

Newsletter of the Indian Academy of Sciences

TWENTY-SECOND MID-YEAR MEETING JULY 8 – 9, 2011

The twenty-second Mid-Year Meeting of the Academy was held at Bangalore on July 8 and 9, 2011. One day prior to the meeting, on July 7, two special half-day symposia were organized for the benefit of the teacher invitees and students from local schools and colleges. One was devoted to current topics in the life sciences; the other to aspects covering the solid earth, the surface land masses, the oceans and the atmosphere as important components of earth sciences. These symposia have become useful adjuncts to the mid-year meetings.



The two special lectures were by **Jayant B. Udgaonkar** (NCBS, Bangalore) on the protein folding problem, and by Mustansir Barma (TIFR, Mumbai) on entropy and order. The former described again the near miraculous ways in which information in a one-dimensional DNA chain gets converted into or

expressed as a protein with specific three-dimensional structure leading to corresponding function. Errors in protein folding can cause such conditions as Alzheimer's disease. The speaker discussed the time scales involved, the sequence of steps, and many still unanswered questions in this area. From the talk by **Barma**, we learnt that both fundamental constants k and h appeared first in Planck's 1900



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Newsletter, please write to the
Executive Secretary of the Academy
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Forthcoming Events

Seventy-seventh Annual Meeting

Ahmedabad, 18 – 20 Nov. 2011

Refresher Courses

Experimental Physics – XXXIII

Jalahalli, Bangalore
8 – 23 Nov. 2011

Techniques in neurosciences – Behaviour to molecules

Sophia College, Mumbai
23 Nov. – 7 Dec. 2011

Experimental Physics – XXXIV

Jalahalli, Bangalore
2 – 17 Dec. 2011

Cell and molecular biology techniques

Manipal University, Manipal
23 Jan. – 4 Feb. 2012

Paradigms and applications of pattern recognition in image processing and computer vision

Dr GR Damodaran College of Science,
Coimbatore
23 Jan. – 4 Feb. 2012

Experimental Physics – XXXV

St. Xavier's College, Ahmedabad
15 Feb. – 1 Mar. 2012

Experimental Physics – XXXVI

Institute of Technical Education and
Research, Bhubaneswar
15 – 30 May 2012

Experimental Physics – XXXVII

B. S. Abdur Rahman University, Chennai
12 – 27 June 2012

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Lecture Workshops

Recent trends in chemistry

University of North Bengal, Darjeeling
11 – 12 Nov. 2011

Advances in bioinorganic and nano-chemistry

D. A. V. Postgraduate College, Kanpur
12 – 13 Nov. 2011

Nanotechnology and Biosensors: Present and Future Perspectives

Dayananda Sagar Academy of Technology and
Management, Bangalore
29 – 30 Nov. 2011

Advances in chemistry

Jayaraj Annapackiam College for Women
Periyakulam
15 – 16 Dec. 2011

Fundamentals of molecular spectroscopy

Manipal University, Canchipur
15 – 17 Dec. 2011

Mathematics

PSGR Krishnammal College for Women
Coimbatore
21 – 23 Dec. 2011

Current trends in nanoscience and technology

National Institute of Technology, Warangal
23 – 24 Dec. 2011

Lectures on fundamental concepts in basic physics for Masters Course students and teachers

PSGR Krishnammal College for Women
Coimbatore
5 – 6 Jan. 2012

Frontiers in science & engineering – Opportunities for graduates

Deen Dayal Upadhyaya College, New Delhi
17 – 18 Feb. 2012

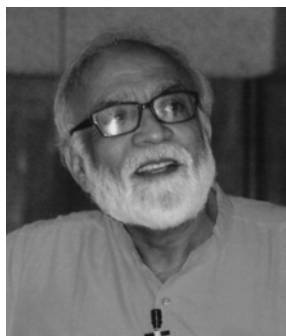
Partial differential equation

S V National Institute of Technology, Surat
1 – 4 March 2012

Molecular spectroscopy: Theory, instrumentation and applications

Banaras Hindu University, Varanasi
2 – 3 March 2012

paper, and the former was called Planck's constant till 1911! Also that it was Planck who first wrote down the Boltzmann formula $S = k_B \ln \Omega$. Barma gave several insightful examples to show how entropy can be the cause behind states which are ordered on large scales, typically due to objects getting in each other's way. At the conclusion of the lecture one had the impression that order is but disorder by another name.



The public lecture by **Anil Sadgopal** on "Neo-liberal assault on education: Undoing freedom movement's aspirations and vision of the constitution" was both informative and disturbing. The speaker – an escapee from science to social science – quoted extensively

from writings and documents going back over a century to the likes of Phule and Gandhiji to convey the hopes and aspirations of the thinkers of those times. The speaker then contrasted such ideas with developments over the decades since independence, and the current policies of government in the arena of education essentially dictated by global economic and commercial forces.

Among the twenty odd lectures by newly elected Fellows and Associates, a few may be mentioned. Shiraz Minwalla's (TIFR, Mumbai) packed and high intensity presentation traced the connections between theories of gravity and the Navier Stokes equations of fluid dynamics. Surendra K Sharma (AIIMS, New Delhi) explained the reasons leading to snoring and beyond, mainly due to blocking of airways. There can be breaks in breathing for as long as ten seconds, and we all need six hours of good quality sleep each night to function well in day time. And men on the average are greater offenders as snorers than women by about a factor of two!

There were in all about 209 fellows, 28 invited teachers from outside Bangalore and from local institutions and many students attending the sessions.

SEVENTY-SEVENTH ANNUAL MEETING Physical Research Laboratory, Ahmedabad

18 – 20 November 2011

Programme

18 November 2011 (Friday)

- 0930–1100 **Inauguration & Presidential Address**
A K Sood, IISc, Bangalore
Fascinating flow of complex fluids – Jamming, order and chaos
- 1200–1300 **Lectures by Fellows/Associates**
- 1200 **Sandeep Verma**, IIT, Kanpur
Metal-organic framework on carbon nanotubes: Covalent conjugates and catalytic action
- 1220 **J N Chengalur**, NCRA, Pune
Near-field cosmology with dwarf galaxies
- 1240 **Rakesh Bhatnagar**, JNU, New Delhi
Recombinant vaccine against anthrax: Clone to clinical trials
- 1400–1500 **Lectures by Fellows/Associates**
- 1400 **S K Satheesh**, IISc, Bangalore
Understanding the black carbon aerosol paradox
- 1420 **V Rajshekhar**, CMC, Vellore
Neurocysticercosis: Appearances can be deceptive
- 1440 **A K Ganguli**, IIT, New Delhi
From mercury to oxypnictides: A century of superconductivity
- 1530–1730 **Symposium on 'Chemical biology':**
- 1530 **Siddhartha Roy**, IICB, Kolkata
A chemical biology approach to study biological regulatory networks
- 1600 **Ram Vishwakarma**, IIIM, Jammu
Chemical biology of glycosylphosphatidylinositol (GPI) anchors

- 1630 **R Nagaraj**, CCMB, Hyderabad
Chemistry of peptide aggregation: Relevance to biology
- 1700 **N Jayaraman**, IISc, Bangalore
Interaction of synthetic glycolipid inhibitors of mycobacterial biofilms and motilities with surfactant protein A
- 1800–1900 **Public lecture**
Sudhir Kakar, Goa
A creative melancholy: The paintings of Rabindranath Tagore
- 19 November 2011 (Saturday)**
- 0900–0940 **Special Lecture**
Samir K Brahmachari, CSIR, New Delhi
Open source drug discovery: A model for science 2.0 through crowd sourcing
- 0940–1020 **Lectures by Fellows/Associates**
- 0940 **Debajyoti Choudhury**
University of Delhi, Delhi
Delayed response and the redundancy of an inflaton
- 1000 **K R Gopidas**, NIIST, Thiruvananthapuram
Nanoparticle-cored dendrimers: Synthesis, characterization and applications
- 1050–1300 **Symposium:**
a) Recent trends in high energy physics:
- 1050 **Sunanda Banerjee**, SINP, Kolkata
Quest for new physics at the large hadron collider
- 1115 **Saurabh D Rindani**, PRL, Ahmedabad
Going beyond the standard model of elementary particle physics
- 1140 **S Mohanty**, PRL, Ahmedabad
Standard cosmological model and beyond
b) *Fundamental physics challenges in plasma physics:*
- 1205 **R Jha**, IPR, Gandhinagar
Turbulence in fusion plasma
- 1230 **G Ravindrakumar**, TIFR, Mumbai
High energy density science with laser light
- 1400–1540 **Lectures by Fellows/Associates**
- 1400 **Dilip D Dhavale**, University of Pune, Pune
In the search for new drug candidates for type-II diabetes

- 1420 **Onkar Dabeer**, TIFR, Mumbai
Collaborative filters: Fundamental limits and good practices
- 1440 **B N Mallick**, JNU, New Delhi
Neural mechanism of rapid eye movement sleep regulation
- 1500 **Rajesh K Srivastava**, BHU, Varanasi
Record of short-lived mantle generated magmatic events and their dyke swarms of the Indian shield during precambrian
- 1520 **C S Gopinath**, NCL, Pune
A possible approach to broaden catalytic activity regime: More wine in the old bottle
- 1610-1730 **Business Meeting of Fellows**
- 1830–1930 **Public Lecture**
Sudarshan Iyengar, Vice Chancellor, Gujarat Vidyapith, Ahmedabad
Science – Social science interface
- 20 November 2011 (Sunday)**
- 0900–0940 **Special Lecture**
Devang V Khakhar, IIT, Mumbai
Dense granular flows: Rheology and segregation
- 0940–1300 **Lectures by Fellows/Associates**
- 0940 **Ayan Datta**, IISER, Thiruvananthapuram
Catalysis by organogold complexes and gold nanoclusters
- 1000 **Balaram Ghosh**, IGIB, Delhi
MicroRNA with macro-role in asthma
- 1050 **S R Barman**, CSR, Indore
Ferromagnetic shape memory alloys
- 1110 **Basudeb Datta**, IISc, Bangalore
Stacked spheres and lower bound theorem
- 1130 **Subroto Mukerjee**, IISc, Bangalore
Quantum phases of bosons in optical lattices
- 1150 **Narendra M Dixit**, IISc, Bangalore
Therapeutic engineering
- 1210 **Sanjeev Galande**, IISER, Pune
From sequence to consequence
- 1230 **D S Nagaraj**, IMSc, Chennai
Morphism of varieties

ASSOCIATES – 2011

VK Chandrasekar

Bharathidasan University, Trichy
Integrable systems; synchronization in
complex networks; neural networks



DH Dethé

National Chemical Laboratory, Pune
Total synthesis of bioactive natural
products; development of new
methodologies; drug discovery and
development



Subi J George

Jawaharlal Nehru Centre for Advanced
Scientific Research, Bangalore
Organic materials; supramolecular
chemistry; π -conjugated systems



Zhumur Ghosh

Bose Institute, Kolkata
Stem cells and regenerative therapy; RNA
biology and gene expression;
bioinformatics



T Govindaraju

Jawaharlal Nehru Centre for Advanced
Scientific Research, Bangalore
Bioorganic chemistry of peptides, proteins
and nucleic acids; organic synthesis;
bionanotechnology



