

CSIR NEWS



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Team CSIR



India and France to set up Joint Research Laboratory on Sustainable Chemistry

India's Council of Scientific & Industrial Research (CSIR) and French National Science Research Institute (CNRS) have entered into an agreement for the creation of a Joint Research Laboratory on Sustainable Chemistry at Interfaces. The CSIR-CNRS Memorandum was signed on 25 January 2008 in New Delhi by Ms Catherine Brechignac, President, CNRS, and Prof. Samir K. Brahmachari, Director General, CSIR, in the presence of Mrs Valerie Pecresse, French Minister for Higher Education & Research and Shri Kapil Sibal, Minister of Science & Technology and Earth Sciences, Government of India.

A milestone of Indo-French Partnership in the field of Science and Technology, the Joint Research Laboratory will focus on research partnership in the areas of:

- Green chemistry targeting therapeutic agents for cancer and neuro disorders
- Protein interactions for targeting alternative drugs/biological systems.

The Indian Institute of Chemical Technology (IICT), Hyderabad, one of the CSIR laboratories, will be implementing the programme in partnership with the CNRS Laboratory for Molecular Chemistry on Molecular Photonics and University of Rennes in France.



Signing of the CSIR-CNRS Agreement



New Cultivar of Bougainvillea released

A new cultivar of multi-bracted bougainvillea 'Los Banos Variegata-Jayanti', induced by chemical mutagen, has been released by the National Botanical Research Institute (NBRI),

Lucknow, recently. The chimeric branch has been isolated from one plant from 0.02% EMS treated population and multiplied. The size of chlorophyll variegation in leaves varies from a narrow streak on a leaf

to whole leaf. However, no change in bract colour was detected in the mutant. This mutant is entirely different in chlorophyll variegation pattern on leaf from gamma ray-induced mutant 'Los Banos Variegata'.



Los Banos Variegata – Jayanti

CFTRI Process for Shelf-stable Chapati released

The Central Food Technological Research Institute (CFTRI), Mysore, has standardized an appropriate formulation and process for making shelf-stable *chapati* using a continuous *chapati*-making machine (extrusion, cutting & baking) – developed in the institute, which can cater to the large requirement of *chapatis* in a short span of time. As part of this technology package, an automated *chapati* making unit (1500 *chapatis*/hour), developed by CFTRI, is also available. Alternatively it can be done by manual sheeting, cutting and baking on hot plates.

Normally *chapatis*, being a high moisture product (water activity 0.90-0.95), contain 25-35% moisture. *chapati* stales like bread or cake and becomes hard and brittle on storage, making it unacceptable for consumption. Mold growth also occurs after 3-4 days of storage. The shelf-stable *chapatis* with a life span of 12 days can be marketed through bakeries, groceries and departmental stores. It is a convenient, ready-to-serve product after heating on a microwave oven or *tawa* at low temperature. The development would cut down drudgery of housewives and working women in the kitchen.

NBRI signs Agreement for Transfer of Technology for Anti-cough Herbal Formulation

The National Botanical Research Institute (NBRI), Lucknow, signed an Agreement for transfer of technology for Anti-cough Herbal Formulation with M/s Toral Herbal, Lucknow, on 26 September 2007.

Patents granted to NBRI

Following patents have been granted to the National Botanical Research Institute (NBRI), Lucknow, in the recent past:

- Anti-ulcer herbal composition (0574 NF 2002/RU).
- Development of an anti-cough, anti-tussive and throat soothing herbal formulation (EP 1581237B1).
- Herbal composition for gastro-intestinal disorders (7172772/US).
- Herbal nutritious chocolate formulation and process for preparation thereof (0381 NF 2004/US).
- Fermented herbal health drink from *Andrographis* (0330 NF 2001/RU).

US Patent granted to CFTRI-developed Medium Formulation for Clonal Propagation

The Central Food Technological Research Institute (CFTRI), Mysore, has developed a medium formulation for the clonal propagation of *Pandanus amaryllifolius* and a US Patent No. 7189568 has been granted to it. Scented *P. amaryllifolius* produces high levels of 2-acetyl-pyrroline, a major flavourant in *Basmati* rice.

The development of specific nutrient medium with growth regulators helps in the establishment of shoot cultures and rapid aseptic multiplication of *Pandanus* shoots which may subsequently be hardened to obtain high quality planting material.

- It is for the first time, a medium formulation has been made that efficiently supports shoot bud establishment to form aseptic shoot cultures of *P. amaryllifolius*.
- There is a 10-fold increase in the shoot number in four weeks period, which is a high rate of multiplication using tissue culture methods.
- The process involves a nutrient medium formulation for continuous multiplication of *Pandanus* plants throughout the year and planting material remains free from saprophytic fungal and bacterial diseases.

New Projects taken up at NBRI

The new projects taken up by the National Botanical Research Institute (NBRI), Lucknow, include:

- “Identification and development of a web-enabled database on medicinal plants used in ISM (Ayurveda, Siddha and Unani)”, under the sponsorship of the Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy (AYUSH), Ministry of Health and Family Welfare, Government of India, New Delhi, for a period of one year with Dr R. Tuli, Director, as PI; Dr T. Husain, Scientist, as Nodal Person and Dr A. K. S. Rawat, Dr K. N. Nair, Dr L. B. Chaudhary, Dr S. K. Srivastava, Shri Baleshwar and Shri S. Shukla, Scientists and Dr B. Datt, T.O., as Co-PIs.
- “Transgenic crop plants and genes for resistance to insect pests”, under the sponsorship of CSIR, New Delhi, under Eleventh Five-Year Plan, for a period of five years with Dr D. V. Amla, Scientist, as Nodal Officer; NBRI, Lucknow, as Nodal Institute and NCL, Pune, as the Participating Lab.



