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Team CSIR

New DG-CSIR

Dr M. K. Bhan, Secretary, Department of Biotechnology, has taken over the additional charge as Secretary, Department of Scientific and Industrial Research and Director General, Council of Scientific & Industrial Research.

Dr Bhan's appointment comes in the wake of the approval by the Appointments Committee of the Cabinet, after Dr V. Prakash, Director, Central Food Technological Research Institute of CSIR, who was earlier selected to succeed Dr R.A. Mashelkar, expressed his inability to join on medical grounds. Dr Mashelkar laid down office on 31st December 2006.

CSIR News
wishes its readers
A Happy New Year

Counting Our Tigers Right : CCMB's Conservation Genetics

Dr Lalji Singh, Director, Centre for Cellular and Molecular Biology, and his Ph.D. Student, Ms Jyotsna Bhagavathula have developed a novel microsatellite method of DNA typing using the scat samples collected from the natural habitat for the correct counting of tigers. This method has just been accepted for publication and made available on-line in the prestigious international scientific journal "*BMC Genetics*". This methodology is now internationally accepted.

The methodology

There is no doubt that the threat of extinction is hanging over tigers. Though widespread in the earlier part of the last century (www.catfolk.lynx.unio), the number of tigers in the wild all over the Indian subcontinent dwindled has over the last few decades. The chief cause of this decline is habitat fragmentation, depletion of prey and extensive hunting.

Population estimation and monitoring of an endangered species is important for conservation planning. Tigers are difficult to count visually because they are elusive, nocturnal, territorial and cryptic animals. Therefore, indirect and non-invasive methods are employed for population estimation.

The traditional method of estimating tiger populations is called the "pugmark" method. It has been in use for three decades now for estimating tiger populations in India. The pugmark method assumes that the paw-print of each tiger is individual-specific. Therefore, during a tiger census, plaster casts and tracings of the left hind paw-prints of a tiger are made, wherever encountered in forests, and tiger numbers arrived at on the basis of the paw measurements.

However, each and every paw-print of all the tigers in an area may not be available at the time of census. Moreover, the pugmarks would change in shape and size based on the substrate that a tiger walks upon; thus a single tiger could possibly be counted as several individuals. Also, this method is prone to human errors during tracing or casting the paw-prints. Therefore, tiger researchers have questioned the veracity of this method.

The DNA or deoxyribonucleic acid of all living organisms is unique to each and every individual, which is why no two individuals (except identical twins) are completely alike. DNA is composed of four bases called Adenine (A), Thymine (T), Cytosine(C), and Guanine (G). Certain combinations of these four bases called short tandem repeats or STRs [for instance CACACACACA] are interspersed all over the mammalian DNA. The STRs are important because they can help to uniquely identify one individual from another based on their copy number which varies from individual to individual. It is now possible to preferentially target these unique STR regions of the DNA because of the development of a recent technology called Polymerase Chain Reaction (PCR). Thus one can identify each and every individual animal because of the unique arrangement of repetitive DNA, popularly called 'DNA fingerprint'. Therefore, if one could generate 'DNA fingerprints' of endangered animals like tiger, one can uniquely distinguish one tiger from another, thereby arriving at reasonable estimates of tiger populations.

However that is easier said than done! The primary problem confronting a bid to generate unique 'DNA fingerprints' of tigers would be the procurement of biological material. Genetic studies of free-ranging animals are carried out by collecting shed hairs or faecal samples from which DNA is isolated. Thus DNA can be extracted from the animal that one is studying without catching it. This is called non-invasive sampling. Once individual 'DNA fingerprints' are obtained for the animals, it is possible to estimate populations using mathematical models that can predict the population abundance and density.

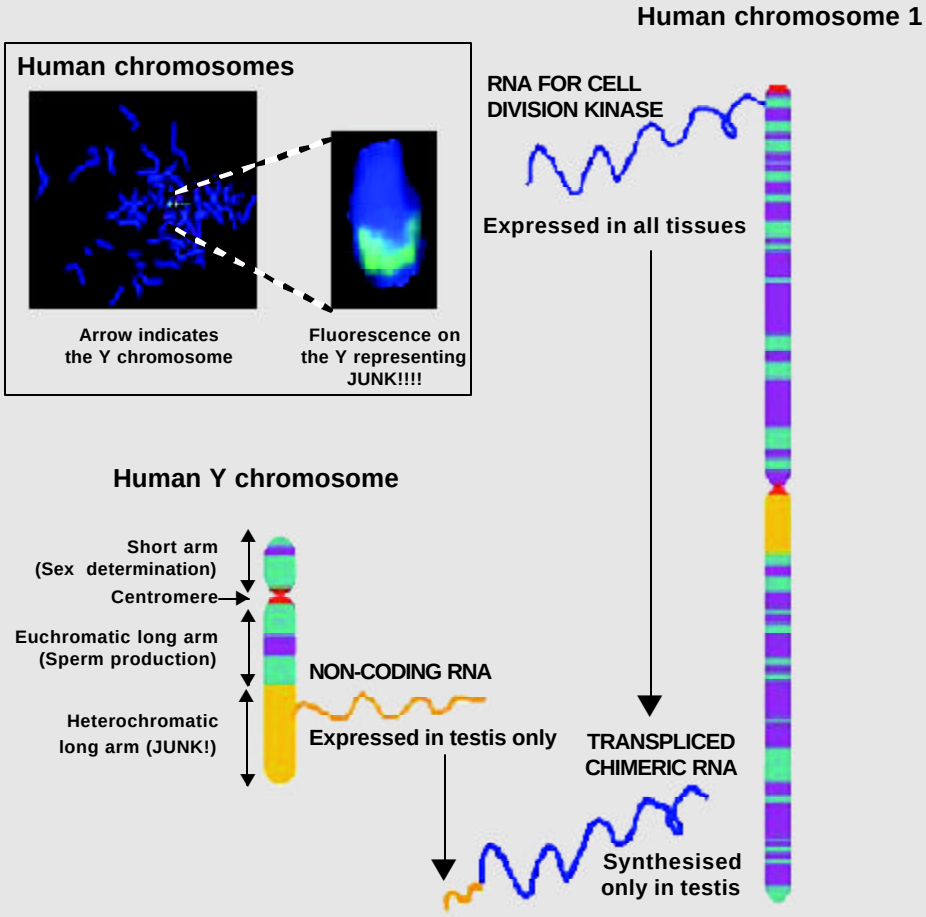
The source of DNA in faecal samples is the sloughed-off intestinal epithelial cells. Here comes in the second problem being confronted in generating 'DNA fingerprints' from tigers living in the wild. DNA that is isolated from faecal samples is of very poor quality. The reason being that faecal samples collected from the forest, especially in sub-tropical countries like India, are subject to a variety of environmental conditions and insect attack or fungal degradation. There are several technical difficulties involved in working with such miniscule and poor quantities of DNA. Therefore before one embarks upon long term DNA based population studies of tigers covering the entire country, it is very important to conduct a pilot study in order to check whether it is feasible at all to use DNA based methods to count the animals.