Thirupathi Gudi

Indian Institute of Science, Bangalore
Numerical analysis; finite element
methods; partial differential equations



Prahladh Harsha

Tata Institute of Fundamental Research,
Mumbai
Computational complexity; algorithms;
coding theory



Amol A. Kulkarni

National Chemical Laboratory, Pune
Microreactors; experimental fluid
dynamics; chemical reaction engineering



Supriyo Mitra

Indian Institute of Science Education and
Research, Kolkata
Seismology; seismotectonics; earth
sciences



Debdeep Mukhopadhyay

Indian Institute of Technology, Kharagpur
Cryptography; side channel analysis;
VLSI



GV Pavan Kumar

Indian Institute of Science Education and
Research, Pune
Raman scattering; nanophotonics;
classical optics



U Deva Priyakumar

International Institute of Information
Technology, Hyderabad
Computational chemistry; biomolecular
simulations; computer-aided drug design



Thomas J Pucadyil

Indian Institute of Science Education and
Research, Pune
Biochemistry; biophysics; cell biology



Dipankar Saha

Indian Institute of Technology, Mumbai
Nanotechnology; microelectronics;
optoelectronics



Ritesh K Singh

Indian Institute of Science Education and
Research, Kolkata
High energy physics; collider
phenomenology



P Ramu Sridhar

University of Hyderabad, Hyderabad
Carbohydrate chemistry; synthetic organic
chemistry; natural product mimics



Smitha V Thampi

Physical Research Laboratory, Ahmedabad
Space sciences; ionospheric imaging;
space weather



C Vineeth

Vikram Sarabhai Space Centre,
Thiruvananthapuram
Optical remote sensing of the terrestrial
upper atmosphere; solar-terrestrial physics;
space physics & aeronomy



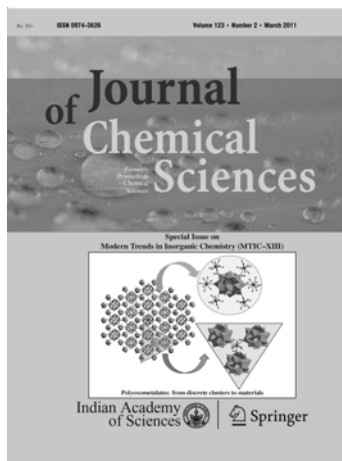
SPECIAL ISSUES OF JOURNALS

Modern trends in inorganic chemistry

Guest Editors: S Vasudevan and GU Kulkarni

Journal of Chemical Sciences, Vol. 123, No. 2, March 2011, pp. 95–239

This special issue is based on the invited lectures delivered at the thirteenth symposium on **Modern trends in inorganic chemistry** (MTIC) held at the Indian Institute of Science, Bangalore in December 2009. The MTIC series of symposia (held once in two years) have emerged as a primary forum for the scientific fraternity of the country to focus on the current status and future projections of research in frontier areas of inorganic chemistry. The topics covered span a wide range from organometallics, bio-inorganic chemistry and catalysis to materials chemistry that reflect the current trends of research in inorganic chemistry in India.



Multiwavelength variability of blazars

Guest Editors: JH Fan, GE Romero, Z Shen, AC Gupta and Y Liu

Journal of Astrophysics and Astronomy, Vol. 32, Nos. 1/2, March/June 2011, pp. 1–358

The growing multi-wave-length space- and ground-based observing facilities have initiated a new era of observational astronomy. Blazars are among the most fascinating astronomical objects for multi-instrument observations because of their flux and



polarization variability across the whole electromagnetic spectrum.

This special issue comprises the scientific contributions presented at the conference on **Multiwavelength variability of Blazars** held at Guangzhou, China in September 2010. It also includes a series of invited reviews which were chosen to cover the various aspects of the conference topic. These reviews are supplemented with over 27 contributed talks and 45 poster presentations.

The first meeting dedicated to blazars was held at Pittsburgh, USA in 1978. The second was at Como, Italy in 1988, while the third was at Turku, Finland in 1998. The present conference (fourth) originally planned for 2008 was finally held in 2010 at Guangzhou University, Guangzhou, China.

This conference brought together about 120 participants from more than ten countries around the globe. The presence of such a large number of people from the international blazar community was particularly beneficial to the young Chinese research students and postdoctoral fellows. The Chinese government has significantly increased the budget for astronomy in recent years, a fact that helped this conference to provide a venue for the international community in the field to meet and interact with Chinese astronomers and enabled the consequent benefit of strengthening cross-cultural relations.

From a scientific point of view, a large number of new results on blazar variability was presented, encompassing the whole electromagnetic spectrum (from very high energy gamma-rays to radio) and various time scales. The talks highlighted the recent developments in blazar variability research mostly due to the effect of the new space and ground-based gamma-ray facilities.

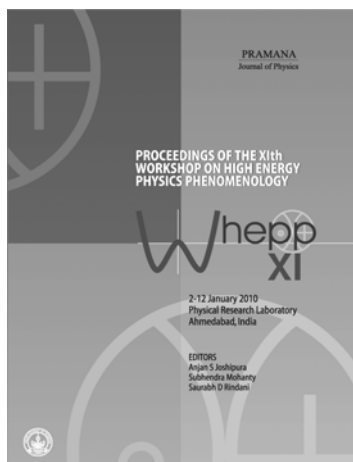
Proceedings of the XI Workshop on High energy physics phenomenology

Guest Editors: Anjan S Joshipura, Subhendra Mohanty, Saurabh D Rindani

Pramana, Vol. 76, No. 5, May 2011, pp. 691–818

The Eleventh Workshop on **High Energy Physics Phenomenology** was held at the Physical Research Laboratory, Ahmedabad in January 2010. It brought together a large number of active phenomenologists from all over the country and abroad. There were a total of 124 non-IMSc participants including 22 from abroad.

There were five working groups under which most of the activity of this workshop was organized: (1) astroparticle physics and cosmology; (2) non-perturbative QCD and QGP; (3) neutrinos and physics beyond standard model; (4) physics at LHC; and (5) B-physics. A summary of activities of these five working groups is included in the proceedings along with text of selected talks.



This Workshop was organized as a programme of the International Centre for Theoretical Sciences.

Proceedings of the Chandrasekhar Centenary Conference (CHANDRA 2010)

Guest Editor: T Padmanabhan

Pramana, Vol. 77, No. 1, July 2011, pp. 1–232

S Chandrasekhar was born on 19 October 1910. As a part of the birth centenary celebrations of this distinguished astrophysicist and Nobel Laureate, an international conference was organized at the Indian Institute of Astrophysics (Bangalore) in December 2010.



This conference was also sponsored by the Indian National Science Academy (New Delhi), Indian Academy of Sciences (Bangalore), the National Academy of Sciences, India (Allahabad), Inter-University Centre for Astronomy and Astrophysics (Pune), Tata Institute of Fundamental Research (Mumbai), Physical Research Laboratory (Ahmedabad), Harish-Chandra Research Institute (Allahabad), and Institute for Mathematical Sciences (Chennai).

This special issue contains written versions of the plenary lectures delivered at the meeting (excepting those by E Vishniac and R Wald who could not contribute). It was felt that a contemporary overview of

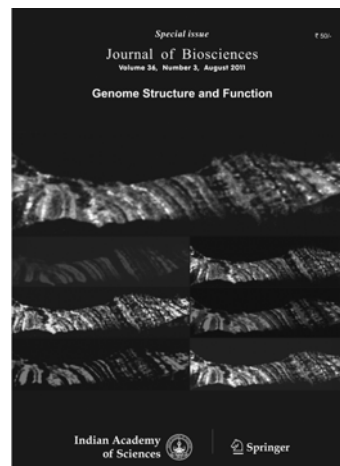
the different topics in astrophysics that Chandra had worked on would be of interest and useful to the physics community in India and abroad.

Genome structure and function

Guest Editor: JK Roy

Journal of Biosciences, Vol. 36, No. 3, August 2011, pp. 397–553

The science of genetics, a little over a hundred years old, has been ‘moulting’ rather rapidly: it has been 50 years from defining the laws of inheritance to unravelling the physico-chemical nature of hereditary material. Once discovered, genetic material became a subject of intense exploration and a tool to influence life in myriad different ways. Genetics engendered genomics, and now we are in the post-genomic era. Whole genomes are being unravelled and older concepts are gaining newer meaning. ‘Functional Genomics’, one of the byproducts of the post-genomics era, in itself is a big branch that ramifies into almost every sphere of biological sciences. Like any new development, it brings in newer findings, newer applications and newer challenges each day. Therefore, it was appropriate to organize an international conference on ‘**Functional genomics: challenges and prospects**’ at Banaras Hindu University from October 2–4, 2010. The conference had three symposia: developmental genetics and stem cells; molecular etiology of human diseases and epigenetics; and stress and non-coding RNA. The conference included 12 invited talks by eminent scientists from different parts of the world and 21 invited talks by leading scientists from India. The conference was attended by a large number of scientists and students from various institutions, including the past and present members of the cytogenetics family of BHU.



At the meeting S. C. Lakhotia was honoured and felicitated on his 65th birthday. Lakhotia born in Churu had his schooling and university education in Kolkata, completed master’s degree in zoology with the first rank. His doctoral work at Calcutta University under the supervision of S Mukherjee elucidated the cellular autonomy of dosage compensation mechanism in the fruit fly, *Drosophila melanogaster*. During his doctoral work, he discovered benzamide-

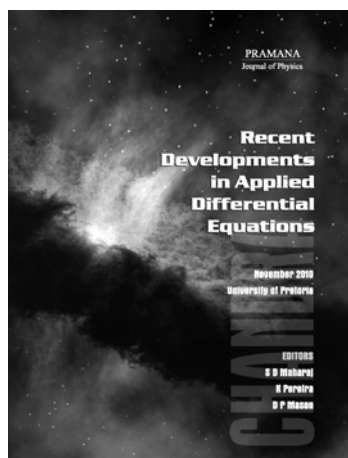
induced specific puff at the 93D locus in polytene chromosomes of *Drosophila melanogaster*, which set the course of his future research as narrated in the first article in this issue. On the wings of the 'fruit fly', he soared to great heights. He was honoured with the SS Bhatnagar Prize and the Fellowship of the three major Indian science academies.

After his post-doctoral fellowship with SRV Rao at Delhi University, he joined Burdwan University as Lecturer in 1971, then moved to Gujarat University in 1972 and later joined the Zoology Department of Banaras Hindu University in 1976 as Reader in cytogenetics. He served BHU with great distinction in various capacities: Professor of zoology; Coordinator, Centre of Advanced Study in Zoology; Head, Department of Molecular and Human Genetics; and Dean, Faculty of Science.