Aerodynamic Evaluation of Twin Roll Model Support System

National Trisonic Aero-dynamic Facilities (NTAF) at the National Aerospace Laboratories (NAL), Bangalore, recently acquired two units of Twin Roll Model Support Systems (TRMS) as a part of an augmentation programme for the 1.2 m wind tunnel. As the new support system had higher blockage compared to the previous ones, it became necessary to assess the effect of blockage on aerodynamic characteristics. Hence this evaluation programme was carried out. The first objective was to evaluate the primary of the twin roll system as a replacement to the existing model support pod and the second objective was to evaluate the twin roll (primary + secondary) against the support systems used earlier so that TRMS could be used for future tests.

The primary investigation was carried out using a long slender body model and a 1:20 scale model of a typical combat aircraft configuration in the Mach number range of 0.5 to 1.2. Results of this investigation indicate that the primary could replace the old support pod without any penalty to aerodynamic characteristics of the model.

The twin roll evaluation was carried out using two identical models of a typical combat aircraft configuration, one of 1:20 scale and the other of 1:15 scale in a Mach number range of 0.5 to 1.8. Twin roll system appears to produce a slightly different upstream effect in relation to the support systems used earlier, which is difficult to correct by simple methods. However, incremental effects due to control surface deflections are picked up well and repeatability is found to be good. The data with twin roll system is closer to CALSPAN (USA) wind tunnel data on the same configuration. Hence adoption of TRMS has been recommended for future tests on aircraft models.

PLANETARY X-RAYS ASTRONOMY AND PHYSICS

**Dr Anil Bhardwaj's Shanti Swarup
Bhatnagar Prize-winning Work**



Dr Anil Bhardwaj, a Senior Scientist at the Space Physics Laboratory (SPL) of Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram, has been awarded Shanti Swarup Bhatnagar Prize for 2007 in the discipline 'Earth, Atmosphere, Ocean and Planetary Sciences' for his pioneering contributions to the field of Planetary Science, in particular, the planetary X-rays astronomy and physics.

Today, the field of solar system X-rays is very dynamic and in the forefront of new research. X-rays are generally associated with high temperature phenomena, such as those found in the hot plasmas (~ 1-100 million degree K and above) of solar and stellar coronae, accretion disks around condensed objects, and in clusters with galaxies moving at high velocities through the intergalactic medium. However, in the solar system, other than the Sun, we observe X-rays from bodies that are much colder (temperatures much below 1000 K). This makes the field of planetary X-rays an interesting discipline, where X-rays are produced from a wide variety of phenomena and under a broad range of conditions.

During the last few years, our knowledge about the X-ray emission from bodies within the solar system has significantly improved. Several new solar system objects are now known to shine in X-rays at energies below 2 keV. Apart from the Sun, the known X-ray emitters now include planets (Venus, Earth, Mars, Jupiter, and Saturn), planetary satellites (Moon, Io, Europa, and Ganymede), all active comets, the Io plasma torus (IPT), the rings of Saturn, the coronae (exospheres) of Earth, Mars, and Venus, and the heliosphere. The advent of higher resolution X-ray spectroscopy with the *Chandra* and *XMM-Newton* X-ray

observatories (and now the *SWIFT* and *Suzaku* observatories) has been of great benefit in advancing the field of planetary X-ray astronomy. Progress in modeling X-ray emission, laboratory studies of X-ray production, and theoretical calculations of cross-sections, have also contributed to our understanding of processes that produce X-rays from the solar system bodies.

Dr Bhardwaj is an expert in the field of solar system X-rays. Making observations with the sophisticated *Chandra* and XMM-Newton X-ray observatories, he has made an invaluable contribution to the field of planetary X-ray astronomy. Some of his landmark accomplishments are:

- Discovery of X-rays from the Rings of Saturn (cf. Fig. 1), and a convincing explanation that they are oxygen $K\alpha$ fluorescence emission from water-icy ring material.

- First detection of X-ray flare from the low-latitude disks of Jupiter and Saturn: demonstrating that these gas giant planets act as 'diffuse mirrors' for incident solar X-rays (cf. Fig. 2). These studies showed for the *first* time that the gas giants Jupiter and Saturn scatter back a part of the solar X-ray radiation incident onto their atmospheres. However, Jupiter and Saturn atmospheres are not a perfect mirror of sunlight in X-rays – only one in few thousands of solar soft (energy regime ~ 100 eV to few keV) X-ray photons are backscattered. Thus, we can say that these planets are 'cloudy' or 'hazy' mirrors for solar X-rays. These crucial findings imply that we could use giant planets like Jupiter and Saturn as remote-sensing tools. The result has

important implication — in studying the Sun, i.e., X-rays from Jupiter and Saturn can be used to study flaring from solar hemisphere that is otherwise invisible to Earth-orbiting satellites. Also, such observations can be used as well to derive solar soft (0.2-2 keV) X-ray fluxes — the energy regime in which there is a dearth of measurements.

- Use of an unusual and innovative observation mode of *Chandra* X-ray observatory to conduct the *first and the only* observation so far of soft (< 2 keV) X-rays from Earth's aurora: showing that these soft X-rays from Earth's aurora are highly variable (cf. Fig. 3).
- First extensive study of Jovian low-latitude X-rays: revealing interesting correlation with its magnetic field strength that