The Centre for Cellular and Molecular Biology (CCMB), Hyderabad, has carried out such a pilot study with faecal samples collected from two protected areas to check the possibility of carrying population studies in tiger populations by non-invasive genetic methods. The primary goal of the study was to identify individual tigers with unique DNA fingerprints and whether these unique DNA fingerprints can be used for identifying individuals in a protected area so that tiger population estimates can be generated.

The researchers identified the unique STR regions in tigers for identifying individuals and calculated the probability of obtaining the similar fingerprints in closely related individuals. It was found that with these STRs it is possible to distinguish between even closely related animals with a 99% certainty. This part of the study was confirmed with captive tigers before embarking on DNA analysis of samples collected from the forest.

Fieldwork was conducted at two locations in southern India namely, Mudumalai Wildlife Sanctuary and at BRT Sanctuary. Scat samples

Model for mechanism of control of autosomal gene by non-coding RNA from Y chromosome



The non-coding RNA controls the synthesis of cell division kinase protein in testis, which maintains the balance between cell division and cell death

were collected randomly and preserved in alcohol or desiccant silica. At this point, came yet another difficulty. The tiger shares its habitat with two other carnivores, namely the leopard and dholes (wild dogs) at these two locations (as with all other forests in south Asia). As the biological material for the study was faecal samples, there was no room for confusing the faecal samples of tigers from those of the other two carnivores. Morphological features of the faecal samples have traditionally been used for distinguishing the faecal samples of these carnivores. Though it is easier to differentiate the scats of wild dogs from those of the tiger and leopard; it sometimes becomes difficult to distinguish the tiger and leopard faecal samples. Moreover, such identification procedures are often subjective. Therefore, a DNA-based method was developed for identifying the scat samples of tigers from those of the other carnivores. This can identify the scats of tigers with greater certainty than the morphological methods that are generally used. DNA was isolated from the scats that were collected from the study areas. Samples were positively identified as tiger with the DNA-based assay that the CCMB had developed. Samples are then subjected to 'DNA fingerprinting'. DNA-based sex identification of the samples was also done. The results of the DNA profiling show that samples collected from forests could be assigned to individuals. The follow up of random sampling method in pilot study gave an estimate of the Minimum Number Alive (MNA) at the time of sampling.

The results of the CCMB study indicate that it is indeed possible to conduct such surveys on a large scale and that it would be possible to estimate tiger population under appropriate sampling designs in protected areas in India. This could therefore become the method of choice for counting tigers in the future.

Multi Channel Automated Water Level and Quality Monitoring System

THE National Geophysical Research Institute (NGRI), Hyderabad, has designed and developed a Multi Channel Automated Water Level and Quality Monitoring System mainly for recording important groundwater parameters employing industry standard water level, conductivity, pH and temperature sensors for unattended long-term recording in observation bore wells.

For hydro-geological studies like water resource evaluation it is essential to continuously monitor groundwater level fluctuations. Water level in an aquifer is an important parameter in groundwater hydrology and a careful and detailed analysis reveals useful information on the aquifer system. Over-exploitation of groundwater results in desaturation of aquifer and declining of water levels. Coastal aquifer systems face a danger of saline ingression with the increase in groundwater exploitation resulting in acute scarcity of supply of drinking water. Appropriate management practices to control salinity must be implemented on irrigated fields, in irrigation projects, and for geo-hydrologic systems. It is also equally important to measure water quality in many natural and industrial environments including streams, water sheds, wells and processing plants. Attempt made in this direction has led to the development of a low cost yet accurate system for this purpose.

Features

- System can be customized by choosing the number of channels and sensors.
- Ability to directly interface with a large variety of sensors.

Applications

- Effective groundwater utilization and management
- Pollution monitoring studies

Specifications

Recording interval	:	Selectable from 1 min. - 12 hours.
Number of channels	:	Four
Type of memory	:	Internal, non volatile
Memory capacity	:	8500 readings on all for 4 channels or 17,500 readings in case of single channel operation
Computer	:	Fox LP3500 C-programmable SBC with memory and RTC (in the size 66 mm x 93 mm x 11 mm)
A/D Converter	:	16 bits SPI interface (0.03% accuracy)
Software	:	Windows-based user-friendly VB Application Software via serial port to control the monitoring system featuring data acquisition, diagnostics and data retrieval using laptop computer
Dimensions	:	220 ×120 × 80 mm IP 65 Sealed Enclosure.
Autonomy	:	Better than 2 months with 4 sensors at a recording interval of 1 hour employing Duracell AA cells.
Sensors	:	Any industry standard 4/20 mA bore hole sensor such as water level, conductivity, pH and temperature.
Deployment	:	Near the mouth of well with provision to lock.

Thermophysical Instrumentation developed by NAL gets IETE Corporate Award

THE National Aerospace laboratories (NAL), Bangalore, has been awarded the first IETE Corporate Award 2006 instituted by the Institution of Electronics and Telecommunication Engineers for Performance Excellence in the field of Electronic Instruments and Instrumentation for the work related to Thermophyical Instrumentation (*CSIR News*, 56 (2006) 340.

The award was presented by Shri D.S.Mathur, Secretary, DOT and Chairman, Telecom Commission on the occasion of the 49th Annual Technical Convention on 'Convergence-Transformation from Vision to Reality' at IETE, New Delhi on 30 September 2006. Dr A.R Upadhya, Director, NAL along with the team members Dr V. Shubha and Dr T. G. Ramesh of the Materials Science Division received the award.

Presented here is a brief account of the instrumentation developed:

Dr A. R. Upadhya, Director, NAL; Dr T. G. Ramesh and Dr V. Shubha, Scientist, NAL, receiving the award from Shri D. S. Mathur, Secretary, DOT

Differential Thermal Analyzer

Differential thermal analyzer is a tool to study physical and chemical changes in the system. DTA developed at NAL is based on a PC-based data acquisition system. Appropriate hardware and software have been developed to record the thermal event in a material by comparing it with an inert reference material (which is devoid of any physical or chemical changes in the temperature range of interest). The DTA can work in the temperature range from ambient to 1000^{0}C.

The unique features of this system are:

- Menu driven software to record the thermal event in the sample in Visual basic, Turbo C and Lab View environment
- Software selectable rate of heating from 1^{0}C/min. to 20^{0}C/min.
- Real time digital filtering of the data to improve signal to noise ratio
- Real time graphic display of ÄT versus T signal for on-line observations of thermal events occurring in the sample.