Chandrasekhar's centenary: Recent developments in applied differential equations

Guest Editors: SD Maharaj, K Pereira, DP Mason
Pramana, Vol. 77, No. 3, September 2011, pp. 405-597

Subrahmanyan Chandrasekhar was born on 19 October 1910. The year 2010 therefore marked the centenary of his birth. Chandrasekhar was a physicist and applied mathematician who made significant contributions to the structure and evolution of stars, stellar dynamics, radiative transfer, hydrodynamic and hydromagnetic stabilities, the mathematical theory of black holes in general relativity, and the theory of colliding gravitational waves. He also explained the geometry of Newton's Principia in terms of ordinary calculus. In a seminal paper, Chandrasekhar derived the limit named after him, which determines the maximum mass of a white dwarf star. A star with mass greater than the Chandrasekhar limit will collapse into a neutron star or a black hole. Chandrasekhar was awarded the Nobel Prize in Physics in 1983, jointly with W A Fowler, for his work on the structure and evolution of stars. A unifying feature of Chandrasekhar's research was his deep admiration and respect for differential equations and their various applications.



The Annual Congress of the South African Mathematical Society (SAMS) was held at the University of Pretoria in November 2010. The Council of SAMS agreed to dedicate a special session of the Congress to research related to the work of Chandrasekhar. The special session was organized jointly by the Astrophysics and Cosmology Research Unit, University of KwaZulu-Natal, and the Centre for Differential Equations, Continuum Mechanics and Applications, University of the Witwatersrand. This was the only special session of the SAMS conference, which is an indication of the high value that has been placed on the contributions of Chandrasekhar. The special session was entitled *Chandrasekhar centenary: Recent developments in applied differential equations* and attracted considerable attention. Several research papers with this focus were presented, a selection of which appeared in this special issue. It was hoped that the deliberations at this meeting would positively affect the course of future research in areas of research that were of interest to Chandrasekhar.

DISCUSSION MEETINGS

Present understanding and future directions on non-equilibrium materials processing

Orange County, Coorg
20 – 23 February 2011

Convener: BS Murty (IIT, Chennai)

ACADEMY PUBLIC LECTURE

How long is 1 metre? From ancient length units to modern concepts in metrology

Klaus von Klitzing
**(Max-Planck-Institut für Festkörperforschung,
Stuttgart)**

4 July 2011
Indian Institute of Science, Bangalore

Length measurements are as old as humanity itself. Together with time and mass measurements, they have



had a profound influence on all aspects of our lives, including trade, science and industrial developments. The presentation surveyed the development of these units, starting with an historical overview and concluding with the most recent developments where fundamental constants form the basis for units independent of space and time. In a surprising twist, the quantum Hall effect, which essentially represents a new type of electrical resistance, plays a crucial role for these modern aspects, and it may even be important for a new definition of kilogramme, the unit of mass.

SUMMER RESEARCH FELLOWSHIP PROGRAMME FOR STUDENTS AND TEACHERS

The summer research fellowship programme (SRFP) for students and teachers has now become a major activity of the Academy under its Science Education initiatives. Started on a small scale in 1995, it has grown rapidly in size. This is particularly so after the Indian National Science Academy (New Delhi) and the National Academy of Sciences India (Allahabad) joined with this Academy in 2007 in running this programme.

The following table gives information on the number of applications received and the number of fellowships awarded and availed in 2011.

	No. of applications received		No. of fellowships offered		No. of fellowships availed	
	Students	Teachers	Students	Teachers	Students	Teachers
1 Life Sciences	4154	258	486	86	435	69
2 Agricultural Sciences	184	10	6	6	5	5
3 Engineering & Technology	5162	151	218	7	161	5
4 Chemistry	1703	152	251	37	217	29
5 Physics	1438	126	198	37	161	28
6 Earth & Planetary Sciences	687	13	110	5	94	5
7 Mathematics	444	38	84	11	58	8
Total	13772	748	1353	189	1131	149
Grand Total	14520	1542	1280			

Many institutions in the country helped the programme by hosting summer fellows and providing them the necessary facilities such as laboratory support, accommodation etc. The following tables give information on (a) the cities in which ten or more summer fellows were placed and (b) institutions which hosted ten or more summer fellows in 2011.

Sl. No.	Cities (as hosts)	No. of SRFs
1	Bangalore	338
2	Delhi	200
3	Hyderabad	166
4	Kolkata	152
5	Mumbai	143
6	Pune	75
7	Thiruvananthapuram	52
8	Chandigarh	46
9	Chennai	44
10	Kanpur	23
11	Dona Paula, Goa	23
12	Varanasi	18
13	Ahmedabad	15
14	Lucknow	14
15	Nainital	13
16	Manesar	13
17	Indore	13
18	Allahabad	13
19	Mysore	12
20	Kharagpur	12
21	Dehradun	11
22	Bhavnagar	11
23	Vellore	10

Sl. No.	Institutions (as hosts)	No. of SRFs
1	IISc, Bangalore	248
2	Univ. of Hyderabad	66
3	IIT, Mumbai	58
4	IISER, Kolkata	51
5	BARC, Mumbai	46
6	IISER, Mohali	42
7	Univ. of Delhi (North/South campus)	36
8	NCL, Pune	29
9	NII, New Delhi	28
10	IISER, Trivandrum	27

Sl. No.	Institutions (as hosts)	No. of SRFs
11	CDFD, Hyderabad	24
12	ICGEB, New Delhi	24
13	IIT, Kanpur	23
14	NIO, Dona Paula, Goa	23
15	IIT, New Delhi	22
16	ISI, Kolkata	21
17	IISER, Pune	20
18	TIFR, Mumbai	18
19	BHU, Varanasi	18
20	CCMB, Hyderabad	18
21	JNCASR, Bangalore	17
22	AIIMS, New Delhi	17
23	IIT, Chennai	17
24	JNU, New Delhi	17
25	NPL, New Delhi	17
26	Bose Institute, Kolkata	16
27	NGRI, Hyderabad	15
28	RRI, Bangalore	14
29	PRL, Ahmedabad	14
30	SINP, Kolkata	13
31	ARIES, Nainital	13
32	NBRC, Manesar	13
33	IMSc, Chennai	12
34	IACS, Kolkata	12
35	IICT, Hyderabad	12
36	IIT, Kharagpur	11
37	CSMCRI, Bhavnagar	11
38	ICT, Mumbai	11
39	NCBS, Bangalore	10
40	HRI, Allahabad	10
41	IGIB, Delhi	10
42	Univ. of Calcutta	10

Many institutions in the country were also benefitted by the programme as several of their own students and teachers got selected under the programme and got an opportunity to work at institutions elsewhere. The following is a list of such institutions from where ten or more summer fellows got selected in 2011.

Sl. No.	Institutions benefitted by SRFP	No. of SRFs
1	IIT, Roorkee	50
2	IIT, Kharagpur	44
3	IISER, Kolkata	40
4	NIT, Surathkal	40
5	Univ. of Hyderabad	37
6	SASTRA University	35
7	BHU, Varanasi	34
8	IIT, Kanpur	33
9	Pondicherry University	31
10	NIT, Warangal	29
11	NIT, Rourkela	23
12	Bharathidasan University	22
13	IISER, Pune	21
14	Jadavpur University	21
15	IISER, Mohali	20
16	VIT, Vellore	20
17	IITB, Mumbai	19
18	Anna University, Chennai	18
19	University of Calcutta, Kolkata	18
20	IITM, Chennai	17
21	Madurai Kamaraj University	16
22	University of Madras	16
23	Andhra University	15
24	CUSAT, Cochin	14
25	BITS, Goa	12
26	St. Stephens, New Delhi	12
27	University of Delhi	12
28	Institute of Bioinformatics and Biotechnology, Pune	11
29	NIT, Calicut	11
30	A.C. College of Technology, Chennai	10
31	Bharathiar University, Coimbatore	10
32	BITS, Pilani	10
33	IIT, Guwahati	10

This activity of the Academies has received enthusiastic response from both the faculty who acted as guides as well as the students and teachers who availed the fellowship.

In order to strengthen this programme, it is necessary to have more guides. Another area of concern is that about 15–20% of the fellowships are not fully availed by the candidates for reasons such as health and family problems, taking up other opportunities, leave difficulties etc. It will be our endeavour to take corrective measures to minimize such drop-outs.

As part of the Summer Fellowship Programme, a get-together of the students and teachers with mentors and Science Panel members was held on 29 June at INSA, New Delhi and on 2 July at IISc, Bangalore. At Bangalore the Academy also arranged two popular lectures for the



benefit of students and teachers working at Bangalore. Sriram Ramaswamy (IISc, Bangalore) spoke on 'self-driven matter' on 17 June 2011 and MRN Murthy (IISc, Bangalore) spoke on 'twists and turns of protein structures' on 24 June 2011.

REFRESHER COURSES

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

A. Refresher Courses in Experimental Physics

The Refresher Courses on Experimental Physics were held under the direction of R Srinivasan who was instrumental in the conceptualisation and designing of the experiments with the assistance of a group in Goa University. These experiments are useful for the laboratory programmes at BSc and MSc levels and many universities in the country have adopted these experiments as part of their curricula. In order to conduct the Refresher Courses, a user-friendly kit containing several components has been developed and these are now being manufactured under licence by a company in Bangalore: M/s Ajay Sensors and Instruments.

In 2010, the Academy set up an experimental physics laboratory in Bangalore. It will now be possible to hold 4 to 6 courses in Bangalore besides courses that will be held in other parts of the country.

Some of the experiments that can be done with the kit are listed below:

1. Calibration of a silicon diode and a Cu-Constantan thermocouple against Pt 100 thermometer
2. Temperature coefficient of resistance of copper
3. Load regulation of the constant current source
4. High resistance by leakage
5. Stefan's constant
6. Thermal and electrical conductivity of copper
7. Thermal diffusivity of brass
8. Law of addition of capacities, dielectric constant of benzene and dipole moment of acetone
9. Measurement of impedance of an inductance and capacitance as a function of frequency, series and parallel resonant circuits
10. Passive filters – low pass, high pass and band pass
11. AC Bridges (Maxwell's, DeSauty's and Anderson's Bridges)
12. Thermal relaxation of a serial light bulb
13. Study of the lock-in amplifier and its calibration
14. Measurement of mutual inductance with a lock-in-amplifier
15. Measurement of low resistance with a lock-in-amplifier

At every course, a series of lectures are held to help the participants in conducting the experiments and problem-solving sessions.

The following is a list of Experimental Physics Refresher Courses held with R Srinivasan as the Course Director. These form course numbers 26 to 31 in this series.

1. XXVI. Ramakrishna Mission Vivekananda College, Chennai

18 January – 2 February 2011

Co-ordinator: K Elankumaran (RMVC)

2. XXVII. Bangalore, IASc

22 March – 6 April 2011

No. of participants: 27 from Bangalore, Chitradurga, Coimbatore, Dhenkanal, Guntakal, Guntur, Gurgaon, Hooghly, Kadapa, Ranchi, Talcher, Thalavady, Vadodara, Vidyanagar

Resource Persons: R Srinivasan (Mysore), Sarbari Bhattacharya and K Rukmani (Bangalore University),

XXVII REFRESHER COURSE IN EXPERIMENTAL PHYSICS



INDIAN ACADEMY OF SCIENCES BANGALORE, 22 MARCH-6APRIL 2011

SG Bubbly and SB Gudennavar (Christ University, Bangalore), Seeta Bharati (Bangalore), TG Ramesh (NAL, Bangalore).