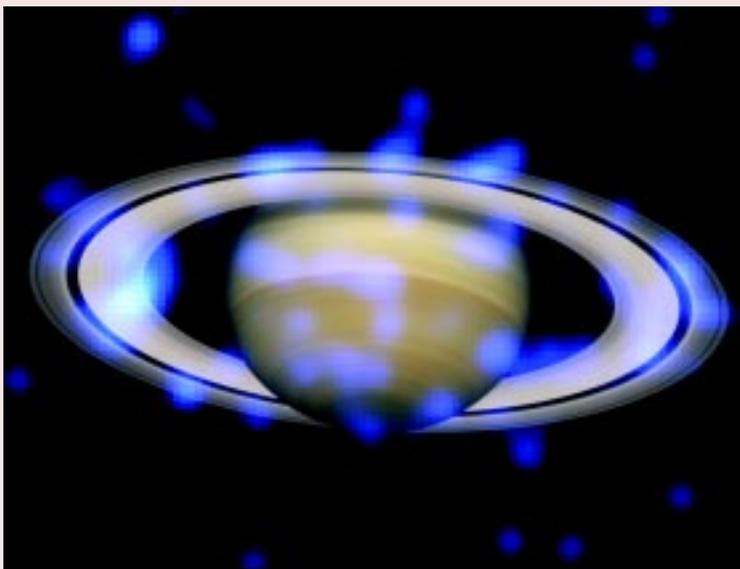


Figure 1: *Chandra* images reveal that Saturn's rings sparkle in X-rays (blue dots in this X-ray/optical composite). The likely source for this radiation is the fluorescence caused by solar X-rays striking oxygen atoms in the water molecules that comprise most of the icy rings. As the image shows, the X-rays from the rings mostly come from the B ring, which is about 25,000 km wide and is about 40,000 km above the surface of Saturn (the bright white inner ring in the optical image). The apparent concentration of X-rays on the morning side (left side in the image) could be due to additional solar fluorescence from clouds of fine ice-dust particles that are lifted above the surface of the rings by meteoroid impacts on the rings. At the time of this observation, the angular diameter of the disk of Saturn was 20.5 arcsec.

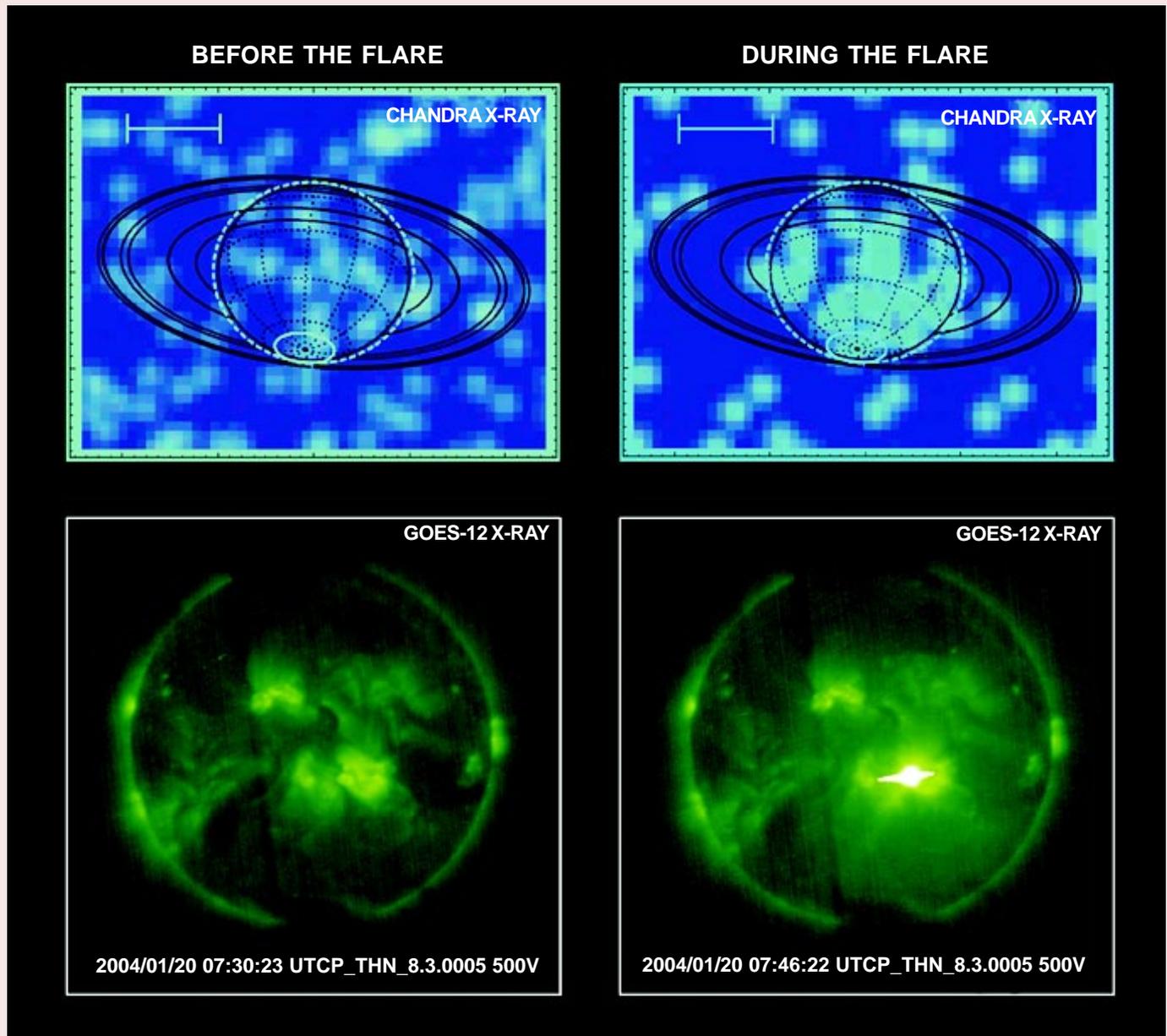


Figure 2 : On 20 January 2004 a large flare (lower panels) was detected on the Sun by an X-ray telescope on a Geostationary Operational Environmental Satellite (GOES-12). About two hours and 14 minutes later Saturn, which was being monitored by *Chandra* X-ray observatory, was observed to brighten in X-rays (upper panels). This time delay corresponds to the difference in time it takes for X-rays, or any other form of light, to make the trip from the Sun to Saturn and back to Earth as opposed to traveling directly from the Sun to the Earth. The observation showed that the upper atmosphere of Saturn reflected about 0.07 percent of the solar X-rays that hit its atmosphere. At the time of this observation, the angular diameter of the disk of Saturn was 20.5 arc seconds.

suggests plausibility of precipitation of radiation belt plasma at Jupiter.