AC Calorimeter

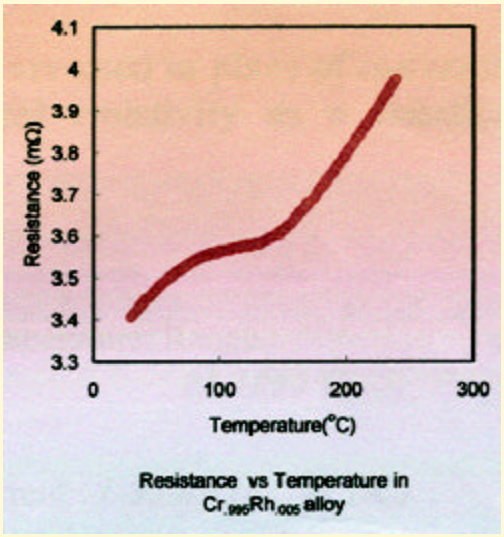
AC calorimeter is a powerful diagnostic tool to study continuous phase transitions induced by temperature or pressure. It is based on measurement of the linear response of a metallic sample subjected to an oscillatory heat input. The oscillatory part of the

temperature rise in the sample is inversely related to the specific heat of the sample. Two techniques based on the "plus-minus square wave" and "sine wave current signal: have been developed.

The system employs a new generation modulated technique with high sensitivity for thermal characterization of Aerospace materials with a unique feature of simultaneous measurement of AC specific heat and AC resistivity of metallic samples.

Thermopower Analyzer

Thermopower (Seebeck Coefficient) is the most sensitive among the electronic transport properties and is a powerful diagnostic tool to prove the electronic band structure of conducting materials. It gives valuable information on the energy dependence of the density of states and carrier relaxation time at the Fermi energy.



- Temperature range : 30-800°C
- Temperature stability : ± 0.1°C
- Resolution in TEP : 0.1ìV/°C

The unique features of this system:

- A completely automated PC based data acquisition system (DAS) for measurement of absolute thermopower (TEP).
- This technique developed at NAL has been recognized as the standard method of measurement of thermoelectric power in *Laboratory Notes on Electrical & Galvanomagnetic Measurements Materials Science Monographs* 2nd ed Wieder H H 1979 (Amsterdam, Elsevier)

Electro Thermal Analyzer

Technique for the measurement of four-probe resistivity as a function of temperature up to 1000°C has been integrated with PC-based data acquisition system.

The unique features of this system:

Novel technique where only four leads are used in place of conventional six lead method to measure electrical resistivity as a function of temperature.

- Temperature Range : 25-10000°C
- Current : 1-50 mA (AC&DC) Selectable
- Voltage Compliance : 30V
- DC Power Amplifier : 30V 4A

RRL-Jorhat signs MoU with Assam and Gauhati Universities

THE Regional Research Laboratory (RRL), Jorhat, has signed Memoranda of Understanding with the Assam University (AU), Silchar and the Department of Chemistry; Gauhati University, Guwahati, for mutual collaboration.

MoU with Assam University, Silchar

The RRL-Jorhat's MoU with Assam University aims at providing support for mutual benefit to the science and technological programme of the North Eastern region. Assam University is a young and progressive university with a rich source base in scientific manpower. RRL, Jorhat offers fair scope for collaboration in diverse areas of science and technology for development of the region in particular and the country as a whole. The MoU will lead to establishing close linkage and functional coordination between AU and RRL; to recognise RRL as accredited research centre for research and directed study by AU, to facilitate RRL professionals to pursue higher studies, research and need-based training programmes in AU; to facilitate AU faculty and research students to pursue their R&D programmes in RRL under the guidance of RRL scientists at PG level; to assess and accredit skill - based training/professional programmes offered by RRL leading ultimately to acquiring degrees and diplomas in AU; to consider the qualified RRL professional as accredited instructors/guides for training and consultancy with industries/institutions in India/ abroad; and to facilitate creation/ development of new experimental/ computational facilities through mutual co-operation and exchange of experts, and Intellectual Property Rights.

MoU with Department of Chemistry; Gauhati University

The MoU with the Department of Chemistry; Gauhati University (GU), Guwahati, has been signed with a view to creating a platform for mutual collaboration with the specific objectives such as (i) to establish a close linkage and functional coordination between GU Department of Chemistry and RRL, Jorhat; (ii) to recognize RRL Jorhat as an accredited research centre and directed study by GU Department of Chemistry; (iii) to facilitate RRL, Jorhat professionals to pursue higher studies, research and need-based training in GU Department of Chemistry through teaching programmes of Gauhati University; (iv) to assess and accredit the skill-based training/ professional programmes offered by RRL, Jorhat leading ultimately to the award of degrees and diplomas by Gauhati University; (v) to facilitate joint seeking of funds and conduct or research, training and consultancy with institutions/ industries in India/abroad; and (vi) to create/develop new experimental/theoretical facilities through mutual cooperation and exchange of expert, etc. An Executive Committee has also been formed under the MoU to review the functioning of collaboration between the two institutions.

CSIR/NAL signs MoU with Plexion Technologies (India) Private Limited

CSIR represented by the National Aerospace Laboratories (NAL), Bangalore, has signed a Memorandum of Understanding with Plexion Technologies (India) Private Limited on 8 Nov 2006 for joint development and commercial production and marketing of a 4-seater aircraft.

International Conclave on Traditional Medicine

Seen on the dais at inaugural function of International Conclave on Traditional Medicine. Seated (from right) are: Dr Ikhlas Khan, National Centre for Natural Products Research, USA; Shri Shiv Basant, Joint Secretary, Department of AYUSH; Smt. Anita Das, Secretary, Department of AYUSH; Dr Anbumani Ramadoss Hon'ble Minister of Health and Family Welfare ; Dr Nityanand, former Director, Central Drug Research Institute, Lucknow; Dr P. Sudharto, Representative of World Health Organization and Shri V. K. Gupta, the then Director, NISCAIR

THE Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH), in collaboration with National Institute of Science Communication and Information Resources (NISCAIR), New Delhi, and with the support of World Intellectual Property Organization (WIPO), World Health Organization (WHO) and Asia Pacific Centre for Transfer of Technology (APCTT), organized an International Conclave on Traditional Medicine during 16-17 November 2006 at National Agricultural Science Complex, New Delhi. Over 450 delegates from 16 countries representing SAARC, BIMSTEC, IBSA and APTMNET, which included Afghanistan, Bangladesh, China, India, Indonesia, Iran, Malaysia, Mongolia, Nepal, Philippines, Republic of Korea, Singapore, South Africa, Sri Lanka, Thailand, and Vietnam participated in the conclave. All these are the cradle of ancient and time tested Traditional Medicine systems. In addition the conclave also had the participation from USA, UK and Germany and WIPO and WHO.