Special Lectures: electron paramagnetic resonance (SV Bhat); laser cooling of atoms and liquid crystals (Hema Ramachandran and NV Madhusudana).

3. XXVIII. KIIT University, Bhubaneswar

16 – 31 May 2011

Co-ordinator: RN Mukharjee (KIIT University)

4. XXIX. SICES Degree College of Arts, Science and Commerce, Ambernath

7 – 22 June 2011

Co-ordinator: Maheshwar Sharon (SICES)

No. of participants: 15 from Ambernath, Bhiwandi, Kalyan, Navi Mumbai, Solapur, Thane, Ulhasnagar, Vikroli.

Resource Persons: R Srinivasan (Mysore), Chakra Deo (CHM College, Ulhasnagar), RT Sapkal (Kolhapur University), Manohar Nyayate (B.N. Bhandodkar College of Science, Thane), R Nagarajan (University of Mumbai).

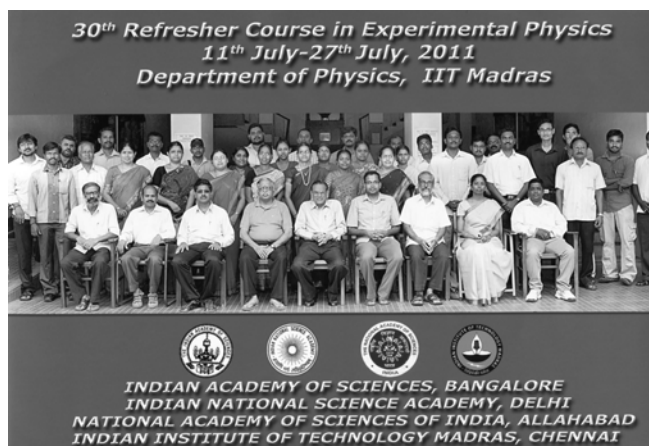
Special lectures: Bio-nanotechnology (Madhuri Sharon); Liquefaction of helium and the discovery of superconductivity (R Nagarajan).

5. XXX. IIT, Madras, Chennai

11 – 27 July 2011

Co-ordinator: C Vijayan (IIT, Madras)

No. of participants: 36 from Bangalore, Chennai, Hyderabad, Karaikal, Mysore, and Pondicherry.



Resource Persons: G Vinitha (VIT University, Chennai), K Elankumaran (RMVC, Chennai), Prahallad Padhan and N Harish Kumar (IIT, Chennai).

Special lectures: Workshop on innovative experiments (Umesh Kadhane); experiments in nuclear physics (Prasanna Behera); from concept to realization (Prita Nair); lasers and you (Prem Bisht); LHC: experiments and expectations (James Libby).

6. XXXI. Don Bosco Institute of Technology, Bangalore

8 – 23 August 2011

Co-ordinator: HS Puttanna (Don Bosco Institute of Technology)

Other Refresher courses:

7. Foundations of physics

Bengal Engineering and Science University (BESU), Shibpur

16 – 26 May 2011

No. of participants: 24 students from institutions in Kolkata and Howrah

Course Director: AK Mallik (BESU)

Course Co-ordinator: BK Guha (BESU)

Resource Persons: AK Mallik, S Sarkar, BK Guha (BESU), JK Bhattacharya (SN Bose Centre, Kolkata), A Datta (Dinabandhu College, Howrah).

This was the second such course organized by the University after the first one in May, 2010. This programme consisted of thirty-five lectures of one hour duration on each day. The topics of lectures covered in



the course were (a) Newtonian mechanics and non-linear dynamics; quantum theory; electricity, magnetism and special theory of relativity; thermodynamics and statistical mechanics, optics.

There were special lectures on solar system and stellar evolution (Debiprasad Duari, M P Birla Planetarium); elementary particles and field theory (Soumitra Sengupta, IACS, Kolkata); high energy physics (Palash Baran Pal, SINP, Kolkata); Optimization technique and fuzzy logic (Tapan Kumar Roy, BESU).

Demonstrations and experiments were also conducted for the participants during this course. They include optics: experiments on reflection and refraction of light using laser source; refraction through a prism; polarization using polaroids; interference using Fresnel's biprism experiment on diffraction using single slit; acoustics: experiment on open tube resonance showing formation of nodes and antinodes, resonance tube with end corrections; Oscillations: large amplitude oscillations of a pendulum, ring pendulum, assembly of ring pendulums, forced vibration of a cantilever beam; a falling sheet of paper and the role of air resistance and how a parachute works; the ring magnets in repulsive mode and the free fall of the system; how a light ring connected with a string that passes over a peg drops down. Physics of rotational motion: role of critical observation and designing of experiment; movement of the fingers supporting a uniform ruler and the identification of the centre of mass; Archimedes Principle and finding out where the apparent loss of weight goes; a few experiments involving measurements of specific gravity of solids with only length measurement using a uniform beam and applying the principle of moments; explaining the generation of sound and Doppler effect; explaining the colours of the sky and stop traffic signal and the role played by the scattering of light; different ways of breaking the ruler by bending, role of bending moment and the explanation for the positions of the beams under the bridge or flyover; the jumping ball (involving the conservation of linear momentum); the role of the measuring device: measuring

voltages across the capacitors connected in with a multimeter; balancing three knives (equilibrium of forces). There were talks on Fermi problems involving order of magnitude calculations, logical thinking and the art of making realistic assumptions for the grasping of the real life situations.

Books on fundamentals of physics (Halliday Resnick and Walker) and the character of physical law (Richard P Feynman) were distributed to the participants.

8. Motivational Bridge Course in Mathematical methods in Physics & Laboratory practices for I and II year B.Sc. students

Deogiri College, Aurangabad

15 June – 9 July 2011

No. of participants: 65



Course Director: S Ananthkrishnan (University of Pune)

Course Co-ordinators: RH Ladda (Latur), AL Choudhari (Aurangabad)

Resource Persons: S Ananthkrishnan, PN Sen and RN Karekar (University of Pune), Atul Mody (Vivekanand Society's Arts, Commerce and Science College, Mumbai), JV Narlikar (IUCAA, Pune), MJ Narlikar (Bhaskaracharya Pratishthana, Pune), CK Desai (Bajaj Science Centre, Wardha), AL Choudhari, GS Raju, PB Patil, SH Behere (Aurangabad), Shirish Pathare (Homi Babha Centre for Science Education, Mumbai), VH Raybagkar (SSR College of Arts, Commerce and Science, Silvassa), R Nagarajan (University of Mumbai), SD Deshpande, SS Patil (Dr Babasaheb Ambedkar Marathwada University, Aurangabad), SK Vyawahare and MN Sarnaik (Deogiri College, Aurangabad), SM Rampurkar (Majalgaon College, Majalgaon), Ajay Mahajan (Dayanand Science College, Latur), MI Iqubal (Maulana Azad College, Aurangabad).

LECTURE WORKSHOPS

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

1. Forests as carbon sinks

University of Agricultural Sciences, Bangalore
9 – 11 March 2011

Convener: KN Ganeshaiyah (UAS)

Co-ordinator: AS Devakumar (UAS)

Speakers: NH Ravindranath, R Sukumar and Renee Borges (IISc, Bangalore), James Jacob (Rubber Research Institute of India), MK Yadav (PRL, Ahmedabad), MD Behra (IIT, Kharagpur), KN Ganeshaiyah (UAS), KC Jha, BR Ramesh, M Sanjappa (Howrah), GS Pujar, Rajesh Gunaga, BN Satish, YB Srinivasa, ARV Kumar, Sridhar Vijaykrishnan, Padma Venkat (FRLHT), Amit Agarwal (Natural Remedies Ltd), BS Vishwanath (Mysore University), K Santhosh Kumar (RGCB), R Ramesh, Prashant Patil, GM Devgiri (College of Forestry, Ponnampet), DK Ved, R Vasudeva, Ravi Prasad Rao, Uma Partap.



Participants: 134 students and faculty from various colleges in Bangalore.

Topics of lectures: Pollination and food security; mapping bio-rich areas of the country; diversity of Indian legumes; forest landscape analysis for biodiversity conservation; regional scale contiguity of vegetation; satellite remote sensing based assessment using IRS P6 data; floristic composition and conservation value of Brahmagiri wildlife sanctuary; tropical dry forests in ecological services in India; anthropogenic pressures affecting elephant habitat utilization patterns and foraging behaviour in Jaccanari reserve forests; ethno-pharmacology and bioprospecting in India; snake venom and calotropis; peptidal antibiotics from frogs;

uncertainties in forest carbon assessment; carbon estimation using field inventory; aerospace data and geographic information system in Yamunanagar district; estimation of AGB and carbon using remote sensing and geographic information system in South Western parts of Karnataka; species recovery programmes in India; conservation of cycads; pollinators in mountain ecosystems.

2. Recent advances in biology

Manipur University, Imphal
28 – 29 March 2011

Convener: K Muniyappa (IISc, Bangalore)

Co-ordinators: Upendra Nongthomba (IISc, Bangalore)
DS Ningthoujam (Manipur University)

Speakers: K Muniyappa, Upendra Nongthomba, Deepak Saini, Rajan Dighe (IISc, Bangalore), DS Ningthoujam (Manipur University), Chitra Mandal (IICB, Kolkata).



Participants: 119 students and faculty from Manipur University and other institutions in Imphal.

Topics of lectures: Genomics of microbial pathogens and discovery of new antimicrobial agents; role of ubiquitination in muscle disease and function; actinomycetes: treasure trove of bioactive secondary metabolites; exploration of Indian potential herbal sources for future new drugs; telomere and telomerase: their implications in human health and disease; sugar plays mysterious role in diagnosis and therapy of leukemia patients; living cells under the microscope; expression, characterization and purification of recombinant proteins; actinobacteria; revisiting signalling paradigms in living cells; glycoprotein hormone-receptor interactions; model organisms and drug discovery.

3. Nonlinear Dynamics

Tezpur University, Tezpur
26-28 April 2011

Convener: AV Khare (IISER, Pune)

Co-ordinator: PK Karmakar (Tezpur University)

Speakers: AV Khare (IISER), M Lakshmanan (Bharathidasan University, Tiruchirapalli), PK Panigrahi (IISER, Kolkata), PK Karmakar (Tezpur University), J Banerji (PRL, Ahmedabad), A Kundu and AN Sekar Iyengar (SINP, Kolkata), SP Chakrabarty (IIT, Guwahati)



Participants: 150 teachers and students from Tezpur and other colleges from North-East region

Topics of lectures: An elementary introduction to chaos and bifurcation; nonlinear dynamics – a science of complexity; an introduction to integrable models; solitons in Bose-Einstein condensates; nonlinear fluctuation dynamics in self-gravitating solar plasma; nonlinear energy spectrum and fractional revival of wave packets; generating Schrödinger cats with sub-planck spots; topological charge in field theory and its application; mathematical modelling and analysis of Hepatitis C Viral dynamics; nonlinear dynamics experiments in plasmas; integrable system and application to optical soliton communication; application of Monte Carlo techniques in pricing of exotic options.