- Member of the team that

discovered X-rays from (i) Jupiter's satellites Io and Europa, and (ii) the Io plasma torus, and (iii) the first observation of the pulsating

auroral X-ray hot-spot on Jupiter, which has revolutionized our understanding about the Jovian auroral X-ray

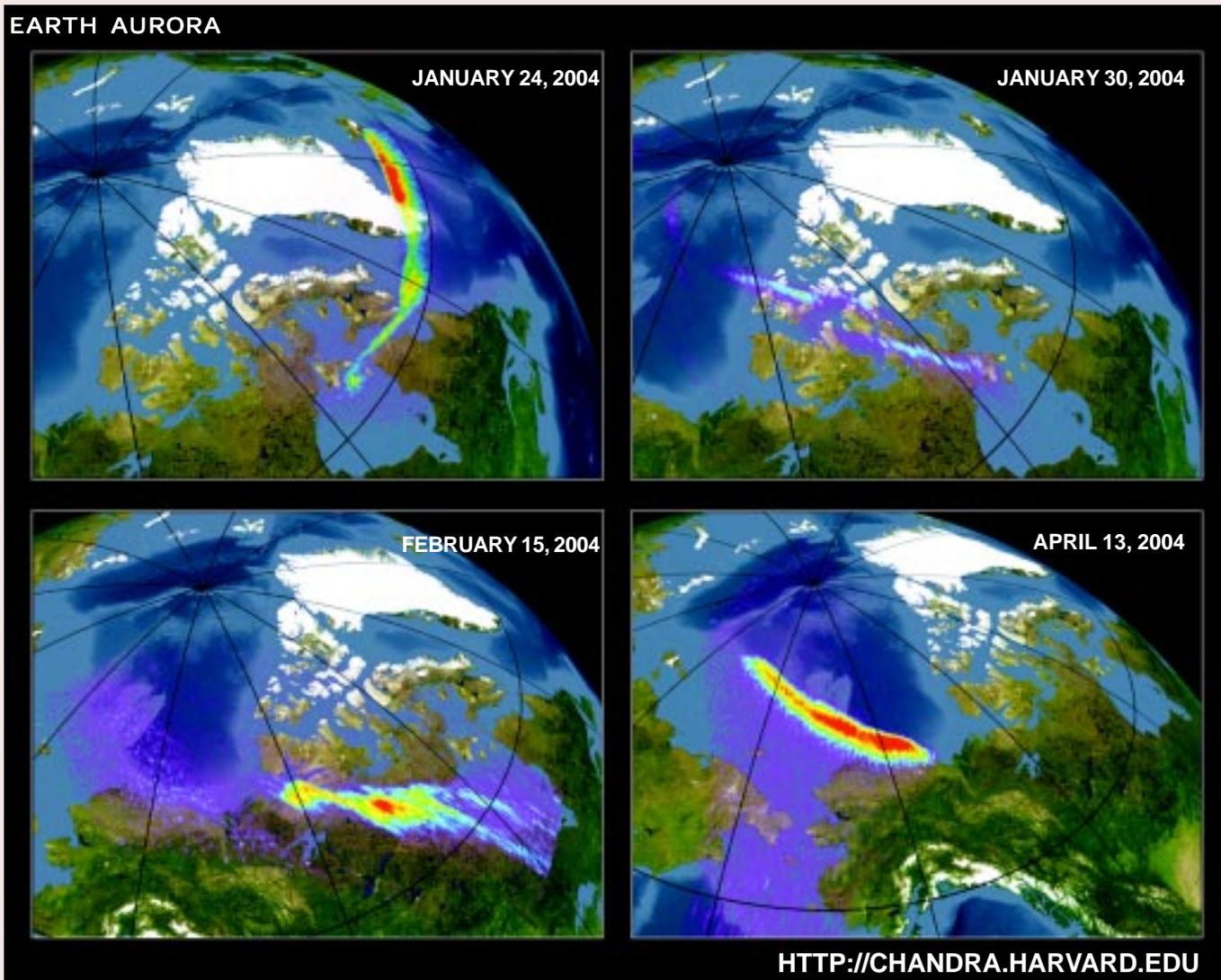


Figure 3 : Four example X-rays images (shown on the same brightness scale) of the north polar regions of Earth obtained by *Chandra* HRC-I on different days (marked on top of images), showing large variability in soft (0.1-10.0 keV) X-ray emissions from Earth's aurora. The bright arcs in these *Chandra* images show low-energy X-rays generated during auroral activity. The images — seen here superimposed on a simulated image of Earth — are from an approximately 20-minute scan during which *Chandra* was pointed at a fixed point in the sky while the Earth's motion carried the auroral region through the field of view. Distance from the North Pole to the black circle is 3,340 km. These observations had high spatial resolution of 0.5 arcsec (~0.3 km at Earth from *Chandra* apogee).

phenomena.

- Unambiguous detection of X-rays from Mars halo (exosphere), demonstrating its spectral similarity to cometary X-rays and extend to 8 Martian radii. These results have implications on

the escape of Martian atmosphere.

- Dr Bhardwaj's 1992 model predicted spectrum of bremsstrahlung auroral > 2 keV X-rays on Jupiter, which has been confirmed by observations made recently

by the XMM-Newton and *Chandra* X-ray observatories.

NASA and ESA have come out with several press releases on these breakthrough researches of Dr Bhardwaj. Several special news reports on his research have appeared in *New Scientist*, *Science*



S.S.B. Prize-winners' Work

News, Space Now, Science Daily, etc., and in several national and international dailies.

Born in a town near Aligarh District in Uttar Pradesh, Dr Bhardwaj had most of his schooling in Lucknow. He did B.Sc. and M.Sc. in Physics from Lucknow University, and Ph.D. in Applied Physics (Planetary and Space Science) in 1992 from the Institute of Technology, Banaras Hindu University (BHU). Dr Bhardwaj joined ISRO (SPL, VSSC) in 1993 and is currently Head of the Planetary Science Branch (PSB) of Space Physics Laboratory of VSSC.