This two-day international conclave deliberated on the following thematic areas pertaining to Traditional Medicine:

- Harmonization and International Cooperation
- Standardization, Quality Control and Safety
- Regulatory and Trade Aspects
- Protection and IPR Issues

Inaugural Session

Inaugurating the Conclave, Hon'ble Minister of Health and Family Welfare Dr Anbumani Ramadoss expressed his happiness over the coming together of member countries of SAARC, IBSA, BIMSTEC and APTMNET and internationally recognized experts to discuss various aspects of traditional medicines like standardization, safety, quality and efficacy, and hoped that the deliberations would lead to development of strategy guidelines and a roadmap for strengthening and mainstreaming of these systems in the national health systems.

Dr Anbumani Ramadoss, Hon'ble Minister of Health and Family Welfare

Dr Ramadoss mentioned about the holistic approach of Traditional Medicines and also there growing popularity all over the world. In fact these systems are the mainstay of rural population in most of the developing countries, as they are accessible, affordable and effective. "It is a great challenge as well an opportunity for humanity to standardize natural health products and treatment protocols based on traditional medicine without sacrificing some of their fundamental and underlying principles", he pointed out.

India has a strong base of traditional medicine as well as a proper administrative set-up to look after the regulation and development of Indian Systems of Medicines and Homoeopathy. Similarly, various traditional systems of medicines are firmly rooted in member countries and there is a great scope for cooperation between countries present here in this conclave, the Minister said.

Stressing that protection of Traditional Medicine from misappropriation is the common concern of all the participating countries, the Minister expressed happiness that an exclusive plenary session had been scheduled in the conclave to discuss the issues relating to legal and policy framework on Traditional Knowledge Protection, "in which detailed presentation will be made on the Traditional Knowledge Digital Library (TKDL) created by India to provide protection to more than 1,00,000 traditional medicine formulations described in Ayurveda, Siddha, Unani classical texts from mis-appropriation by issue of wrong patents based on traditional medicine knowledge which is already in public domain. I am sure that this and other presentations including that of the representative of WIPO would lead to formulation of strategies for Traditional Medicinal Knowledge protection."

Referring to the issues pertaining to market authorization of traditional medicine products and non-tariff trade barriers to the trade of national health products, which are having an adverse impact on trade of TM products, the Minister said, "I would like to send out a clear message to the international community through this conclave that to shut out traditional medicine products on arbitrary technical barriers in the name of safety would be against the interest of patients and consumers."

Earlier, while welcoming the Hon'ble Minister of Health and Family Welfare and delegates, Shri Shiv Basant, Joint Secretary, Department of AYUSH, outlined the significance of TM in the current world scenario indicating that there is a global resurgence in the TM systems mainly due to its holistic approach, and being affordable and comprehensive healthcare system. He also mentioned the areas that were to be covered in the conclave.

Smt. Anita Das, Secretary, Department of AYUSH, in her address observed that TM has been accepted as an important health care system in many developed and developing countries. A lot of scope exists for harmonization and international cooperation for greater and more effective use of traditional health knowledge systems and thereby improving the health index of communities and bridging the gaps in health delivery. She advocated the taking of collective steps to ensure systematic and smooth development of TM at national, regional and global levels. The participating countries have a major stake in the areas being deliberated upon in the conclave and they must be instrumental in evolving a consensual regulatory

Smt. Anita Das, Secretary, Department of AYUSH

approach to TM services and products, emphasized Secretary, AYUSH.

Dr P. Sudharto, Representative of World Health Organization, spoke about the growing popularity of Traditional Medicine in the developing as well as the developed world. She also mentioned objectives of the first ever comprehensive Traditional Medicine strategy evolved in 2002, which include: (i) facilitating integration of Traditional Medicine into national health care system by assisting Member States to develop their own policies on Traditional Medicine; (ii) promoting the proper use of Traditional Medicine by developing and providing international standards technical guidelines; and (iii) facilitating information exchange in the field of Traditional Medicine.

Dr P. Sudharto, Representative of World Health Organization

The keynote address by Dr Nityanand, former Director, Central Drug Research Institute, Lucknow, on 'Traditional Medicine in health care: Perspective in New Millennium' set the stage for deliberations of the conclave. In his address, Dr Nityanand discussed the following issues: (i) Standardization, safety and clinical efficacy of traditional drugs, (ii) Creation of a system of registration of traditional system of medicine, (iii) Interface between traditional and modern medicine for health care, (iv) Regional co-operation and harmonization, (v) Scientific basis of Traditional Medicine, and (vi) Documentation of Traditional Knowledge as has been done in India by creation of TKDL.

Dr Nityanand, former Director, Central Drug Research Institute, Lucknow

Plenary Sessions

Plenary Session-I

Standardization, Safety and Clinical Efficacy of Traditional Drugs

Dr Ikhlas Khan, National Centre for Natural Products Research, USA, emphasized the necessity to authenticate the uses of medicinal plant products scientifically in order to confirm reproducibility during manufacturing. According to him, major challenges that the manufacturers face are misidentification, adulteration and contamination. He stressed that authentication of raw material is the first and the most important step in the development of an herbal product. Other factors affecting quality and consistency of the final product are harvesting, storing, processing and formulation methods.

Presenting the WHO estimates that 80% of the world's population still uses traditional plant based medicines, Dr G.N. Qazi, Director, RRL-Jammu, proposed that India could tap a sizeable share of the market since it is endowed with a large biodiversity and variety of climatic zones. He lamented the poor growth of the sector owing to lack of required standardization, quality control and hence efficacy of drugs. He stressed on incorporation of modern techniques to meet the world standards.

Dr C.K. Katiyar, Director, Ranbaxy Research Laboratories, emphasized the development of a global strategy for the progress of TM. He suggested that on the basis of regulatory status related to traditional use, countries could be grouped into 3-4 regions and harmonized guidelines be issued for safety and efficacy. Once consensus is achieved, global guidelines may be brought into existence for better harmonization.

Dr U.V. Mallavadhani, RRL-Bhubaneswar, pointed out that the multiple ingredients, each of which needs to be standardized, and stability pose serious problems in developing standards for herbal drugs. He presented the triple 'P' based protocols including pharmacognistical, physico-chemical

and phytochemical along with residual analysis developed to assure standardization. He also emphasized on the need to develop markers for standardization and quality control.

Dr Pushpangadan, DG, Amity Institute for Herbal and Biotech Products Development, Thiruvananthapuram, discussed a wide range of issues from sustainable supply of raw materials to concerns regarding medicinal plants in the negative list.

Plenary Session-II

Regulatory & Clinical Aspects

Dr Ashwini Kumar, former DCG (I), New Delhi, in his presentation on Consensus on Regulatory Approach to Traditional Medicine, highlighted the various components of drugs regulation on traditional medicine, which are focused to ensure the quality of the drug which conforms to agreed standards of safety, efficacy and quality.

