded by anxious physicians. He deteriorated physically thereafter but

his mind was razor sharp and he out-argued his younger colleagues in the intensive care ward.

Chari was a man of contradictions like many thinkers. He often joked that he was a Tamil but not a Tamilian as he never lived in Tamil Nadu. His steely determination to reach his goal belied his polite exterior. His unending curiosity, demand for perfection, and lateral thinking, apparently diverting from the main path of investigation, drove many of his colleagues to distraction but brought scientific dividends. Like his forefathers he was well versed in Sanskrit. He was sociable and friendly but was nevertheless conservative and addressed even decades-old colleagues formally by their family name. His loyalty and commitment to ICMR was legendary and went beyond the call of duty. He was apolitical as an adult but his commitment as a student made him choose 1 May as the date for many of the special functions associated with him.

He leaves behind his daughter Sandhyamani, who followed his footsteps to become a pathologist and his doctor sons Murli and Krishna. His wife Pushpa had died decades earlier due to a drug reaction and is remembered by a memorial lecture instituted by Chari. He also dedicated research awards for the young doctoral students of IOP.

Patcha Ramachandra Rao passed away suddenly after a cardiac arrest in Madurai on 10 January 2010, leaving behind a rich legacy in materials research, education and scientific leadership. He was born on 21 March 1942 at Kavutavaram in the Krishna District of Andhra Pradesh. His parents, Narayanaswamy and Laxmi Bai, schooled him at home and admitted him to the seventh standard directly and he completed school at the early age of 13. He obtained his M.Sc. degree in physics from Osmania University in 1961 and B.E. degree in metallurgy from the Indian Institute of Science in 1963. His long and distinguished association with the Banaras Hindu University (BHU) in many capacities began soon afterwards, when T. R. Anantharaman inspired him to pursue further studies at the Department of Metallurgical Engineering, BHU. He obtained his M.Sc. (Engg.) in 1965 and Ph.D. in 1968. This was a turning point for not just Rao but also for the school of metallurgical research at BHU. His doctoral studies established the rapid solidification group at BHU which grew into a major force in this area of research receiving significant international recognition. He served the faculty of BHU from 1964-92 as lecturer, reader and professor. He was to return later as its Vice Chancellor.

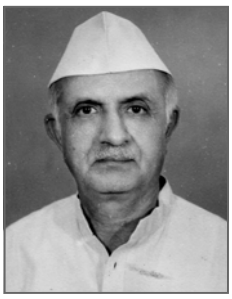
Rao was an innovative and a dexterous experimenter and pioneered several techniques such as the twin-roller quenching for rapid solidification, the use of the heat pipe, diamond as a substrate, laser solidification and mushy state quenching. He was restless in pursuing new ideas and new themes. These enabled him and his students to produce an array of metastable alloys with novel structures and microstructures including metallic glasses and a large number of new metastable phases. He spent two spells overseas early in his career at the University of Cambridge and the University of Sussex. In collaboration with G. A. Chadwick and R. W. Cahn, he established rapid solidification research at these two centres.

In addition to outstanding experimental skills, Rao had a remarkable understanding of theory. He excelled in applying thermodynamics to problems in physical metallurgy. Besides solving the crystal structure of metastable phases, he recognised that the basic processes that lead to metastable effects need to be understood. He quickly realized that the melt gets undercooled below the freezing temperature during rapid solidification and the nature of this melt holds the key to our understanding of metastable solids. He turned to thermodynamics to explore the behaviour of these undercooled liquids. His intense efforts culminated in several outstanding scientific findings which continue to illuminate the field. In particular, the expression of the free energy of undercooled liquid which often defies experimental determination is widely recognized internationally and used as a standard expression for any thermodynamic treatment of undercooled liquids. His other major contribution during this period was the discovery of a new class of quasicrystals in magnesium alloys. As most of us started our work following the discovery of quasicrystals in Al-Mn alloys, Rao with his typical innovative style found a new system and a new type. What is remarkable is that at that time the structure of quasicrystals was hazy. Yet, he took one look at Pauling's compound exhibiting icosahedral coordination and designated it as a candidate alloy. The title of his paper in Pramana ‘A basis for the synthesis of quasicrystals’ seemed at first audacious but in fact was sheer genius. This is one of the best papers to have come out of research in physical metallurgy in India to date. It is also during this period that he got interested in microgravity research. Rao has pioneered the microgravity experiments in the country and the experiments designed by him on the solidification of silver-germanium alloys were carried out in space in a Soyuz spaceship.