Dr Bhardwaj's main field of research is theoretical and observational studies of planetary atmospheres and ionospheres, and their coupling with magnetospheric plasma and solar wind. Apart from planetary X-ray astronomy, his research interests are: aurora and airglow processes and emissions, chemistry of cometary coma, Io and Io-Jupiter interactions, Monte Carlo simulation of charged particle degradation in planetary atmospheres, solar wind-lunar interaction, ENA imaging of the lunar surface and Earth's magnetosphere-ionosphere system, and comparative planetology. He has made many important contributions in all areas of his research interests. He is a multi-spectral (X-ray, UV, visible, radio) observer, a planetary mission experimenter, and a theoretical modeler.

Dr Bhardwaj is the Principal Investigator of the joint Indo-

Swedish SARA (Sub-keV Atom Reflecting Analyzer) experiment on *Chandrayaan-1*: the first Indian lunar mission. He has been the Principal- and Co-Investigator of many observation programmes with *Chandra* X-ray Observatory and Hubble Space Telescope of NASA; XMM-Newton X-ray Observatory of ESA; and Giant Meterwave Radio Telescope (GMRT) of India. He is a member of the ASTROSAT mission, and a Team Leader of International Heliophysical Year-Coordinated Investigation Program (CIP3). He is a Core Team member of ISRO's small satellite program SENSE and of the Mars mission and *Chandrayaan-2* lunar mission study group.

Dr Bhardwaj has written a Chapter in '*Encyclopaedia of the Solar System*' (2007, Academic Press), he was Editor-in-chief of *Advances in Geosciences*, Vol. 3 (2006) and Vol. 7 (2007), published by World Scientific, Singapore, and has written invited reviews for reputed international journals. He has authored more than 70 publications in refereed international journals and conference proceedings. His research publications have made cover page of journals '*Reviews of Geophysics*' and '*Astronomy and Astrophysics*', and his paper in *Geophysical Research Letters* has been selected as the 'AGU Journal Highlights'. He has delivered several invited talks and presented over 100 research papers at

conferences in India and abroad. He has been the convener of several special sessions on topics related to planetary science at international conferences abroad, and has delivered several invited talks/colloquium at premier institutes in the world. His collaborative research programmes span over 30 research institutes in USA, Europe and Asia.

Dr Bhardwaj was awarded NRC Senior Research Associateship by US National Academy of Science in 2003 and worked at NASA Marshall Space Flight Center for ~2 years. He was also awarded Fellowship grant by United Nations Office of Outer Space Affairs (UN-OOSA), Vienna, Austria.

Dr Bhardwaj is an elected President of *Planetary Science Section of Asia Oceania Geosciences Society* (AOGS). He is the Member of Editorial Board of the European-Elsevier journal *Planetary and Space Science*, Life member of Astronomical Society of India and Kerala Academy of Sciences, and a member of American Geophysical Union. He is on several ISRO and national level committees related to Planetary and Space Sciences research programmes in India.

One Ph. D., two M. Tech. theses, one MS thesis from MIT (USA), and several MS projects have been awarded under his guidance.

To know more about Dr Bhardwaj's work, Google key word 'Anil Bhardwaj + X-rays'.

Workshop on Herbarium Techniques at NISCAIR

The National Institute of Science Communication and Information Resources (NISCAIR), New Delhi, conducted a five-day workshop on Herbarium Techniques during 17-21 December 2007. The objective of the workshop was to impart training on scientific methods of plant collection, preservation, identification, techniques for creation of herbarium database, documentation of information on plants, management of herbaria etc., and generate awareness on the current developments related to the herbarium techniques among the



Shri S.K.Rastogi, Acting Director, NISCAIR, welcoming the participants of Workshop on Herbarium Techniques. Seen with him on the dais are: Dr H.B.Singh, Head, RHMD and Mrs Renu Arora, Head, Training and Education

institutions and state forest institutes, research scholars and students and those who were interested in setting up herbaria for educational or research purposes.

Eleven participants attended the workshop.

The theme of the workshop was divided into four modules. Module one was on herbarium techniques comprising: (i) collection and preservation of plant materials and (ii) practical exercise including field trip for collection of plant materials. Module two covered processing of mycological specimens

herbarium curators, bioscience teachers of schools, college/university lecturers, scientists from research

field trip for collection of plant materials. Module two covered processing of mycological specimens





and preservation of plant genetic resources. The module three was on techniques of plant identification and creation of herbarium databases while module four was on the role of herbaria in research, education and conservation of biodiversity.

Welcoming the participants, Shri S. K. Rastogi, Acting Director, NISCAIR, outlined the salient features and objective of the workshop. He pointed out that degradation of the environment throughout the world has led to the decline in plant diversity and was threatening life support system. It has been realized that for plant taxonomy, herbarium constitutes the most essential working tool. Creation of herbarium needs a thorough knowledge on plant identification, processing of plant specimens, their preservation, and use of computers in creating herbarium databases for rapid retrieval of the information. He appreciated the initiatives taken by Raw Materials Herbarium and Museum Division, in organizing the workshop.

Mrs Renu Arora briefed about various training programmes being conducted by NISCAIR on regular basis.

The first technical session started with a presentation by Dr B. Subramaniam, Scientist, NISCAIR, on 'Herbarium and Its Functions'. He said that herbaria are scientific tools for establishing correct botanical identity and nomenclature of plants as well as in confirming the genuineness of the plant raw material samples used in the Indian system of medicines, and conservation of natural plant resources.

Dr H. B. Singh described the materials and equipment required for collection of plant specimens and establishing a herbarium. The participants were made aware of what information could be included in the field record note book, particularly the characters which may not be seen after drying the specimens. He also covered the herbarium management aspects.

A field trip for collection of plant specimens was organized in and around Buddha Jayanti Park, New Delhi Ridge to get first hand experience of plant collection. Knowledge regarding rough identification and pressing technique was imparted followed by practical exercises. The participants were also given the hands-on training in processing of specimens, like mounting, stitching and labeling.