Prof Hu Xianming, Dean, College of Pharmacy, Wuhan University, China, spoke on Regulatory Aspects of Chinese Medicine. He discussed the historical aspects of Traditional Chinese Medicine (TCM), methods of diagnosis, advantages of TCM and the current management and regulation situation of TCM and also the challenges being faced by TCM in its management and trade.

In his presentation entitled Framework for Safety Assessment of Traditional Medicine Products, Dr D.B.A. Narayana, Hindustan Lever Ltd, Bangalore, emphasized the need for maintenance of detailed dossiers on TM products under "drug", "food" or "cosmetic", containing information on composition, process, quality control parameters, indications, etc.

Prof. Y.K. Gupta, Head, Department of Pharmacology, All India Institute of Medical Sciences, New Delhi, gave a presentation on Clinical Trials of Traditional Drugs in India. The presentation stressed the need for systemic clinical trials of traditional plant-based medicines to enhance their global acceptance.

Dr A.N. Rao, Editor-in-Chief, *Journal of Tropical Medicinal Plants*, Malaysia, discussed the rich floristic diversity, botany and folklore. He stressed the need for improving R&D on herbal drugs and also narrated a few collaborative ventures and success stories, e.g. the isolation and identification of "Calonolide- a", an anti HIV compound from *Calophyllum lanigerum*.

Dr G.P. Dubey, Varanasi, discussed the basic concepts of Ayurveda including Ayurvedic approach of therapy. Referring to the WHO limit of the normal permissible concentration of the heavy metals, he pointed out that in Ayurveda, various minerals and metals are used for prevention and management of various diseases. Here the metals are in modified forms which do not have adverse effects. He illustrated this by the experiments done on rats using the drug known as *Makardhwaj* (which contains gold, mercury and silver). No adverse effect was found in the rats, particularly with respect to haemopoetic, gastrointestinal, hepatic and kidney function test.

Plenary Session-III

Current Status of Traditional Medicine in Participating Countries

Dr Arvind Mathur, Cluster Coordinator, Family & Community Health, WHO-India, spoke about the WHO TM strategy, its objectives, components and expected outcomes, which include the benefits of safe and efficacious drugs to reach the poor. The guidelines include quality control methods for medicinal plant material, and safety monitoring of herbal medicines. He also mentioned that the national policy on TM and regulation of herbal medicines for methodologies on research and evaluation of TM have been developed to promote the proper use and development of TM.

This was followed by presentations of status reports on use, preservation, documentation, etc. of traditional medical knowledge by representatives of the different participating countries.

Bangladesh: Mr Jasimuddin Choudhury, Bangladesh Council of Scientific and Industrial Research Laboratories, informed that their country uses Ayurveda and Unani as the major TM healthcare systems. These systems are formally taught in Government colleges that provide degree courses in Unani and Ayurveda and research institutes carry out active research work in these systems. About ten national journals publish papers related to TM regularly. National formulary on both Unani and Ayurvedic drugs acts as a regulatory part. The Ministry of Health and Family

Welfare frames the rules and regulations on TM, which ensure quality control.

Iran: Dr Zeynalabedin Bashiri Sadr, APTMNet, Iran, in his presentation brought out that there are a large number of TM practitioners in his country. The information on TM is also provided on websites (www.aptmnet.ir and www.cam.ir).

Indonesia: Presenting the scenario of TM in his country, Mr M. Hanafi said that the use of TM has been increasing every year. He Indonesian herbal medicines are used as preventive and health promoting besides disease curing and cosmetics. Researches on Herbal medicines are conducted in various national universities in order to make them globally competitive. Specific single drugs have been identified for the treatment of different ailments. He mentioned that laws and rules for conservation of national resources and IPR for protection are also being framed.

Mongolia: Mr Z. Mensaikhan pointed out that the Mongolian TM, which is more than 2500 years old, is based on Buddhist Philosophy and use of cosmo-energy existing in five elements. There are many centres on TM such as School of TM, Health Sciences in University of Mongolia, TM Sciences, Technology and Production Corporation of Mongolia, Hepatology Centre of TM, Mongolian-Korean Oriental Medical Centre, etc. Mongolian Materia Medica contains plants, minerals and animal parts/products details.

Conclave participants

He informed that there are seven major TM factories in Mongolia, which produce about 220 TM drugs.

Nepal: In his presentation, Dr Madhab Prasad Lamsal, MD, Singh Durbar Vaidyakhana Vikas Samiti, Ministry of Health and Population, described Ayurveda as the most prevalent medicine system in Nepal. There are around 2100 species of medicinal plants in Nepal on which a majority of Nepalese people rely for their livelihood. According to him, Nepal has over 4000 classical manuscripts on TM, 14000 classical recipes in Ayurveda, 4,00,000 TM practitioners. The Nepal Ayurveda Medical Council is involved in national registration and regulation of Ayurveda professional and academic institutions other activities. For developing plans and policies related to TM, the Government has set up the Ayurveda and Alternative Medicine Section, which also designs rules and regulations to control the quality of TM products.

Philippines: Mr Isidrro Cabuyao Sia stressed on integrating TM with mainstream medicine. He informed about the documentation process of healing traditions of the Philippine's ethno-linguistic groups possessing a rich cultural heritage of herbs' use. He also discussed classification and registration of herbs based on the intrinsic property of the active substance and dose, and the ongoing efforts towards integrative medicine.

Sri Lanka: Dr Asoka Malimage, Secretary, Ministry of Indigenous Medicine, informed that the Sri Lankan traditional system of medicine, *Desheeya Chikitsa*, is enriched with contributions from Ayurveda, Siddha and Unani systems of medicine. The Ministry of Indigenous Medicine endeavours to preserve the identity and strengthen the contribution of TM to the national healthcare system.

South Africa: Discussing TM in South Africa, Mr. Isaac Mayeng stated that 70% of South Africans rely on the Traditional Medicine (both African and Complementary) for their healthcare needs. At national level, the trade in traditional medicine stood at 20,000 tonnes of herbs a year, valued at approximately US$60 million. He also mentioned the various laws and regulations concerning all medicines, including the African TMs and Complementary medicines, and their practitioners.

Thailand: Ms Anchalee Chuthaputti, Institute of Traditional Medicine, Ministry of Public Health, gave an overview of the status of Thai TM and discussed the current Health Policy. The establishment of Department for Development of Thai Traditional and Alternative Medicine (DTAM) in 2002 was a major milestone in the progress of Thai TM, she added.