In addition to being an outstanding researcher and an inspiring teacher, Rao demonstrated administrative acumen of an extraordinary degree. Rao's services at BHU included the coordinatorship of the School of Materials Science and Technology at BHU. He gave it a direction and strength in its formative years. In 1992, he moved to the National Metallurgical Laboratory (NML) as its Director. With the help of a young breed of scientists, he catalysed research in several new directions. One among the many achievements is the creation of the research group on biomimetic materials, for the first time in the country. He also succeeded in bringing a completely new research culture in the laboratory. In 2002 he was invited to take over the Vice Chancellorship of the Banaras Hindu University – the first student of the University to shoulder this responsibility. Once again he infused strength into this old centre of learning. His love for teaching was so strong that he took classes in spite of being the Vice Chancellor. Again he attracted brilliant faculty and munificent endowments including the single largest donation received in recent times of Rs 6 crores. In 2005, he moved to the Institute of Armament Technology, Pune, as the first Vice Chancellor of the newly accredited and deemed to be University known as DIAT. He superannuated from DIAT in 2007 and returned to Hyderabad as a DAE Raja Ramanna Fellow at ARCI, Hyderabad. It was a joy for him to return to active research unburdened by administrative responsibilities. He started new lines of thought but did not live to complete these fresh pursuits. However, Rao's work is of enduring value and his partially completed books and papers will be continued by his colleagues and students. In his book on Thermodynamics, he has effectively utilized his deep understanding to explain abstract thermodynamic concepts in simple language using a large number of illustrative examples from everyday life. Equally, his grand vision for expressing the temperature dependence of the specific heat of metals undergoing allotropic transformations with one universal constant and one metal-dependent constant will be completed.

Ramachandra Rao was a fellow of all the academies in India as well as a fellow of the Academy of Sciences for the Developing World (TWAS). He won most of the major awards in engineering sciences including the S S. Bhatnagar Prize. He was recognized by the Distinguished Alumnus Award of the Indian Institute of Science. He was President of Indian Institute of Metals, Vice President of Materials Research Society and Vice President of the Indian National Science Academy. His sagacious guidance was sought after by many organizations, most notably the Council of Scientific and Industrial Research, The Indo-French Centre for the Promotion of Advanced Research and the Jawaharlal Nehru Centre for Advanced Scientific Research. Rao had many special gifts apart from science. He played the mridangam, recited poems and drew cartoons including one of Linus Pauling. Above all, he had endearing qualities that his friends and associates were privileged to experience. He leaves behind his wife, Sudha Rao, daughter Suparna Dandamudi and son Animesh Patcha.

Prahlad Chunilal Vaidya (elected 1975) a doyen of Indian relativists and an inspiring teacher died on 8 April, 2010 in Ahmedabad. He was a Fellow of the Indian National Science Academy. He was the President of the Indian Association of General Relativity and Gravitation



(IAGRG) from 1974-76, besides being its Founder Member. He had the distinction of being a Founder Member of the International Committee on General Relativity and Gravitation. While gracing these research positions nationally and internationally, Vaidya was also the Founder and first President of the Gujarat Ganit Mandal, an organization that concentrated on teaching school mathematics.

Vaidya was born on 23 March 1918 in Shahapur in the Junagarh District of Gujarat. Right from his younger days he liked and excelled in mathematics and it was clear that he would end up with a successful career in that field. After finishing his schooling at Bhavnagar, he went to Mumbai where he studied at the Ismail Yusuf College, Andheri and then to the Royal Institute of Science where he got his M.Sc. degree from Bombay University with specialization in applied mathematics.

In 1942, he enrolled himself as a student of V V Narlikar in the Mathematics Department of the Banaras Hindu University (BHU), because he wanted to work on the general theory of relativity and the group under VVN was then known to be a flourishing centre for relativity. However, this was a purely informal arrangement, Vaidya had saved a certain amount of money through frugal living and he felt that he would work in BHU till that money lasted. He married in 1939 and soon after had a baby daughter. With a family to support, Vaidya stayed in Banaras for 10 months. But that period under an inspiring teacher

was sufficient to lead Vaidya to the work for which he became best known a few years later, namely the Vaidya solution. He got his PhD degree from the Bombay University in 1948.