Dr D. K. Agarwal, Head, Mycology Herbarium, enlightened the participants regarding collection and preservation of fungi and diseased plant specimens, which was followed by a visit to the Herbarium Cryptogamae Indiae Orientalis (HCIO) at Indian Agricultural Research Institute, where the participants were shown very old collections of preserved diseased plants. HCIO employs modern techniques for preservation of fungi and maintenance of culture collections.

Dr E. R. Nayar, Head, Exploration Division, National Bureau of Plant Genetic Resources (NBPGR), gave an overview of the role of Herbarium in preservation of wild germplasm of cultivated plants and their wild relatives. He emphasized on the utility of wild

species in genetic upgradation of crop species. A visit to the National Herbarium of Cultivated Plants (IARI), National Gene Bank and National Cryogen Bank of NBPGR was arranged to enable the participants understand the current techniques of preservation and maintenance of genetic resources of the country.

Shri C. B. Singh, Scientist, NISCAIR, described computer techniques for creation of a herbarium database, carrying out data entry, search and retrieval of information in various combinations and generation of report for printing.

A lecture on plant identification was delivered by Dr B. Subramaniam. He described methods of plant identification in detail and the role of 'identification keys' in the identification of plants. The role of Herbaria in Research and Education was discussed by Dr Sunita Garg, Scientist, NISCAIR.

The role of herbarium in crude drug identification was discussed by Dr Rajeev Kumar Sharma, Head, Pharmacognosy Division, Pharmacopoeial Laboratory for Indian Medicine, (PLIM) Ghaziabad. He emphasized on the necessity of authentication and correct identification of the raw material for standardization of crude drug and the extent to which herbarium is helpful in the identification of crude drug samples.

Dr Brij Lal, Head, Biodiversity Division, Institute of Himalayan Bioresource Technology (IHBT), Palampur, described the role of herbarium in the study of ethnobotany. He pointed out that the scrutiny of passport data written

on herbarium labels is one of the recognized methods for the study of ethnobotany.

The technical lecture session concluded with a lecture by Dr M. Ahmedullah, Scientist-in-Charge, Botanical Garden of Indian Republics (BGIR), NOIDA, on "The Role of Herbaria in Conservation of Biodiversity". He explained the concept of biodiversity and how a herbarium represents the entire plant biodiversity in a miniscule form at one place. He opined that the data like ecology, phytogeography, economic botany, GIS database, etc. incorporated on the herbarium labels may be found very useful in carrying out conservation studies on the biodiversity of a region. He emphasized that for a long time herbarium specimens remained the subject of academic significance only. But now it is being increasingly realized that the herbarium could be used for a variety of uses both commercial and scientific.

At the valedictory function, a CD on Herbarium Techniques, prepared by RHMD, was played. Participants expressed that the workshop was very informative, well planned and rich in contents and suggested that such workshops should be organized regularly. Shri S. K. Rastogi, gave away certificates and CDs on Herbarium Techniques to the participants. He assured the participants that such workshops would be organized once in a year and informed that there is a plan to invite participants from SAARC countries in future programmes.

The workshop ended with a vote of thanks, proposed by Dr H. B. Singh, Convener of the workshop.

Indo-Canadian Workshop on Awareness and Implementation of Biodiesel Fuel in India

The Institute of Minerals and Materials Technology (IMMT), Bhubneswar and University of Saskatchewan, Canada, jointly organized the Indo-Canadian Workshop on "Awareness and Implementation of Bio-diesel Fuel in India" at Bhubneswar on 4 September 2007. The workshop was co-sponsored by Sastri Indo-Canadian Institute, Canada.

Mrs Rajalaxmi, Additional Secretary and Chief Administrator, KBK, Government of Orissa inaugurated the workshop. Prof. B. K. Mishra, Director, IMMT, delivered the welcome address. Smt. C. Bibeau, Canadian Embassy, New Delhi; Prof. D. P. Ray, VC, OUAT, Bhubneswar and Dr G. V. Sankar also spoke on the occasion. Other scientists and experts who addressed this convention included: Dr A. K. Dalai, Professor and Canada Research Chair in Bioenergy, University of Saskatchewan, Canada; Dr V. Kale, Indian Institute of Chemical Technology, Hyderabad; Dr S. N. Naik, Indian Institute of Technology, Delhi; Dr M. Paramathma, Tamil Nadu Agriculture University, Coimbatore; Dr H. Reheman, Indian Institute of Technology, Kharagpur; Shri A. Bharthuar,



Seated on dais during the Inaugural Function of Indo-Canadian Workshop (from right) are: Prof. D. P. Ray, VC, OUAT, Bhubneswar; Dr G. V. Sankar; Mrs Rajalaxmi, Additional Secretary and Chief Administrator, KBK, Government of Orissa; Prof. B. K. Mishra, Director, IMMT; Smt. C. Bibeau, Canadian Embassy, New Delhi and Dr K. M. Parida, Scientist, IMMT,

Orissa Renewable Energy Development Agency, Bhubaneswar; Shri R.K. Chaturvedi, Chhattisgarh Bio-fuel Board and Ms Sridevi, ICRIST, Hyderabad.

Over 150 delegates from various universities, industries, government institutions, bio-fuel boards, and NGOs participated in the workshop held to discuss issues pertaining to state-of-the-art bio-diesel production processes, oilseed plantations and bio-fuel policy. The discussions also included future and current collaboration between India and Canada on bio-fuels. A visit to the integrated bio-diesel plant installed by DST was organized by Dr M. K. Mohanty, Orissa University of Agriculture and Technology, Bhubneswar. Dr K. M. Parida, Scientist, IMMT, convened the workshop.



Short-term Training Course on Technical Communication at NISCAIR

The Education & Training Division of National Institute of Science Communication and Information Resources (NISCAIR), New Delhi, conducted a Short-term Training Course on 'Technical Communication' during 10-14 December 2007, at the instance of DESIDOC, New Delhi, for the participants from various DRDO laboratories.

The five-day programme comprised lectures, demonstrations and practical sessions covering the following aspects: technical communication process, categories of technical communication, presentation of data, popular science writing and editing, common errors in scientific communication and production aspects.