4. Mathematical analysis

Amrita School of Arts and Sciences, Kollam
20 – 22 June 2011

Convener: Mythily Ramaswamy (TIFR-CAM, Bangalore)

Co-ordinator: PV Ushakumari (Amrita School of Arts and Sciences)

Speakers: AK Nandakumaran (IISc, Bangalore), KSS Moosath (IIST, Thiruvananthapuram), V Krishna



Kumar (Amrita Vishwa Vidyapeetham), K Sandeep and Mythily Ramaswamy (TIFR-CAM).

Participants: 47 teachers and students from Amrita Vishwa Vidyapeetham and nearby colleges.

Topics of lectures: Analysis and limitations of Riemann integration; L^1 -spaces, duals; bibliography of partial differential equations; Lebesgue measure; Lebesgue integral; convergence theorems; fundamental solution; distribution theory; distribution derivative; Sobolev space.

5. Statistical mechanics

Nehru Arts and Science College, Kanhangad
15 – 17 July 2011

Convener: M Lakshmanan (Bharathidasan University, Tiruchirapalli)

Co-ordinator: KM Udayanandan (Nehru Arts and Science College)

Speakers: M Lakshmanan (Bharathidasan University), KPN Murthy (University of Hyderabad), R Rajesh (IMSc,



Chennai), V Balakrishnan (IIT, Chennai), Chandan Dasgupta (IISc, Bangalore).

Participants: 107 students and teachers in colleges and university in Kerala

Topics of lectures: Hamiltonian dynamics, chaos and statistical aspects; basic ideas of statistical mechanics/ensembles/partition function/various features of the three ensembles and comparison; formulation of quantum statistical mechanics; B-E and F-D statistics and phase transitions; random walk and Brownian motion; non-equilibrium statistical mechanics; cluster expansion; Ising model and lattice gas.

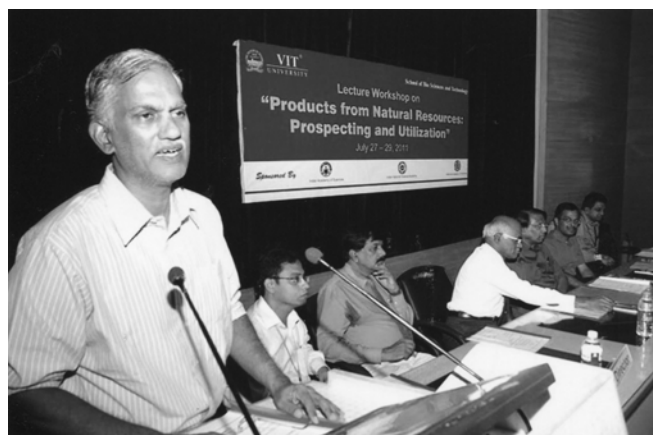
6. Products from natural resources: Prospecting and utilization

VIT University, Vellore
27 – 29 July 2011

Convener: R Uma Shaanker (UAS, Bangalore)

Co-ordinator: R Siva (VIT University)

Speakers: S Ramaswamy (NCBS, Bangalore), BS Viswanath (University of Mysore), R Uma Shaanker and K Chandrasekara (UAS), K Santhosh Kumar (RGCB, Thiruvananthapuram), R Siva (VIT University),



T Suryanarayanan (Chennai), G Ravikanth (ATREE, Bangalore), KV Krishnamurthy (Bharathidasan University, Tiruchirapalli), GA Ravishankar (CFTRI, Mysore).

Participants: 215 students and faculty from universities and colleges in Tamil Nadu

Topics of lectures: Biocatalysis; procoagulants from plant latex; bioprospecting; anti microbial peptides from frogs; drugs from bugs; plant dyes; fungi and their bioprospecting; ecological niche model; evolution of natural products; biotechnological production and utilization of algal metabolites.

7. Nano Science & Technology: A sustainable future

Mody Institute of Technology & Science,
Sikar, Rajasthan
5 – 6 August 2011

Convener: AK Ganguli (IIT, Delhi)

Co-ordinator: Amlan Kumar Das and Rama Ranjan Bhattacharjee (MITS)

Speakers: AK Ganguli and Manish Sharma (IIT, Delhi), Amitava Patra (IACS, Kolkata), Arun Chattopadhyay (IIT, Guwahati), BLV Prasad (NCL, Pune).



Participants: 215 students and faculty from universities and colleges in Tamil Nadu

Topics of Lectures: Micro emulsion-based synthesis of nanostructures and their applications; the advent of nanotechnology; everyone will be a chemist one day; scanning probe microscopy techniques for studying magnetic nanostructures; chemical approaches to nanotechnology; magnetic nanoparticles for biological sensing; monodispersity, superlattices, nanomachining; design of nano-structured materials with tailored properties; water-dispersible biomolecule conjugated nanoparticles and their applications; new light sources based on RE doped NP.

8. Progress and prospects of biological sciences

Burdwan Raj College, Burdwan
16 – 17 August 2011

Convener: Aparna Dutta-Gupta (University of Hyderabad)

Co-ordinator: AK Chattopadhyay (Burdwan Raj College)

Speakers: Samir Bhattacharya (Visva-Bharati, Santiniketan), SC Nandi (Burdwan Raj College), Susanta Roy Choudhury (IICB, Kolkata), Asok Kumar



Mukherjee and SK Ghosal (Burdwan), D Chattopadhyay (University of Calcutta), Aparna Dutta-Gupta (University of Hyderabad), Anupam Basu (University of Burdwan).

Participants: 198 students and faculty from colleges in Burdwan

Topics of Lectures: Ethnobotany; unravelling the mystery of life – from genes to diseases; nano-technology in biomedical sciences; excitements in biology; genetic abnormalities of human; bioinformatics; how to define a problem and how a problem can be solved.

9. A road map to higher learning in mathematics

Christ University, Bangalore
22 – 23 August 2011

Convener: Mythily Ramaswamy (TIFR-CAM, Bangalore)

Co-ordinator: Mayamma Joseph (Christ University)

Speakers: Mythily Ramaswamy and K Sandeep (TIFR-CAM), Kaushal Verma (IISc, Bangalore), B Sury (ISI, Bangalore).

Participants: 82 students and faculty from Christ University and colleges in Bangalore

Topics of Lectures: Analysis; linear algebra; group theory; number theory; multivariable calculus.



10. Applications of nonlinearity in physics

Fatima College, Madurai
25 – 26 August 2011

Convener: M Lakshmanan (Bharathidasan University, Tiruchirapalli)

Co-ordinator: S Arulmozhi Packiasseeli (Fatima College)

Speakers: M Lakshmanan and S Rajasekar (Bharathidasan University), V Ramakrishnan (MKU, Madurai), K Porsezian (Pondicherry University), G Ananthakrishna (IISc, Bangalore), K Murali (Anna University, Chennai).

Participants: 147 students and faculty from Fatima and colleges around Madurai

Topics of Lectures: Nonlinear dynamics; bifurcations and chaos; nonlinear optics; solitons in nonlinear optics and Bose Einstein condensates; nonlinearity in condensed matter; nonlinear electronics.



11. Recent trends in chemical sciences

Amrita School of Arts and Science, Kollam
26 – 27 August 2011

Convener: R Ramaraj (Madurai Kamaraj University)

Co-ordinator: Zeena S Pillai (Amrita School of Arts and Science)

Speakers: D Ramaiah, MLP Reddy (NIIST, Thiruvananthapuram), P Thilagar (IISc, Bangalore), CT Aravindakumar (MG University, Kottayam)



Participants: 110 students and faculty from Amrita and other colleges in Kollam

Topics of lectures: Photodynamic therapy; lanthanide coordination complexes; biomolecular recognition; environmentally benign NIR reflecting rare earth-based inorganic pigments as energy saving materials; proteasome as a therapeutic target in cancer; boron chemistry and boronopeptides; millisecond to femtosecond molecular mechanism in DNA radical chemistry; Green chemistry'.

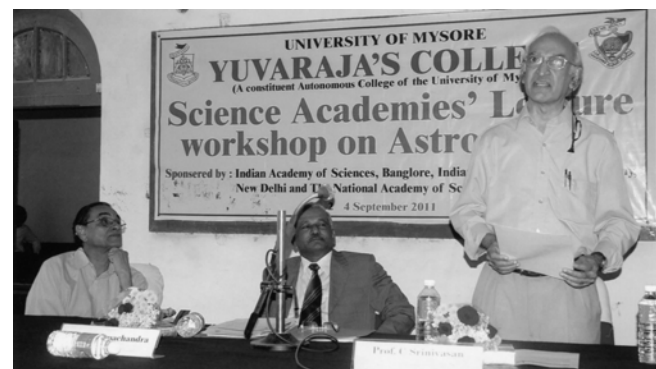
12. Astrophysics

Yuvaraja's College, Mysore
2 – 4 September 2011

Convener: R Srinivasan (Mysore)

Co-ordinator: CB Ramachandra (Yuvaraja's College)

Speakers: G Srinivasan (Bangalore), Biman B Nath and N Udaya Shankar (RRI, Bangalore), P Sreekumar (ISRO, Bangalore).



Participants: 121 students and faculty from Yuvaraja's and other colleges in Mysore

Topics of lectures: The birth and death of stars; the mysterious universe; radio astronomy; x-ray astronomy.

13. Mathematics

Karnatak University, Dharwad
24 – 26 September 2011

Convener: NM Bujurke (Karnatak University)

Co-ordinator: B Basavanagoud (Karnatak University)

Speakers: NM Bujurke, HB Walikar, SS Benchalli, SS Bhoosnurmath, (Karnatak University), S Thangavelu (IISc, Bangalore), GD Veerappa Gowda, AS Vasudeva Murthy, PS Datti (TIFR, Bangalore).

Participants: 120 students and faculty from Department of Mathematics, Statistics and Computer Science and colleges in Hubli and Dharwad.

REPOSITORY OF SCIENTIFIC PUBLICATIONS OF ACADEMY FELLOWS



Topics of lectures: Function spaces in harmonic analysis; an overview of general and fuzzy topology; P and NP problems; hyperbolic/wave equations; laplace/potential equations; parabolic/heat equations; linear algebra; applications of graph theory in google; Ramanujan: glimpse of his life and work.

14. Current trends in biotechnology

Dayananda Sagar College, Bangalore
30 September –1 October 2011

Convener: KA Natarajan (IISc, Bangalore)

Co-ordinator: Shobha K Jayanna (Dayananda Sagar College)

Speakers: KJ Rao, KA Natarajan, TN Guru Row and V Nagaraja (IISc, Bangalore), KN Sridhar (Sri Research for Tissue Engineering, Bangalore), PS Rao, KV Ramesh (Dayananda Sagar College).



Participants: 170 students and faculty from Dayananda and other colleges in Bangalore

Topics covered: Synthetic bone grafting; tissue grafting in human beings; bioleaching of metals; polymorphism in drugs; tissue culture in plants; biological fuel cells; effluent treatment using microorganisms; metagenomics.



For several years the idea of setting up a repository of all scientific publications of Academy Fellows (present as well as past) has been under discussion and consideration. The estimated numbers are, approximately, 1,580 Fellows (980 present and 600 past) and 75,000 publications. Such a repository would make available a valuable resource of scientific work in the country over the past century.