He spent a year (1947-48) at the newly established Tata Institute of Fundamental Research where he came in contact with Homi Bhabha. While he would have liked to continue at TIFR, the difficulty of getting accommodation at an affordable price made him shift from Bombay to his native state of Gujarat. He found a niche in Vallabhbhai Patel College in Vallabh Vidyanagar (which later developed into the Sardar Patel University). From there, he moved to Ahmedabad where he worked in several places and was Principal of M N College in Visanagar for a year. With his growing stature in the educational field, Vaidya occupied prestigious positions as Chairman, Gujarat Public Service Commission and Vice Chancellor, Gujarat University.

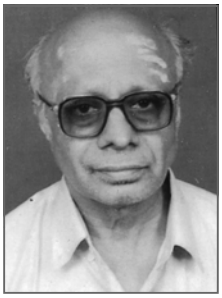
All through his career, P. C. Vaidya was a teacher at heart and despite his administrative commitments, he found time to take M.Sc. classes. He would cycle to work in his usual simple Gandhian dress of white khadi kurta with the inseparable Gandhi cap. It was his concern for fellow teachers that led him to start a new organization called the Gujarat Ganit Mandal which conducts lectures, workshops and discussions relating to problems of teaching mathematics. It also brings out a journal in Gujarati, called Suganitam which publishes articles useful to teachers.

No account of Vaidya will be complete without a description of his major work, namely the gravitational field of a radiating star. According to general relativity, the presence of a gravitating object is perceived and measured by the non-Euclidean geometry of spacetime around it. In the earlier days of relativity, Karl Schwarzschild had worked out the spacetime geometry near a spherical mass in an otherwise empty universe. The next question was 'how does the geometry change if the mass is radiating energy, as a typical star does'. This was the problem that Vaidya successfully tackled and the solution is known as the 'Vaidya solution'.

Although the problem was solved in the early forties, it was relevant even in the sixties when astronomers discovered compact but very powerful radiators of energy known as quasi-stellar objects or quasars. As the subject of relativistic astrophysics took shape, the 'Vaidya solution' found a natural place in it.

Vaidya had been working on several aspects of relativity and published articles in leading journals on topics like exact solutions, supermassive objects, black holes, etc. His research accomplishments were all the more remarkable in that they were achieved in an environment of minimal research infrastructure. He was remarkably active both physically and intellectually, though well into his eighties. This may be ascribed to his simple style of plain living and high thinking. He was Honorary Fellow of the Inter-University Centre for Astronomy and Astrophysics (IUCAA) and had been associated with many of the centre's pedagogical activities. Participants recall his regular presence with alert questions to the speakers all through a school or workshop.

IUCAA in collaboration with Vigyan Prasar of Delhi has produced a film on P. C. Vaidya that deserves to be shown in all our educational establishments. It presents a unique and inspiring picture of a simple man with profound accomplishments.



Kalakad Sundaram Viswanathan (elected 1956) passed away on 5 July, 2009. He was born in Kalakad, Tamil Nadu on 9 June 1929. Viswanathan, together with S. Chandrasekhar, T. K. Srinivasan, M. R. Bhat, D. Krishnamurti, S Pancharatnam and A. K. Ramdas constituted the student body at Raman Research Institute (RRI) in 1950.

His academic training (BA and MA) being in mathematics, C V Raman singled him out for research on theoretical problems e.g., lattice dynamics and atomistic theory of elasticity. His discoveries that the group velocities of the normal modes of crystals vanish at the zone centre and the zone boundary (*Proc. Indian Acad. Sci.*, 1953, 36, 308), as well as his deduction that crystals are characterized by 45 independent elastic constants in general if the stress and strain tensors are not symmetric (*Proc. Indian. Acad. Sci.*, 1954, 39, 196), are scientific results noteworthy for their originality from the earliest phase of his scientific career at RRI. They formed the basis of his 1955 Ph.D degree awarded for his thesis submitted to Madras University. He remained at RRI from 1955 to 1961 as Assistant Professor. Viswanathan broadened and deepened his research interests as documented in his papers dealing with anharmonicity of molecular vibrations, the relativistic theory of chemical binding, and the Dirac equation for many electron systems.