Vietnam: The status of TM in Vietnam and efforts for its promotion were discussed by Ms Vu Tue Anh

India: Dr S. K. Sharma, Advisor, Ayurveda, Department of AYUSH, discussed the wide heritage of

Shri V. K. Gupta, the then Director, NISCAIR

tradition knowledge and the various regulatory acts and bodies for research in this area.

The final part of the session was a presentation on 'Global Status of Unani Medicine' by Prof. Anis A. Ansari, Advisor, Unani, Department of AYUSH. He spoke about the origin, use and basic tenets of Unani system of medicine and also discussed the infrastructure of Unani medicine in India.

Plenary Session IV

Documentation of Traditional Knowledge for Protection, Preservation and Wealth Creation

Shri V. K. Gupta, the then Director, NISCAIR, gave a presentation on Documentation of Traditional Knowledge (TK) with special reference to Traditional Knowledge Digital Library (TKDL). Explaining that the issues involved in documentation of TK were much more complex than that in the case of modern science, he informed that the primary objective of TKDL was the pro-active protection of TK. The database also has a great potential for value addition to and wealth creation from TK. So far 22 million A4 sized pages containing 1,62,000

formulations have been created in the database. These formulations can be accessed in five international languages. The database thus not only overcomes the format barrier but also the language barrier and makes the data understandable to patent examiners. He then demonstrated how the TKDL database could be used for prior art search by examiners. He also emphasized that initially the access to the database would be given to international patent offices. On wealth creation aspect, he expected that the database would facilitate research leading to development of new drugs by the technique of reverse pharmacology.

Dr Shakeel Bhatti, Head, Genetic Resources, Biotechnology & Associated Traditional Knowledge Section, Traditional Knowledge Division, WIPO, in his presentation entitled Legal Policy Framework for Traditional Knowledge Protection, gave an overview of the ongoing process at the WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (the IGC) for establishment of an international legal framework for protection of TK. The complexity of the process is evident from the fact that seven years of intensive discussion with stakeholders and five years of discussion within the IGC had already gone for it. The current legal policy framework for protection of TK was based on ten existing laws from all over the world and addressed only the legal content. The primary focus was preventing misappropriation and not creating private property rights. Some of the objectives of the framework included recognizing value of TK, repressing unfair uses of TK, enforcing prior informed consent, etc. The framework, in addition contained guiding principles and substantive principles in the form of 14 articles. The first article deals with what constitutes misappropriation and gives an overview of acts that constitute them. Some examples are acquisition of TK in violation of prior informed consent, violation of TK against defensive protection, use of TK without fair and just compensation. Other articles deal with benefit sharing, prior informed consent, duration of protection, etc. On the current status of the legal framework, Dr Bhatti opined that the consensus process is gradually building up. However, the articles had already been adopted in parts in several regional and national frameworks for the protection of TK.

Representatives of WHO and WIPO

Presenting the status of TM/CAM in Malaysia Dr M.S. Pillay, Deputy DG of Health, Ministry of Health, said that Malaysia has made a good progress in TM/CAM and the country now has a Traditional and Complementary Medicine Division. He also mentioned about the National Policy on T/CM introduced in 2001, which particularly emphasized on promotion of proper practice of TM/CAM, safety and quality aspects as well as affording protection through IPRs. This has led to the registration of about 16,000 products so far. While discussing the objectives of the TM/CAM Division, Dr Pillay said that it primarily implemented various activities on TM including research, issuing guidelines as well as policy matters. Rather than just to promote alternative therapy, TM/CAM Division sought to achieve integration of medicinal systems. His talk also included the Global Information Hub, created and maintained by the TM/CAM Division, and contains validated information on integrated medicine

from all over the world for dissemination of TM/CAM in evidence based format.

Plenary Session V

Market Authorization of TM Products - Global Scenario

Dr K.R. Kohli, Director (Ayurveda), Dabur Research Foundation said that Traditional Medicine is globally acceptable due to cultural lineage, safety aspect and failure of conventional medical care in the management of chronic ailments. The trade of traditional products globally is in the form of Traditional Herbal Medicine, Drug and Food supplement. He explained that different countries have different legislative procedures and dossiers for registration of TM. After the formation of ICM guidelines, registration has become a little easier. He however opined that many clauses of EU- Traditional Herbal Medicine Product Directive (THMPD) are restrictive and need to be relaxed. He added that the article 16-C of THMPD needs to be amended. He emphasized that the quality parameters for herbal medicinal products should be uniform and rational.

Dr Ranjit Puranik, Ayurvedic Drug Manufacturers' Association, gave a presentation on Non-Tariff Trade Barriers to Traditional Medicine Products. He pointed out that natural product market is growing at a fast pace and emphasized the need for information sharing, He opined that the Non Tariff Trade Barriers (NTTB) should be removed for the advancement of TM sector in view of their economical, safe, reliable, efficacious and time tested solution. He also pointed out the need to format uniform codes and scientific basis for evaluation and mapping of TM.

In his presentation on US FDA Perspective on Food Supplement/ TM, Dr Ikhlas A. Khan, National Center for Natural Products Research, University of Mississippi, explained that the criteria adopted for classifying the products as drugs or food/ dietary supplements are intended use, safety categorization, quality standard differences, drug or dietary supplement claims, etc. New dietary ingredients notification is required for all new ingredients, which are not marketed in the US prior to October 1994. FDA has also published the guidelines for botanical products in June 2006. The guidance principle emphasized that identification of active constituents is not essential, purification is not required, non-clinical evaluations may be reduced, etc. Scientific issues such as identification/ substitution, purity, quality contamination, efficacy, safety or NDI, interaction, etc are important in deciding the regulatory aspects of dietary supplements, explained Dr Khan.

Plenary Session VI

Concurrent Breakaway Sessions for General Discussion

In this session, four themes were discussed. Presentations were made by the moderators followed by discussions which led to the crystallization of the recommendations of the International Conclave.

Valedictory Session

Dr R. A. Mashelkar, FRS, former Director General CSIR and Secretary, DSIR

The session comprised presentation of recommendations and the valedictory address by Dr R.A. Mashelkar, FRS, the then Director General, CSIR and Secretary DSIR. The recommendations were presented by the moderators, viz., Shri Shiv Basant for the Theme Area Scope for harmonization and international cooperation in the area of Traditional Medicine, Dr D. C. Katiyar for Standardization, Quality Control and Safety of Traditional Medicines, Dr Ranjit Puranik for Regulatory and Trade-related Aspects of Traditional Medicines, and Shri V. K. Gupta for Traditional Knowledge Protection and IPR Issues.

