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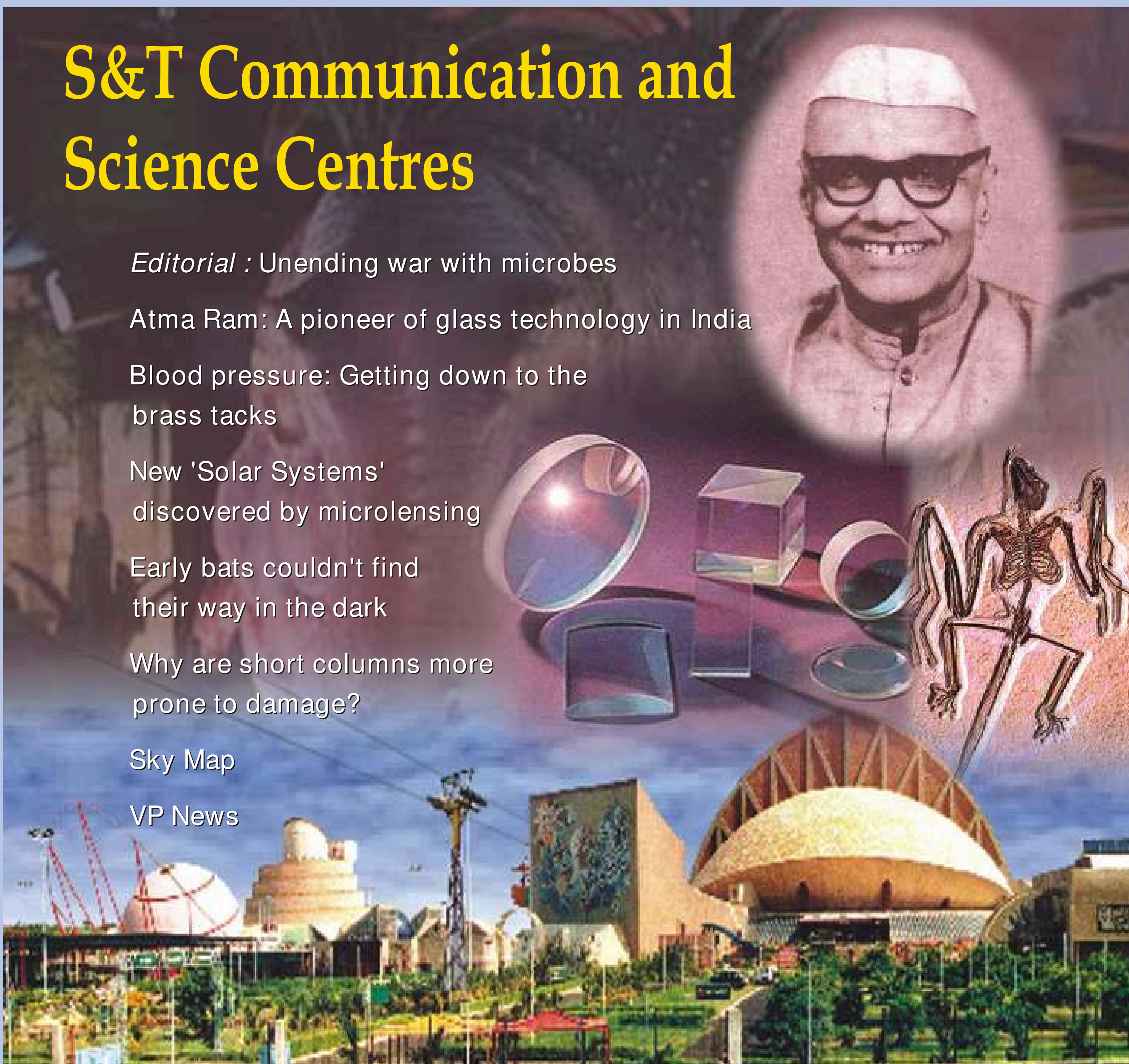

S&T Communication and Science Centres

... think scientifically, act scientifically... think scientifically, act scientifically... think scientifically, act...

Emerging Infectious Diseases

Infectious diseases account for millions of deaths every year all over the world. Although the great majority of these deaths occur in developing countries, infectious diseases are not confined by international borders. As a result, infectious diseases present a substantial threat to populations in all parts of the world including developed countries. It is important to note that in recent years, the threat posed by infectious diseases has grown significantly. New infectious diseases have emerged that were unknown just a decade ago. Severe Acute Respiratory Syndrome (SARS), Avian Influenza (bird flu), and the West Nile Virus (that causes West Nile encephalitis) are only some of them. It is also important to note that several known infectious diseases that were once considered declined or eradicated, have reappeared with increased frequency and severity. Further, there is always a possibility for an infectious disease to develop into a worldwide outbreak of an epidemic – a pandemic – which could have serious consequences on the health and economy of a nation.

During mid-1970s, development and use of vaccines had made several diseases rare in many parts of the world. Through an intense vaccination campaign spearheaded by the World Health Organization (WHO), smallpox had been eradicated from the world. It was expected that the eradication of other diseases also would follow. A large array of antibiotics was developed which could treat many of the great scourges of history, from leprosy to tuberculosis. The infectious diseases appeared to be on their way out. This optimism, however, has waned over the years. Polio is yet to be contained in India and a few other countries. We are faced with diseases like Acquired Immuno-Deficiency Syndrome (AIDS) and SARS. New drug-resistant strains of bacteria have appeared. New strains of diseases like tuberculosis have become resistant to almost all existing antibiotics, and have become a much greater health concern than ever before. Same is the story with malaria parasites. In several cases, the disease causing agent – pathogen – had not been described earlier. In others, a pathogen which could be treated earlier somehow has changed. And of late, altogether new threats have emerged.