In 1960, Viswanathan joined the National Aeronautical Laboratory, Bangalore as the Head of the Mathematical Sciences Division (1960 – 1970). In 1970, he accepted the Physics Professorship of the Kerala University, Thiruvananthapuram. He spent short periods as a visiting scientist at the Dublin Institute of Advanced Studies, Ireland (1965 – 1966), Plasma Physics Laboratory, Princeton University, Princeton (1966 – 1977); and shorter periods at the International Centre for Theoretical Physics, Trieste, Italy (1977 – 1979). His publications reveal an impressive sweep of topics to which he made comprehensive contributions: 'Close equatorial satellites of the Moon' *(Proc. Indian Acad. Sci.,* 1962, 56, 291), 'Artificial satellites and the earth's gravitational field' *(J. Indian Geophys. Union,* 1964, 1, 77), 'Anharmonicity of vibrations and inner displacements in crystals' (with K Watanabe) *(Phys. Rev.,* 1966, 149, 614), 'The internal conical refraction of elastic waves in solids' *(Indian J. Pure Appl. Phys.,* 1970), 'Helicon-Phonon interaction in metals' *(J. Phys.,* 5, L107, 1975) and 'Phonon magnification in cubic crystals' (*Phys. Rev. B.,* 17, 4969, 1978). This selected list of publications illustrates Viswanathan's deep and extended scientific interests to which he brought his mathematical expertise, physical insights and an impeccable taste in the selection of novel research areas.

He was the Secretary of the Indian Academy of Sciences and Editor of the Proceedings of the Indian Academy of Sciences from 1957 to 1961.

In memory of Riki Krishnan (1971 – 2010)

Many Patrika readers probably also regularly read P. Balaram's finely crafted fortnightly Editorials in *Current Science* on a wide variety of topics. For many years now since 1999, he was greatly helped in this work by a young, enthusiastic, and always smiling young man – Riki Krishnan.

Riki joined the staff of the Academy in 1999, and worked over the years for some of the Academy Journals. He endeared himself to everyone, was always willing to help others, and was completely selfless in every respect. His greatest efforts however, were reserved for the *Current Science* Editorials.

Tragedy struck in late 2008 when he was diagnosed as suffering from throat cancer. After many sessions of radio and chemo therapy, which always brought only limited and temporary relief, he lost the battle on 19th March this year. A particularly touching tribute and a fine appreciation of his qualities made up Balaram's *Current Science* Editorial of 25 March 2010. That cannot be bettered.

All of us at the Academy will remember Riki with fondness, and with the unanswerable question – why must such things happen?

Erratum

Patrika (No. 50), September 2009, Page 9

1. Motivational bridge course in physics

Gogate – Joglekar College, Ratnagiri
23 March 2009 – 11 April 2009

Course Director : S. Ananthakrishnan

Course Co-ordinators : G V Kelkar (IAPT), A W Joshi, Anjali Kshirsagar (Pune University), K V Sukhatankar (Gogate – Joglekar College, Ratnagiri).

INDIAN ACADEMY OF SCIENCES

BANGALORE 560 080

KIT FOR EXPERIMENTAL PHYSICS

As part of the programme to improve science education in the country, the Academy organizes two-week Refresher Courses in Experimental Physics for the benefit of teachers in universities and colleges. For this purpose, a set of experimental circuits has been designed by Prof. R. Srinivasan, a Fellow of the Indian Academy of Sciences. A kit of these circuits and set-ups has now been licensed to a company in Bangalore (Ajay Sensors & Instruments) for commercial manufacture.

A sample of items in the kit and the experiments that can be performed with the kit can be found below:

 Constant Current Source	 Temperature Controller	 Signal Generator	 Power Amplifier
 DC Differential Amplifier	 Lock-in-Amplifier	 Mutual Inductance Coil	 Thermal & Electrical Conductivity of Copper
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Experiments possible:

Calibration of a thermocouple
Calibration of a Si diode
Stefan's constant of radiation
Thermal and electrical conductivity of copper
Thermal diffusivity of brass
Frequency dependence of impedance and phase of a coil
Frequency dependence of impedance of a capacitor
Series and parallel resonant circuit
Low pass, high pass and band pass filters
AC bridges – Maxwell's, De-Sauty's and Anderson's
Velocity of sound in air
Temperature coefficient of resistance of copper
Bandgap of a semiconductor
Metal insulator transition in La Ca manganate
Comparison of capacitances and verifying law of addition of capacitances
Dielectric constant of benzene and dipole moment of acetone
Thermal relaxation of a serial light bulb
Demonstration of working of a lock-in-amplifier
Measurement of mutual inductance with a lock-in-amplifier
Measurement of low resistance (0.1 ohm) with a lock-in-amplifier
High resistance by leakage
B-H curve with integrator
Thermal conductivity of poor conductors
Young's modulus by flexural vibrations
Calibration of a search coil

Several universities, particularly in South India, have introduced these experiments in the curricula of their B.Sc. and M.Sc. courses.

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