Dr R. A. Mashelkar began his address by congratulating the Department of AYUSH and NISCAIR for holding the International Conclave. He appreciated the concept of integrated system of health care approach in providing benefits to people using both Traditional and

modern medicines. This concept has been adopted by the Indian Government in the National Rural Health Mission Programme and was earlier mentioned by the Hon'ble Minister of Health and Family Welfare, in his inaugural address. Dr Mashelkar opined that there should be an international institute totally devoted to integrated medicine which may be named International Institute of Integrated Medicine somewhat similar to that of Indian Institute of Management and Indian Institute of Technology, which are institutes of international repute.

He traced the genesis of TKDL to the India's fight against the patent on wound healing properties of turmeric granted at the US PTO and pointed out that the wrong patents result owing to the non-availability of a database on TM with International Patent Offices for the purpose of search and examination. The establishment of TKDL has resulted out of this need and this project has been realized by the great partnership of Department of AYUSH and CSIR. The preservation and protection are just one aspect. In fact, this database has opened up new frontiers of research such as the Golden Triangle project, Bio-actives, etc. These endeavours would play an important role in making the drugs available to people at lower cost since the modern approach of drug development is so expensive and time consuming that the drugs developed this way may become unaffordable even for the people from the developed countries.

He was happy to note that the recommendations would be taken to the Inter-governmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore by Dr Shakeel Bhatti for its presentation at the 10th Meeting scheduled from 30 November to 8 December 2006 and the same are keenly awaited by Mr Francis Gurry, Deputy Director General, WIPO.

Valedictory Session: Seated (from right): Dr D. C. Katiyar; Shri Shiv Basant; Dr R. A. Mashelkar; Smt. Anita Das; Shri V. K. Gupta and Dr Ranjit Puranik

Exhibition on Ayurvedic and Herbal Products and Publications

A display of Ayurvedic and herbal products was also arranged on the occasion, which had the participation of some of the major pharmaceutical firms such as Dabur India Ltd, Zandu Pharmaceuticals Ltd, Bafco Pharmaceuticals (India) Ltd, The Himalaya Drug Co., Natural Remedies Pvt. Ltd, and Hamdard (Wakf) Laboratories. There were in all 23 exhibitors. Besides pharmaceutical products, publications from ICMR, Department of AYUSH and its Councils, NISCAIR, etc. were also on display. NISCAIR also gave a demonstration of the Traditional Knowledge Digital Library at the exhibition.

Recommendations of the International Conclave on Traditional Medicine: Agenda for the Future

Termed as the 'Agenda for the Future' by Dr R.A. Mashelkar, the theme-wise "Recommendations of the New Delhi International Conclave on Traditional Medicine 2006" alongwith the important observations are:

Harmonization and International Cooperation in the Area of Traditional Medicine (TM)

- There is a need for institutional capacity building for supporting and mainstreaming TM in participating countries.
- The participating countries should develop a consensus on

regulatory approach to Traditional Medicine.

- The participating countries should ensure sustainability of raw materials of TM plus trade.
- They also need to encourage greater use of information technology for furthering TM.
- There is also a need for greater collaboration between scientific and educational institutions engaged in TM in participating countries.
- Exchange of information between countries with strong TM traditions regarding Pharmacopoeial Standards/ Standardization and Quality Control Parameters/Good Agro-Technology practices etc.
- Development of a common strategy for protection of both codified and uncodified traditional medicinal knowledge.
- Participating countries should consider grant of mutual recognition of degrees and allow practice of codified systems of traditional medicines in their countries.
- Greater exchange of students and experts among countries.
- Explore the possibility of organizing training programmes on agro technology/ manufacturing technology/ standardization and quality control techniques/collaborative R&D for scientific validation and development of new drugs for prioritized disease conditions based on TM knowledge.
- Countries may encourage translation of classical text into English and other languages.
- Greater encouragement to drugless therapies.
- Support Preservation of traditional technologies and practices of TM.

Standardization, Quality Control and Safety of Traditional Medicines

- Initiate establishment of National policies for overall development and promotion of Traditional Medicines and integration of the same in

A view of the exhibition at the Conclave

National Health Care Systems to allow patients/consumers to have a choice.

- Develop and adopt strategies, policies and operational methodologies for harmonised approach towards quality of raw materials, manufacturing processes leading to quality finished Traditional Medicines. Operational methodologies should also include training programmes and establishment of network of laboratories on regional basis.
- Prepare monographs adopting common formats for Quality Standards of raw materials and finished products including stability and publish common Pharmacopoeia for Traditional Medicines. Establish repository(ies) of crude raw materials as well as marker compounds of pharmacopoeial purity for reference.
- Evolve a consensus with regard to appropriate protocols on Safety and Pharmaco-vigilance.

Regulatory and Trade Aspects of Traditional Medicines

- Universal harmonized code for traditional medicine need be evolved in creating new Pharmacopoeia, Quality Norms Compilation, Traditional Medicine Practices and Registration Permission Guidelines, and classification of products.
- There is a need for establishing Trade Facilitation Cell about all countries for single window trade and practice related issues on TM products.
- WHO needs to evolve guidelines on issues related to quality norms and Pharmacopoeias, TM practices and registration, recommendation of therapies and therapists in the area of traditional medicines.

Traditional Knowledge Protection and IPR Issues

- Traditional Knowledge is of immense and intrinsic value and there is a strong need to promote respect, preservation, wider application, networking for development and protection of traditional knowledge, keeping in view the interest of holder of knowledge.
- Traditional Knowledge shall be protected against misappropriation. In taking appropriate measures for the protection of traditional knowledge, countries should be guided by the objectives and principles elaborated in the draft provisions prepared by Inter-governmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Traditional Cultural Expressions/Folklore, WIPO on the protection of Traditional Knowledge which are evolutionary in nature.
- In implementing appropriate defensive and positive protection measures, countries should utilize local, national and regional registers, databases or digital libraries, such as the Traditional Knowledge Digital Library, in order to protect traditional knowledge, subject to relevant policies, laws and procedures, and the needs and aspirations of TK holders. Countries having expertise in building such Digital Libraries would share their expertise with other countries, who are desirous of building such Traditional Knowledge Libraries.
- There is a need for an international, legally binding instrument on the protection of Traditional Knowledge and traditional cultural expressions against misappropriation and misuse. Work on developing the draft WIPO Provisions should continue on a step-by-step basis, with a view to the development of such an instrument or instruments. The immediate next step, which should be taken on a priority basis in 2007, is that the WIPO General Assembly should decide and declare the status and nature of protection of Traditional Knowledge.
- The recommendations of the International Conclave on Traditional Medicine (TM) be forwarded to international organizations such as World Health Organisation, World Intellectual Property Organisation, World Trade Organisation, Convention on Biological Diversity, United Nation Conference on Trade & Development, and Food & Agriculture Organisation with a request to share the declaration with delegates of Seminar/ Meetings/Workshops as and when organized on the issue of Traditional Medicine/Traditional Knowledge.