Phase I of this project was entrusted to Messrs. Informatics (India) Ltd. to be carried out during the period July 1 to December 31, 2010. At its completion the records in the Repository numbered as follows:

Number of papers with only metadata is 30,000 of which the number of papers with metadata and full text is 8,142. The total cost of completing Phase I amounted to Rs. 14.5 lakhs.

This digital repository was inaugurated by the President Prof. A. K. Sood on 30th September 2011 at the Academy Auditorium.

Work on Phase II has been underway since April 1, 2011.

OBITUARIES



Vallabhaneni Sita Rama Das (elected 1975)

An eminent botanist and plant physiologist passed away at the age of 77 years, on 9 December 2010 at Vijayawada, Andhra Pradesh, following a brief illness. With his demise, botanists, particularly plant physiologists of our country have lost an eminent scientist and excellent teacher. His unique strength was his excellent knowledge of not only plant physiology, but also plant systematics and morphology, which is a rare combination of expertise.

Vallabhaneni Sita Rama Das was born on 5 February 1933 in Gudlavalleru village, (Krishna district) of AP. He had his early education at the Hindu College, Machilipatnam (AP), obtained his B.Sc. (with botany, zoology and chemistry) at Andhra University, (Waltair) in 1951 and his M.Sc. degree in botany in 1953 from University of Delhi. He then moved to Sweden as a research fellow with a renowned mycorrhizal expert, Elias Melin, for about a year and then to University of Oxford, UK to work with an internationally acclaimed plant physiologist, WO James. Rama Das was awarded D.Phil. (1957) for his classic work on isolated chloroplasts. He could not only isolate, for the first time, functional chloroplasts from spinach leaves but also demonstrated that they do not respire as mitochondria do.

After returning from Oxford he started his professional career as an Assistant Professor in the Department of Botany, University of Allahabad during 1957-1959. The urge for contemporary research made him to go to University of California, Berkeley (1959-1960) to work with Daniel I. Arnon, a legendary photosynthesis expert, famous for his unequivocal demonstration of photosynthetic electron transport and photo-phosphorylation in isolated chloroplasts. Rama Das

came back in 1960 to join as a lecturer in the Department of Botany at Sri Venkateswara University (SVU), Tirupati and was promoted as a Reader in Botany in 1967. During 1967-1969, he took leave to be an Associate Professor at the Memorial University, Newfoundland (Canada). Rama Das returned to India to assume charge as Reader and Head of the Department of Botany (1969) at SVU and then became Professor and Head of Botany. To sum up, he had an excellent academic career at SVU spanning almost three decades (1960-88).

Between 1978 and 1980, he worked at the School of Life Sciences, University of Hyderabad (UoH) as Professor, returned to SVU in 1980 and again rejoined UoH in 1988. After formal superannuation (1993), he continued to be in UoH as CSIR Emeritus Scientist and later Professor Emeritus until 1999. He was also the Director of the CSIR Complex (later renamed Institute for Himalayan Bioresource Technology) at Palampur for a short period during 1991-92.

Rama Das was a successful researcher with excellent contributions in plant physiology, plant biochemistry and agriculture. He had over 200 research publications to his credit. In recognition of his contribution to the field of plant physiology, he was bestowed with several awards and recognitions. He was elected Fellow of Indian Academy of Sciences (1975), Indian National Science Academy (1978) and founder fellow of National Academy of Agricultural Sciences (1991). He was twice UGC National Lecturer (1978-1979 and 1985-1986) and recipient of the meritorious University Teacher Award (1981) by the AP Government. He received the JJ Chinoy Memorial Medal of the Indian Society for Plant Physiology (1978), Birbal Sahni Medal of the Indian Botanical Society (1985), Jagadish Chandra Bose Award of UGC (1991), SM Sircar Memorial Medal of University of Calcutta (1986), Honor summus Medal of Watumull Foundation, USA, (1987) and the SB Saxena Memorial Award of INSA (1996). He was the Editor of *Indian Journal of Plant Physiology* and served on the Editorial Boards of several journals.

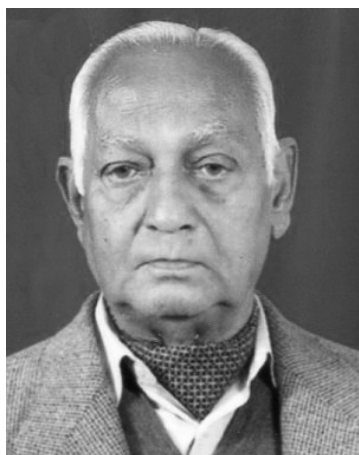
The major contributions of Rama Das were in the areas of C_3 , C_4 and CAM photosynthetic systems, stomatal movement and physiology of herbicidal action. His findings include: discovery and characterization of several C_4 plants in local flora, the direct role of chloroplasts in the pathway of rubber biosynthesis in guayule, occurrence of CAM in non-succulent shrub species, discovery of novel growth regulatory substances, phenolics in lower plants and bioenergetics of guard cells in relation to stomatal function. At UoH, he developed a fascination for heliotropic leaf movements

in plants, which he perceived as an important adaptation to optimize photosynthesis under high light stress.

Rama Das would be remembered for establishing strong schools of plant physiology in India, particularly in photosynthesis, first at the Department of Botany at SVU, and later at UoH. Twenty students obtained PhD under his supervision.

After his superannuation and movement away from UoH, he continued to lead an active academic life. He moved to Nagarjuna University as INSA Honorary Scientist and Visiting Professor and taught MSc students for several years. During these years, he published a Book "Photosynthesis – Regulation under varying light regimes". Despite his fragile health, he visited SVU to deliver the keynote address at the International Seminar on Medicinal Plants and Herbal Products during March 2008. He leaves behind his wife (Ahalya) one son and daughter.

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Mahendra Nath Bose (elected 1982)

Mahendra Nath Bose, former Director of the Birbal Sahni Institute of Palaeobotany (BSIP), Lucknow passed away peacefully on 27 April 2011 at Gurgaon (Haryana). It was a great loss to his many admirers in palaeobotany, botany and geology in India and abroad. He was equally at ease with living and fossil plants.

Bose was born on 3 March 1925 at Jainagar-Majilpur, West Bengal to Satyendra Nath and Suprabha Bose as the elder son of the two siblings. His brother AN Bose was a renowned physical chemist. His ancestors were from a renowned Bengali family of Lucknow and his almost six generations lived in this city of Nawabs. A road in old Lucknow is named after M N Bose's

grandfather who was a famous homeopath Doctor. Young Bose had his schooling in Lucknow's Queens Anglo Bengali School and passed his B.Sc. (1944) and M.Sc. (1946) in Botany from Lucknow University. He was greatly influenced by the late Birbal Sahni, FRS and joined him as Research Assistant for his Ph.D in Botany. Unfortunately, Sahni passed away in 1949 and he completed his PhD under R V Sitholey in 1953.

Bose joined the Institute of Palaeobotany founded by the late Birbal Sahni in 1949 as a Lecturer, became Reader in 1956, Assistant Director in 1961 and finally its Director in 1985. His major contribution has been on the Mesozoic palaeobotany of India and Mesozoic and Palaeozoic palaeobotany of Zaire. His studies on the fossil flora led to a revision of the classification of the Lukuga Group. His immense work on the Mesozoic flora of India coupled with palynological data shed further light on the precise Mesozoic stratigraphy of India. He also worked on the Lower Cretaceous of Arctic region and made significant contributions of fossil Clitellate cocoons and Psilophyte? like leaves. His monograph on Indian species of Ptilophyllum, Otozamites, Weltrichia, Dictyozamites and Mesozoic flora of Kachch is a landmark in the field of palaeobotany well quoted by palaeobotanists the world over.

After retirement from BSIP in 1985, he joined the Geology Department of the University of Oslo, Norway and remained an active researcher until 1990. Returning to India, Bose was the main architect in founding the BSIP Pensioners' Welfare Society in Lucknow.

Bose was deeply influenced by some of the very famous and prominent palaeobotanists besides Birbal Sahni. He received research guidance from several internationally acclaimed scientists including TM Harris, FRS, at Reading (UK), OH Selling, Director, Palaeobotany Section, Ricks Museum, Stockholm and Ove Arbo Hoeg, University of Oslo (Norway).

During his long tenure as Head of the Department of Mesozoic Palaeobotany (1955-1980) at BSIP, he guided many PhD students who later made significant contributions in the field of Mesozoic palaeobotany and palynology. They include S K Roy, K P Jain, Sukh Dev, M L Kasat, Shyam C Srivastava, P Pal and B N Jana. With his vast team of students and associates, Bose undertook several excursions to collect fossil plants to study geological information

leading to many new discoveries in Indian Mesozoic palaeobotany. Many new fossil localities were discovered and their studies gave a comprehensive and precise picture of Mesozoic palaeobotany such as Jurassic-Lower Cretaceous and Triassic. In short, he was instrumental in creating a strong base for research in Mesozoic palaeobotany and for putting the Sahni Institute on the world map of this branch of palaeobotany.

Bose undertook important expeditions in India besides Mesozoic fossiliferous localities. To mention a few, he went up to Pindari Glacier, Rupkund with anthropology experts, to Spiti (with Ove Abro Hoeg) in quest of early land plants, to Jongri Sikkim Himalayas with Japanese scientists, to Spits Bergen with Norwegian scientists and to Zaire with African geologists. He collected fossil and living plants from England, France, Austria, Sweden, Norway, Tunisia and Nigeria and generously donated these precious specimens to the Birbal Sahni Institute of Palaeobotany.

He chaired many sessions of various International and National Conferences, delivered many invited lectures at various universities and institutes in India and abroad. Bose was a correspondent for Palaeoecology of Africa for a considerable time. He was elected a fellow, correspondent or member of various academies, societies and committees: Indian Academy of Sciences, Indian National Science Academy, Palaeobotanical Society, National Working Group for IGPC, Norwegian Academy of Science and Letters and Belgium Royal Academy of Sciences.

He was a strict disciplinarian and a cultured gentleman; he lived a life full of achievements and honours. He was a dedicated student and took keen interest in his subject until the end. He was known for his mannerisms, discipline, gentle behaviour and punctuality and expected the same from his students and subordinates. He had a special liking for plants and it was a treat to see his beautiful garden full of some rare plants. He had a remarkable memory and knew which rare plants are blooming, not only in his or his friends gardens but at the Institute.

Although he settled himself in Gurgaon during the last six years of his life he visited Lucknow as often as possible. Bose leaves behind his wife (Smritikona), a son (Pranab) and two daughters (Shyamli and Mitali).

D D D D D D



Satyavati Motiram Sirsat (elected 1977)

Born on 7 October 1925 in Karachi. Her father (Professor Buch), a professor of English at the St. Xavier's College Bombay, was a voracious reader and a Sanskrit scholar. He passed on these traits on to his children. Later he shifted to shipping to join the Bombay Steam Navigation Company and therefore the family had to travel to many countries exposing them to different cultures at a very young age. Sirsat's mother, however, settled in Chennai to take care of the children. Both her parents were theosophists, so she was educated at the Beasant Memorial School of George and Rukmini Arundale who had brought about a resurgence of ancient Indian art and music. She thus developed a love for cultural heritage, literature and languages at a young age. Sirsat was well versed with South Indian dance and classical music. She could speak besides her mother tongue Gujarati, many Indian languages like Tamil, Kannada, Hindi and Marathi and of course she was fluent in English and French.