Thirty-five participants attended the programme. The participants highly appreciated the topics as well the detailed and extensive information provided by faculty drawn from various divisions of NISCAIR.

NIO celebrates Foundation Day



Prof. C.N.R. Rao delivering the Foundation Day Lecture on 'Today's Scientific Scenario and Tomorrow's Challenges'

The National Institute of Oceanography (NIO), Goa, celebrated its 42nd Foundation Day on 1 January 2008 by organizing a public lecture on 'Today's Scientific Scenario and Tomorrow's Challenges' by Prof. C.N.R. Rao, National Research Professor and Honorary President and Linus Pauling Research Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore.

Highlighting the scenario of the early 1950's, Prof. Rao said that it was extremely difficult to perform research those days, but yet the outcome was outstanding. There were many individuals interested in research and even universities were contributing. Fifty per cent of research publications were contributed by the researchers from various universities. The research facilities since then have improved significantly over the years in many of our institutions in India though there is still a need to invest more on the infrastructure. Prof. Rao also expressed a sense of satisfaction that even with the drawbacks in the current education system, India has produced a large

number of scientists and engineers who have contributed to the science and technology.

While addressing to the current scenario, he said, "there have been major changes in industrial and technological scenarios all over the world. Globalization has made an extraordinary impact on our lifestyles. The word 'competitiveness' has replaced words like 'self-sufficiency' and 'self-reliance', which has altered society's approach towards science."

India is facing competition not only from the advanced countries, but also from our neighbour China, from where the research output has increased multifold today when compared to early years. The important thing that we must learn from China is the investment in the manpower and infrastructure. The difference can be noticed just by examining one single parameter of number of Ph.Ds produced.

In conclusion, he highlighted the need for more effort and investment in higher education for better science in India. He also placed responsibility on

the individuals Indian citizens, especially the young generation. The creativity that lies with individuals is getting drained in to the jobs of routine nature that give better returns. He proposed that the creative brains should accept the challenges in research and shine with the creativity rather than getting attracted to the fat salaries with no mental satisfaction.

On the second day, the Jawaharlal Nehru Centre for Advanced Research (JNCAR) and NIO in association with Goa Chamber of Commerce and Industries and Goa University organized a programme titled 'Learning Science' for middle school standard students and science teachers. They demonstrated how to teach/learn science so that the subject becomes interesting.

The programme was attended by students from 60 schools across Goa. The selection of schools was based on their performance in 2007 SSC examination. Over 600 students, 70 teachers attended the programme and found it excellent and useful. Each school was provided with a complementary copy of a volume 'Learning Science' produced by JNCAR.

Prof. P. Khanna Memorial Lecture

Arsenic : The threat to Bengal delta



Prof. P. Ramachandra Rao delivering the lecture. Seated on the dais are: Dr S. P. Pande, Dr S. Devotta and Shri A. Ghosh

Prof. P. Khanna was Director of the National Environmental Engineering Research Institute (NEERI), Nagpur, during 1987-99. He passed away on 14 August 2004. The third Prof. P. Khanna Memorial Lecture was delivered by Prof. P. Ramachandra Rao, FNA, Raja Ramanna Fellow, Advance Research Centre International (ARCI), Hyderabad, on 16 August 2007 on 'Arsenic: The threat to Bengal delta'. At the outset, Prof. Rao recalled his association with Prof. Khanna and described him as the most dynamic Director in CSIR. In his lecture Prof. Rao brought out various important aspects of arsenic pollution in Bengal delta in a very lucid manner. These included the scale of problem of arsenic, the beneficial and harmful effects of arsenic, the arsenic cycle, symptoms of arsenic poisoning, arsenic and the Himalayas, mechanism of arsenic mobilization,

the solutions for arsenic problem, the societal and policy factors involved in remediation of arsenic problem.

Prof. Rao in his concluding remarks mentioned that all organizations, both governmental and non-governmental, have to actively participate for solving this grave problem. He emphasized the need to organize awareness and training programmes at various levels as this problem, which is presently restricted to Bangladesh, West Bengal, Jharkhand and Bihar, may spread to other parts of India. He appealed to the scientific community to study this problem in greater depth and find appropriate cost effective solutions so that relief can be provided to the arsenic affected communities.

Earlier, Prof. P. Ramachandra Rao visited various R & D Divisions and held fruitful discussions with different scientific groups of NEERI.



Prof. V.G. Bhide Memorial Lecture

Climate and Climate Changes

The first Prof. V.G. Bhide Memorial Lecture was delivered by Dr R.R. Kelkar, Professor, ISRO Space Chair, University of Pune and former Director General, Indian Meteorological Department, Government of India, on 'Climate and Climate Changes' at the National Environmental Engineering Research Institute (NEERI), Nagpur, on 8 August 2007. The event was jointly organized by Maharashtra Academy of Sciences, Nagpur Chapter, Bal Vidnyan Chalwal, Nagpur and NEERI. On this occasion, Dr Sukumar Devotta, the then Director, NEERI, presided as the Chief Guest and delivered a lecture on "Global Warming".

Dr Kelkar in his lecture explained that it is feasible to predict climate changes by observing nature which leaves behind certain identification marks. These changes can be observed inside the rings of a bark tree and sea corals, he added. Attributing the climate change to green house effect, Dr Kelkar said that temperature is constantly rising. While 90s was the hottest decade in the last several centuries, 1998 was the hottest year, he said. Dr Kelkar opined that by the end of 21st century, the earth's temperature may increase by 1 to 6 degree Celsius. Explaining the reasons behind this, he said that from 1750 to 2005, concentration of carbon



Dr R. R. Kelkar, Professor, ISRO Space Chair, University of Pune, delivering the lecture on "Climate and Climate Changes". Seated on the dais (from left): Smt. P. Bhide, Dr S. Devotta and Dr S. S. Deshmukh

dioxide in the earth's atmosphere has risen from 280 ppm to 379 ppm. Methane has increased from 715 ppb to 1774 ppb and nitrous oxide's concentration has increased from 270 ppb to 319 ppb. Dr Kelkar said that the rising temperature has already led to increased floods and droughts, melting of Himalayan glaciers and rise in sea levels.