National Workshop on Rolling Element Bearings

ROLLING Element Bearings are critical components of all machines and equipment as their malfunctioning costs heavily to the performance of the system. Understanding and evaluation of the life of rolling elements bearing is, therefore, of great concern. In order to explore the untouched domains of rolling element bearing technology and evolve guidelines for future research in this area the Central Mechanical Engineering Research Institute (CMERI), Durgapur, organized some time back, a two-day National Level Workshop on Rolling Element Bearings on the specific theme 'Future Directions in Research on Rolling Element Bearings in India'. The workshop was sponsored by the Department of Science & Technology (DST), Council of Scientific and Industrial Research (CSIR) and co-sponsored by Tribology Society of India (TSI).

The broad objective of this workshop was to provide a platform for the scientists, manufacturers, maintenance engineers and academicians for interaction to take stock of the diverse and complex problems associated with rolling element bearing technology and explore the R&D options through a strong partnership between industry, academia and the research laboratories, keeping the future perspectives of the country in view.

The workshop was attended by more than 40 delegates from Indian School of Mines, Dhanbad; Bengal Technical and Science University, Shibpur; TATA Bearings, DJR Deluxe, NTPC-SAIL, DVC,IOCL, CVRD, Dantech Pvt. Ltd, DUCOM, CMERI, etc.Dr G.P. Sinha, Director, CMERI, welcomed the participants to the workshop which was inaugurated by Prof. D.V. Singh, former Director, IIT-Roorkee. Prof. Singh delivered the inaugural lecture on Importance of Bearings. Shri G.S. Rattan, Executive-In-Charge, TATA Bearings, was the Chief Guest on the occasion. In his address, Shri Rattan emphasized the importance of regular interaction and collaboration between industry, R&D institutions and academic institutions for quality augmentation of indigenously manufactured bearings. Shri N.C. Murmu, Scientist, CMERI and Organizing Secretary of the workshop, proposed a vote of thanks.

The workshop had six technical sessions where the following presentations were made:

- Bearings in Indian industries by Shri G.S. Rattan
- Elasto-hydrodynamic lubrication and its importance in enhancing the bearing life by Prof. B.C. Majumder, IIT, Kharagpur
- Effects of surface roughness in Tribological interactions by Dr P. Sahoo, Assistant Professor, Department of Mechanical Engineering, Jadavpur, University, Kolkata
- Rolling element bearings under electrical environments by Dr Harprashad, former Senior DGM, BHEL
- Rotor dynamics and failure analysis of hydrodynamic bearings by Dr Bhaskar Sarma, Former Senior DGM, BHEL, Hyderabad
- Bearings in Aerospace application by Dr B.S. Vedaprakash, Group Director, Centre for Military Airworthiness and Certification (CEMILAC), Bangalore
- The importance of failure analysis of bearings from contact mechanics point of view by Dr S.K. Karmakar, Head, Department of Mechanical Engineering, Bengal Engineering & Science University, Shibpur
- Condition Monitoring of Bearings in Industrial Environments by Shri R.K. Biswas, Scientist, CMERI, Durgapur
- Essence of Lubricants Condition Monitoring by Dr N.M. Mishra, Head of Department, Applied Chemistry, Indian School of Mines, Dhanbad
- Importance of Wear Debris in machine reliability assessment by Prof. Bijon Sarkar, Professor, Production Engineering Department, Jadavpur University, Kolkata
- Oil Condition Monitoring by Shri Deepak Sharma, Dantech Technology, and
- Bearings and Lubrication Systems for Aerospace Application by Shri N. Nanjunda Rao, Group Director, Gas Turbine Research Establishment (GTRE), Bangalore

The seventh session was chaired by Prof. D.V. Singh who invited suggestions from speakers and participants. The workshop concluded by a Vote of thanks proposed by Shri G.D. Thakre, Scientist, CMERI and Joint Secretary of the workshop.

Appointments

Shri S.K.Rastogi takes over as Acting Director, NISCAIR

SHRI S. K. Rastogi (b.1948) has taken over as Acting Director of the National Institute of Science Communication And Information Resources (NISCAIR), New Delhi, w.e.f. 8 December 2006.

Shri Rastogi did his post-graduation in Chemistry from Meerut University in 1968. He then served as Lecturer at A.S. Degree College, Mawana, Meerut from 1968-1970. He joined the erstwhile Publications and Information Directorate (PID) in October 1970 as SSA. He rose to the position of Scientist F at NISCAIR in 1998 and is currently the senior-most Scientist at NISCAIR.

Shri Rastogi has enormous experience in the field of scientific publications, having been closely associated with almost all the prestigious publications of CSIR, such as *CSIR News, CSIR Annual Reports, CSIR handbook, Status Report on Science & Technolgy in India* etc. He has held independent charge of the *Indian Journal of Fibre and Textile Research* since 1987. He has served as Head, Periodicals Division (Physical and Chemical Sciences), NISCAIR since 2004 and earlier, as Head, Sales and Marketing Division, NISCAIR. He coordinated the 'PID-BITS M.Phil Programme in Science Communication and Journalism' during 1993-97 and has served on several committees of NISCAIR, as chairman/ coordinator. He is Life Member of the Textile Association (India).

Dr Parthasarathi Banerjee takes over as Acting Director, NISTADS

DR Parthasarathi Banerjee (b.1955) has taken over as Acting Director of the National Institute of Science Technology and Development Studies (NISTADS), New Delhi, w.e.f. 8 December 2006. Dr Banerjee acquired Bachelor's Engineering degree and Doctorate in Engineering from Jadavpur University, Calcutta (now Kolkata). His doctoral work involved research in economics as well. He started his research career at the Centre for Studies in Social Sciences, Calcutta. He joined NISTADS as Scientist C in 1983 and rose to the position of Scientist G in October 2001.

He was a post doctoral student at Fernand Braudel Center, State University of New York, Binghamton; Visiting Professor with the *Etudes des Hautes Ecole Social Sciences* (EHESS), Paris; Fellow with *Ecole Polytechnique,* CREA, Paris; and the senior-most Japan Foundation Fellow with the Tokyo University.

Dr Banerjee has been on the editorial boards of several international journals. As Keynote Speaker, or as invited delegate he has been to fora ranging from the purely scholarly and academic, to a forum such as the World Economic Forum. At NISTADS, he provided leadership to research projects including sponsored research projects. He also organized a large number of workshops, conferences, and networks and worked for multiple types of developmental activities. He has provided consultancy inputs to agencies such as the World Bank.

Dr Banerjee has published nine books, more than seventy-five research papers, about ten research reports, edited six special issues of journals, and presented of large number of papers in conferences/symposia or as talks to students in India and abroad. His latest book is '*Biomedical Innovation in India*', and two previous books were entitled '*Software Strategy*', and '*Knowledge Economy in India*'.

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