Sirsat received her bachelor's degree in microbiology in 1947 from St Xavier's College, Mumbai. As she recalled in her brief memoir, she was fascinated by the book 'The microbe hunters', by Paul de Kruif and was thus attracted to the study of microbes and biological research. Thereafter, she joined VR Khanolkar, the chief of laboratories, and chief pathologist at the Tata Memorial Hospital (TMH) for Cancer for her post-graduate studies. Here she developed a broadbased scientific interest in oncology.

In 1948, the Ministry of Health, Government of India, decided to make the Department of Pathology at TMH into a full-fledged Cancer Research Institute (CRI). As a senior doctoral student, Sirsat became associated with the new research centre. After obtaining her PhD in 1958, Sirsat went to the Chester Beatty Research Institute in London to learn electron

microscopy where she had an opportunity to interact with Hans Selye, Albert Szent-Györgyi, Linus Pauling, Alexander Haddow, Charles Oberling, and William Astbury, scientific stalwarts of the time. Returning from UK, she fulfilled the exciting task of establishing the electron microscopy laboratory at the Indian Cancer Research Centre as it was then called (now ACTREC). This was the first biomedical laboratory in ultrastructural cytology and diagnostic molecular pathology in India. Many young students flocked to her laboratory attracted by the mind boggling power of electron microscope and an opportunity to work with leading biomedical electron microscopists of India. Her main interest was in the study of cancer cells and their interaction with the surrounding stromal milieu. She studied the ultrastructure of collagen fibers and epithelial mesenchymal relationships in experimentally induced and human cancers. Her ultrastructural studies also helped in accurate diagnosis and therapy of cancers that were difficult to diagnose by light microscopic observation.

She pioneered ultrastructural studies to understand alterations at the level of the plasma membrane of cancer cells and specific alterations at junctional complexes using techniques available then. Sirsat's major contribution has been in the area of oral pre-cancer. Her work focussed on studying cellular alterations in oral leucoplakia and oral submucous fibrosis and frankly malignant oral cancer, rampant in India due to the habit of lime-based paan and tobacco chewing. Her major contribution was the recognition of oral submucous fibrosis as a distinct entity endemic and distinct among Indian population and elucidation of pathogenesis underlying the precancerous condition. She investigated the role of viruses in causation of human breast cancer. Although viral etiology of breast cancer was disproved in later studies, the importance of her study is evident from her publications in journals such as *Nature*, *Nature New Biology* and the *Journal of National Cancer Institute*. For this project expertise was required in molecular biology that was not available at CRI. She collaborated with Dan Moore and later closely with MR Das at TIFR, Mumbai. This was the first time anyone from CRI had tried to investigate molecular aspects of cancer. Unfortunately she could not bring the technology to her own laboratory.

Sirsat served on the Editorial Boards of several journals including *Journal of Biosciences* and *Indian Journal of Experimental Biology*. She served on the advisory committee on collagen of the Central Leather Research

Institute, Chennai and founded The Electron Microscope Society of India where she served as President from 1967 to 1972. The awards she received include the ICMR Shakuntaladevi Amirchand Prize, Trans-Asian Award for Biological Electron Microscopy and the Bharatiya Vidya Bhavan's Citation for Lifetime award for Science and Humaneness. Sirsat had the distinction of being a postgraduate guide in microbiology, applied biology and biophysics at the same time. She was elected fellow of the Indian Academy of Sciences in 1975.

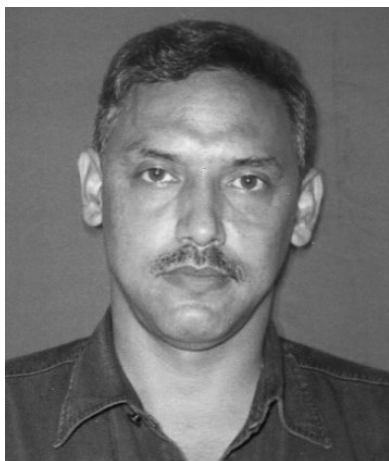
Sirsat played a vital role in establishing the Life Sciences Department at the University of Bombay continuing to teach and participate in the activities of the department in its formative stage and thereafter for several years. She was associated with many universities in the country and Indian Association of Cell Biology. She was a source of wisdom, warmth and joy in the proceedings of the conferences.

After retiring from the Cancer Research Institute in 1985, she worked for 17 years at the Bharatiya Vidya Bhavan Ayurvedic Centre on ancient insights and modern discoveries. Her knowledge of Sanskrit proved invaluable while she worked on a project on Cancer Nosology of the "Vridhatrayi" – Charaka, Sushruta and Vagbhata. Post-retirement, Sirsat continued to serve her alma mater (TMC) as Chairman of the Medical Ethics Committee.

A great humanitarian, she was drawn to cancer patients wellbeing and particularly care of terminally ill patients. She worked closely with Lucito D'Souza to start a safe haven — India's first hospice, Shanthi Avedna Ashram in Mumbai, where terminally ill cancer patients find hope for a peaceful end. She was the founder trustee-counsellor of the Hospice since 1986. The Hospice movement was dear to her heart and she continued to associate with it for as long as her strength permitted.

Those who had the good fortune to associate with her truly admire her versatility and understanding of science, literature, music and dance and her motherly warmth. Her passing has created a void not only in her family but the scientific community that remains indebted to her pioneering efforts in modernizing cancer research in India. She authored a book titled "Death the final freedom" with Lancelot Pereira which speaks about peaceful death. Sirsat who helped and cared for terminally ill patients in their last journey, passed away peacefully on 10 July 2010.

D D D D D D



Vinod Bhakuni (elected 2004)

A gifted researcher with sharp and decisive intellect and an ever smiling face, had an untimely rendezvous with death on 15 July 2011 due to cardiac problems, thus bringing an abrupt end to an illustrious and productive research career.

Vinod Bhakuni was born on 24 May 1962 as second son to another eminent scientist of the country Dewan Singh Bhakuni (a Bhatnagar Fellow at Lucknow) and Mithlesh Bhakuni. Vinod completed his academic pursuits in Lucknow with several academic distinctions. After securing the first position in MSc in Organic Chemistry from Lucknow University, he felt more inclined to enter the vast realm of biological sciences and joined as a CSIR fellow in the research group of CM Gupta, a renowned membrane bio-physicist at Central Drug Research Institute, (CDRI) Lucknow. During his doctoral work, Vinod worked on heat-induced alterations, the phospholipid organization and skeletal protein structure and functions in erythrocyte membranes. In 1987 he was inducted as scientist in Gupta's group and thus started Vinod's scientific journey.

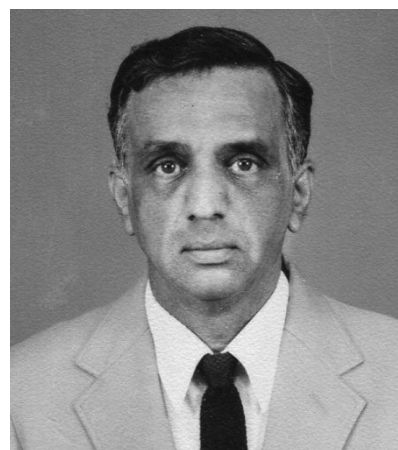
In 1990, Vinod had a two-year stint as a post-doctoral fellow in the research group of E. Freire at the Institute for Biophysical Research on micromolecular assemblies at The John Hopkins Institute, Baltimore (USA). There he did work on the energetics of protein folding and this international exposure shaped his subsequent researches in the area of protein foldings. He pursued aspects of equilibrium protein folding, stability and function. Bhakuni established a vibrant group on protein structure and folding in the country and made several seminal contributions to this area. These include: (a) understanding the role of surface potential and electrostatic interactions in the stabilization and folding of proteins; (b) role of electrostatic interactions in subunit assembly of multimeric proteins; and (c) determination of the thermodynamics associated

with stabilization of partially folded intermediates and off pathway products of proteins. His work highlights the importance of electrostatic interactions in maintenance of native conformation and subunit assembly of multimeric proteins. The work on several multimeric proteins demonstrated that even slight alteration in electrostatic interactions leads to dissociation of the native assembly of these proteins resulting in stabilization of lower enzymatically active oligomers. These studies throw light on the possible mechanism of existence of heterogeneous forms of enzyme in spite of being synthesized as a single gene and build-up of one type of subunit. Besides this, the work on energetics associated with unfolding of monomeric proteins has provided significant insight on the correlation between the various interactions that play a major role in stabilization of intermediates during folding/unfolding of proteins.

Vinod received a large number of recognitions during his short but brilliant career such as the CSIR Young Scientist Award in 1996, the DBT National Biosciences Award for Career Development (2002) and the Shanti Swarup Bhatnagar award (2006). He was also the elected fellow of all the three national science academies of the country as was his father Dewan Singh Bhakuni.

Vinod Bhakuni is survived by his father (Dewan Bhakuni), wife (Neelam), son (Abhyudai), and daughter (Harshita), remembered by a large body of friends and well wishers.

D D D D D D



Nuggeshalli Raghuveer Moudgal (elected 1975)

An eminent reproductive biologist and endocrinologist from the Indian Institute of Science, Bangalore, India, Moudgal passed away on 8 May 2011. He was battling cancer for the last few months and breathed his last in Dublin, CA, USA. Moudgal was born in Mysore in 1931

and obtained his Masters and Ph.D degrees in Biochemistry from University of Madras. After postdoctoral work at Hormone Research Laboratory, University of California, San Francisco and spending a year as a Wellcome Trust Fellow at the Department of Immunology, St. Mary's Hospital Medical School, London, UK, he returned to India as a CSIR Pool Officer at the All India Institute of Medical Sciences, New Delhi. He worked at the Department of Biochemistry, Indian Institute of Science, Bangalore, as an Assistant Professor and rose to the position of Professor and also served as Chairman of the Department of Biochemistry and Dean of the Science Faculty. During his long career spanning more than 40 years, Moudgal made seminal contributions and he was the first to initiate research in the areas of endocrine biochemistry, reproductive physiology, and primate biology using immunological methods. Moudgal had conducted systematic studies using highly characterized antibodies to gonadotrophins to block their action and demonstrated the critical role of these hormones in follicular maturation and implantation using rodents and non human primates as models. His pioneering work using antibodies to Luteinizing Hormone formed the basis of further studies on immunological approaches to human contraception. He successfully demonstrated the need for follicle stimulating hormone for initiation of spermatogenesis in non-human primates and humans. He was instrumental in establishing the finest bonnet monkey facility in India and contributed nearly 150 scientific papers using exclusively non-human primates as a model. He was the first Indian scientist to present his research work at the prestigious Laurentian Hormone Research Conference, Canada. He also developed a vibrant group and trained a large number of graduate students and post doctoral fellows, who are currently leaders in science. He was a Fellow of two of the Science Academies in India and a Member of Endocrine Society, USA and Society for Study of Reproduction, USA and received several awards including the SS Bhatnagar Award.