Dr Kelkar urged the Indian scientists to study monsoon, sea level changes and melting of Himalayan snow with the Indian perspective. Policy makers must understand the uncertainties and possibilities of global warming before deriving at any conclusions, he added.

Delivering the lecture on Global Warming, Dr Devotta briefed about the sources of pollution responsible

for global warming. He said that CO₂ is the main culprit for climate change followed by methane and nitrous oxide. The average temperature of the planet is alarmingly increasing since the last five years, particularly in the northern hemisphere, Dr Devotta said. He pointed out that ten thousand inhabitants of Tuvalu Island are living under the fear of being submerged in a few years. Objective of the international protocols like Kyoto and Montreal Protocols is to mitigate the effects of global warming. He informed that Kyoto Protocol restricts use of green house gases to the safe level.

Smt. P. Bhide, wife of Late Prof. V.G. Bhide, was also present on this occasion

CSIR Programme on Youth for Leadership in Science (CPYLS)

The primary objective of CPYLS is to build a scientific attitude in students at an impressionable age and instill in them a sense of pride in the achievements of Indian science. Highlights of this two-day event held recently at AMPRI, IMMT and NAL are presented here:

Advanced Materials and Processes Research Institute (AMPRI), Bhopal

AMPRI organized the CPYLS for meritorious students of CBSE and ICSE from the states of Madhya Pradesh and Chattisgarh on 27-28 December 2007. Around 40 students attended the two-day programme. The programme was inaugurated by Prof. (Dr) Manjul Saxena, Acting Director of NITTT and R, Bhopal. Dr L. C. Mohan, Coordinator of the programme, welcomed the Chief Guest, dignitaries and students. Dr C.B. Raju, Scientist, AMPRI, delivered his address on AMPRI. Vote of thanks was proposed by Dr Prabal Roy, Chief of Regional Science Center, Bhopal. On the first day, the student had the opportunity to hear popular science lectures, visit to NITTT and R, science park and *tara mandal* including video shows and night sky view. The second day was devoted to the visit of AMPRI and an interactive valedictory function.



Seated on dais during the CPYLS at AMPRI (from left) are: Dr Prabal Roy, Dr C.B. Raju, Dr Manjul Saxena, and Shri L.C. Mohan

Institute of Minerals and Materials Technology (IMMT), Bhubneswar



Prof. C.V.R. Murty delivering his lecture on 'Earthquake Engineering'

Over 100 students from schools/colleges across the state of Orissa were invited to participate in the CPYLS held at IMMT during 20-21 December 2007. The aim of the programme was to expose young minds to the exciting world of Science and encourage them to take up basic sciences as their career.

The programme started with the introductory note by Dr R.K. Paramguru, Scientist 'G' and Co-chairman, CPYLS 2007, followed by a very brilliant lecture by Prof. C.V.R. Murty, IIT, Kanpur, on 'Earthquake Engineering'. Dr Sanjeev Sahu, Scientist, Institute of Life Science, talked about 'Nano-Technology for Biologists'. Prof. B.K. Mishra, Director, IMMT, gave an overview of the CPYLS-2007 programme and also introduced the Chief Guest, Prof. S.K. Joshi, former Director General, CSIR. Prof Joshi gave a thought provoking lecture on the 'Story of Electron'. The programme ended with vote of thanks by Dr

M.T. Arasu, Coordinator, CPYLS 2007. The students were taken around the various laboratories of the institute and given live demonstration of various sophisticated equipment.



On the second day, Prof. Archita Patnaik, IIT, Madras, gave a lecture on 'Engineering Molecules via Self-Assembly' followed by a laboratory visit. A f t e r n o o n session started



Prof. S.K. Joshi, former Director General, CSIR, delivering his lecture on the 'Story of Electron'



Students being explained the activities of his division by Dr B.K. Mohapatra, Senior Scientist, IMMT

with a lecture by Prof. Mishra on mathematics followed by career counseling by Prof. Murty. The students were given certificates for their participation. During the programme an audio-visual show on activities of IMMT was also shown to the students to have a glimpse of the institute.

National Aerospace Laboratories (NAL), Bangalore

NAL organized the 'CSIR Programme on Youth for Leadership in Science' (CPYLS) on 4 -5 December 2007. Dr M. N. Sathyanarayana, Jt. Head, KTMD, welcomed the gathering and gave a brief introduction about the CPYLS programme.

Dr A. R. Upadhyya, Director, NAL, introduced the chief guest Prof. N. V. Madhusudhana, Raman Research Institute, as a distinguished scientist and a great academician. In his opening remarks Dr Upadhyya said, that a country's esteem increases with its advancement in Science and Technology (S&T). He advised the young achievers to take S &T to greater heights by looking at what

the nation needed and work on those projects relentlessly.

Prof. Madhusudhana gave a very inspiring lecture on Liquid Crystals: Fluids with direction dependent properties. He introduced the students to the basic concepts of liquid crystals in a simple manner with good visuals that the students were able to comprehend and absorb. He concluded his lecture by stating, 'Life is possible because of the formation of structures which are flexible and can evolve. This is neither possible in the highly disorganized isotropic liquid, nor in the rigid lattice of a crystal. Liquid crystals which have soft structures are essential for life processes'.

Dr M. N. Sathyanarayana compered the function and Ms Gomathy Sankaran proposed the vote of thanks.

Dr V. Shubha, Scientist, Material Science Division, spoke on 'Thermoelectricity Science and Technology' and Dr H. N. V Dutt, Jt. Head, C-CADD, spoke on 'Basics of Flight Aerodynamics'.

The valedictory function of CPYLS was an interactive session where students and their parents shared their experiences about the programme. The students thanked the management for providing them the opportunity to see some of the Asia's best facilities.

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