Moudgal was not only a great scientist, but a kind-hearted human being. He will be remembered for his dedication to science and also for his positive attitude toward life in general. He was a source of inspiration and brought the best out of everyone around him. He leaves behind two sons and a daughter and six grand-children and a large number of colleagues.

D D D D D D



Madhu Sudan Kanungo (elected 1975)

MS Kanungo, an eminent biochemist and an internationally known gerontologist from the Department of Zoology, Banaras Hindu University (BHU), Varanasi, passed away on 26 July 2011. He was ill for the last few years.

Kanungo was born on 1 April 1927 at Berhampur, Orissa. He completed his graduation from Ravenshaw College (now University), Cuttack, Orissa in 1949, obtained his Master's degree in zoology from Lucknow University in 1951 and Ph D degree in physiology from the University of Illinois (Urbana), USA in 1959 under the supervision of C. Ladd Prosser, a doyen in the field of comparative animal physiology. After serving as Lecturer in zoology at the Ravenshaw College, and Reader in Zoology at Utkal University during 1961–62, Kanungo joined the Department of Zoology at BHU and served as Reader (1962–69) and Professor (1970–87). He was Head (1974–76 and 1980–82) and Coordinator, Centre of Advanced Study (1982–87) of the Department of Zoology and Dean, Faculty of Science (1986) at BHU. He was made an Emeritus Professor (for life) at BHU (1993–2011) in the same department. Kanungo was an active and popular teacher of physiology, biochemistry and molecular biology for more than 40 years. He started a laboratory for research in modern biology and created an active group, which became famous for its work in gerontology. Kanungo was the Founder Director (honorary) of the Institute of Life Sciences of Government of Orissa at Bhubaneswar during 1990–96.

Kanungo received many prestigious awards and recognition for his teaching and research work in the field of biochemistry and molecular biology of ageing, such as Shanti Swarup Bhatnagar Prize of CSIR (1971), National Fellow (1976–77), Visiting Professor at the West Virginia University, USA (1977–78), National Lecturer (1982) of UGC, Jawaharlal Nehru Fellowship

(1987–89), FICCI Award (1989), INSA Golden Jubilee Commemoration Medal (1992), Emeritus Scientist of CSIR (1989–94), Senior Scientist INSA (1995–99), Sir Shriram Memorial Oration Award Medal of National Academy of Medical Sciences, India (1998), Padma Shri (2005) and Chancellor of Nagaland University (2009–11). He was elected fellow of the Indian National Science Academy, Indian Academy of Sciences, National Academy of Sciences (India), National Academy of Medical Sciences and the Indian Academy of Neurosciences.

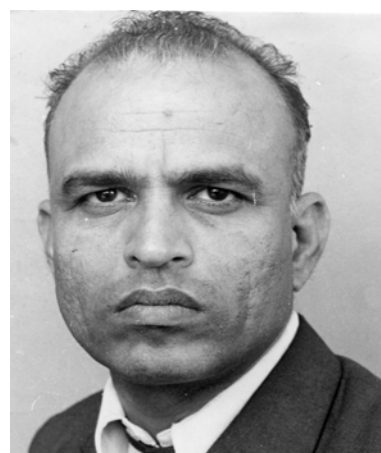
Kanungo introduced a strong teaching and research programme in physiology and biochemistry as early as the 1960s, which he developed into biochemistry and molecular biology in the 1980s. Later he initiated and was also coordinator of a 'Brain Research Centre' under the XI Plan of UGC at the Faculty of Science, BHU. He produced 32 Ph D students, spread over many universities and institutions in India and abroad. Kanungo published 139 papers in the area of 'biology of ageing' and authored two books: *Biochemistry of Ageing* (Academic Press, UK, 1980; translated into Russian) and *Genes and Aging* (Cambridge University Press, UK, 1994). He proposed a theory and a model on ageing in 1975, which is known as 'gene regulation theory of ageing'. This theory suggested that genes are responsible for ageing in mammals. The ageing process starts soon after reproductive maturity due to depletion of certain essential factors resulting into gradual decline in the physiological processes, which dysregulates the metabolic homeostasis. However, it may be possible to postpone ageing by replenishing the essential metabolic factors. His research has shown how activities of many physiological/metabolic enzymes and their isoenzyme patterns, steroid hormone/neurotransmitter receptors, chromatin structure and its post-translational modifications and function(s), DNA methylation, expression of genes into mRNAs and binding of transcription factors into promoters of genes change during ageing and contribute to the ageing process in mammals and birds. Kanungo has published in prestigious scientific journals and has been extensively cited internationally. He delivered a large number of invited lectures and chaired many scientific sessions in national and international conferences. He also organized a number of national and international symposia/workshops at BHU and Bhubaneswar.

Besides teaching and research at BHU, Kanungo was an active member and chair in many Government committees. He was the Founder President (1981–88) and patron (1989–2011) of the Association of

Gerontology, India. He was also an active member of the National Council for Older Persons of Government of India, Ministry of Social Justice and Empowerment from 1999 to 2011, which proposed the National Initiative for Care of Elderly policy.

Kanungo's devotion and dedication to teaching and research will remain an inspiring example for the younger generations at BHU and other Indian universities. He was also interested in sports like cricket and tennis. Kanungo is survived by his wife, three sons and four grandchildren.

D D D D D D



Kanakanahalli Ramachandra (elected 1975)

Born in Mandya near Mysore on 18 August 1933 to K Mallaraiah and Subbalakshamma. He completed his BSc (Hons) in 1955 and MSc in 1956 both in I class from Central College in Bangalore. He did his PhD in 1965 from the University of Bombay. His research career started when he joined TIFR (Mumbai) in 1958 and rose through the ranks to become the Professor of Mathematics. After his retirement from TIFR in September 1996, he settled in Bangalore and took up an honorary visiting professorship at the National Institute of Advanced Studies (NIAS) where he continued till the end.

Ramachandra specialized in the areas of algebraic number theory, transcendental numbers, Diophantine equations, prime numbers, Riemann Zeta-function and dirichlet series.

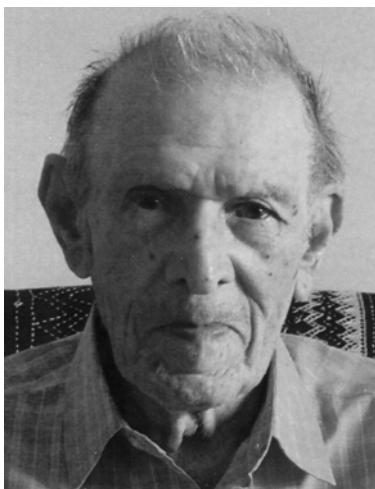
Ramachandra is a naturally gifted number theorist and had a large number of excellent papers in many areas of number theory. His outstanding publications include: "Lectures on transcendental numbers" (Ramanujan Institute, 1969), Riemann zeta function (1979); on the

mean-value and omega-theorems for the Riemann zeta-function" (1995). He published over 100 research papers, many of them with R. Balasubramanian who was his long-time colleague and collaborator starting with his TIFR days.

Ramachandra was elected to the Indian National Science Academy (1974), National Academy of Sciences, Allahabad (1990) and the Biographical Academy of Commonwealth (1980). He was President of the Ramanujan Mathematical Society (1988-90), Vice-President of the Calcutta Mathematical Society (1993-96) and a National Lecturer in Mathematics (1977-78). He was a recipient of the Hari Om Trust Award (1976), UGC Meghnad Saha Award (1976), Srinivasa Ramanujan Birth Centenary Award of ISCA (1994-95) and the INSA Srinivasa Ramanujan Medal (1997). He founded the Hardy-Ramanujan journal in 1978 and published it on behalf of the Hardy-Ramanujan Society until his death.

He passed away in Bangalore on 17 January 2011 leaving behind his wife K. Saraswathi and a daughter R. Valli.

D D D D D D



Ganesh Shrikrishna Laddha (elected 1974)

Passed away in Chennai on 30 September 2010. Laddha was born in Kakada (Maharashtra) on 26 August 1922 to Shrikrishna Laddha and Narayanidevi. He had his early education in Nagpur with a BSc (1942) and BSc (Tech) (1944) from Nagpur University. He then left for Purdue in Indiana (USA) where he did his M.S in chemical engineering in 1947 and his PhD, also in chemical engineering, from Purdue University.

He soon returned to India and joined as Reader in the Department of Chemical Engineering at AC College of Technology affiliated to the University of Madras in January 1950. He was promoted as Professor of Chemical Engineering and subsequently as Director of A.C. College from 1957 to 1983. After his formal retirement, he worked as Professor-Emeritus at the A.C. College from 1983.

Laddha's fields of interest in chemical engineering include fluid mechanics, heat and mass transport, absorption and liquid extraction, crystal growth, biotechnology and chemical technology. His contributions in these areas were specifically on: liquid-liquid extraction in packed towers; mean drop size and characteristic velocity of droplet swarm in spray columns; dissolution of solids with chemical reaction; hydrodynamics; mass transport and axial mixing in rotary disc contactors; prediction of mean drop size in batch agitated vessels; estimation of interfacial areas and mass transfer coefficients in packed absorption columns; absorption and extraction in stirred cells; bubble swarm characteristics in bubble columns; absorption of gases such as oxygen, carbon dioxide, sulphur dioxide and hydrogen sulphide by reacting solutions; liquid flow through packed and fluidized beds; estimation of effective thermal conductivity for heat transfer in packed beds; thermodynamic consistency of y - x data for binary and ternary systems; mass transfer in packed distillation columns; measurement and prediction of liquid diffusivities; inter-relationships of viscosity, heat of mixing and vapour-liquid equilibria; thermodynamic consistency and prediction of ternary liquid-liquid equilibria; kinetic studies of catalytic conversions; inter-esterification of vegetable fats; fractionation and deacidification of sal, mango and ricebran oils; industrial modeling for forecasting the performance of chemical and related industries. He was the principal investigator of a PL-480 scheme to investigate the fractionation of hexane-acetone-water mixtures to obtain fundamental information needed in the design of solvent recovery systems for use in an improved mixed solvent extraction process for extraction of oil from cottonseed. He published over 175 papers in these areas.

He wrote two authoritative books: "Transport phenomena in liquid extraction" (McGraw Hill, 1976) and "Transport properties of liquid mixtures" (Min. of Education and Cultural Affairs, New Delhi 1984).

Besides his research pursuits, Laddha actively participated in the growth of chemical industry in India. He served as Director on the boards of management of several industries such as Rishi Gases, Hindustan Sanitarywares and Industries, Mettur Chemical and Industrial Corporation, Reichhold Chemicals, Phosphorous and Chemicals Travancore, Malladi Drugs and Pharmaceuticals, Mount Mettur Pharmaceuticals,

Trichy Distilleries and Chemicals, Detergents India, Asia Carbon and Moty Chemicals. He was President of the Indian Institute of Chemical Engineers (1968), and UGC National Lecturer (1983-84). Among the awards he received are the Ambrose Congreve Award (1980) and the Homi Bhabha Award (1980).

He leaves behind his wife (Sumitra) and a daughter (Renu).

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