How did this all happen? Billions of bacteria belonging to hundreds of different species – both identified and unidentified – inhabit the human body, forming an ecological community living in a state of equilibrium. Most of them are benign to the host and some even provide valuable services. The use of some broad-spectrum antibiotics can, however, disturb the balance dramatically, decreasing the numbers of friendly bacteria. In this situation, other kinds of potentially harmful bacteria, normally present only in small numbers, can overgrow, and may even cause a super-infection. Next, resistant bacteria proliferate when a population of both susceptible and resistant bacteria is exposed to an antibiotic within the host. Susceptible bacteria succumb and resistant bacteria proliferate. However, if the full course of antibiotic is not completed, the bacteria that survive the drug mutate and become resistant to that antibiotic. This is why patients are advised to complete the full course of antibiotic treatment. Use of antibiotics in animal feed is an additional cause of antibiotic resistance. Moreover, bacteria from livestock can get into our water systems.

Bacteria and other microbes move readily from person to person and global travel has only contributed to the dissemination of novel pathogens, including drug-resistant strains. It is important to note that crowding also contributes to the spread of novel pathogens. Hospitals and nursing homes are particularly ideal environments for the exchange of microbes including drug-resistant strains. Cancer treatments and other immunosuppressives (drugs that reduce body's normal immune response) such as those used for transplant patients add to the problem. So does human immunodeficiency virus (HIV) that leads to AIDS. Further, surgery or catheterization that breaches the protective barrier of the skin increases the risk of infection. In crowded cities, and especially in countries where adequate sanitation may be lacking, microbes are brought by immigrants from diverse locations. They can spread rapidly, particularly when immunizations and health care are inadequate.

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Atma Ram

A Pioneer of Glass Technology in India

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Atma Ram

"All glass technologists can feel a glow of pleasure at the prominent place their subject has attained in India and will join in their appreciation of Dr. Atma Ram's work."

– Prof. W.E.S. Turner, FRS, a doyen in the field of glass and ceramics technology

"The manner in which Dr. Atma Ram would roll up his sleeves and did not find work dirty or demeaning so long it was of scientific value and could lead to application, he would not hesitate to do. In a way it gives an insight into his life, both his early academic career as well as his later rise in the scientific hierarchy of the country."

– K. G. Krishnamurthi in Biographical Memoirs of Fellows of the Indian National Science Academy (1984)

Atma Ram's contributions cover fundamental and applied sciences as technology of production. His most significant achievement was the development and production of optical glass. In those days it was a vitally strategic material, the technology of production of which was a closely guarded secret of some ten countries in the world. Some of his work led to the development of entirely new industries in the country like the production of heat insulating materials from waste mica and foam glass for use in building, cold storage and refrigeration industries. Atma Ram's work also made it possible to produce many articles indigenously, which used to be imported from European countries. Some of the articles, which were produced using technologies developed by Atma Ram are: chemical porcelain, glass electrode for pH meters, coloured glasses, sun-glare glasses, ceramic and vitreous enamel colours and stains, and special refractories. He held 23 patents relating to his industrial work. His work on the origin of colour in copper-red glasses was of fundamental importance. His work showed that the red colour was due to the formation of cuprous oxide colloid and not copper colloid as it used to be believed by scientists world-over till then. Atma Ram's findings helped the substitution of imported selenium for the production of red bangles, which happens to be one of the biggest cottage industries in the country.

Atma Ram was a firm believer in indigenous products for the progress of the nation. He believed that scientists and technologists had a social responsibility of utmost importance and that their activities should be related to needs of society, which supports them. Freedom and accountability must go hand in hand in their work. He believed that in a poor country like India scientists must be extra careful in spending public funds.

Atma Ram was born on 12 October 1908 in a small village named Pilana in Bijnor District of western Uttar Pradesh. His parents belonged to a lower middle class family. He had early school education in his village where he studied Persian, Arabic and Urdu. After passing middle school examination he had to walk several kilometers to a school located in another village for higher classes. In 1924, he passed his matriculation examination in first class from Banaras Hindu University, Varanasi as a private student. He also passed his Intermediate Examination from the same University in 1926, but this time as a regular student. He passed the BSc examination of the Agra University from DAV College, Kanpur in 1929. He then joined the Allahabad University for doing his MSc degree in chemistry. While studying at the Allahabad University he was much influenced by the celebrated Indian physicist Meghnad Saha. K. G. Krishnamurthi wrote: "One of the major influences in Atma Ram's life while he was in Allahabad working for his doctorate was his association with Professor Meghnad Saha, who had distinguished himself by his fundamental contributions to astrophysics, and who was then Professor of Physics at Allahabad University. Professor Saha was at that time held in great esteem by Pt. Jawaharlal Nehru. Saha had developed a particular liking for Atma Ram for his devotion to scientific work and his basic thought processes. At the instance of Professor Saha, Atma Ram did certain amount of background work for the National Planning Committee under Nehru's Chairmanship and thus came into contact with Nehru who also considerably influenced him."

Atma Ram passed his MSc examination in 1931, standing first in

Atma Ram (middle) S.S. Bhatnagar and Zakir Hussain

order of merit and then taught chemistry for a very short period at the Government College, Ajmer. After this he joined the research group of Professor Nil Ratan Dhar for his doctorate. While in Allahabad, Atma Ram realised the importance of skilled technicians. This is how it happened as described by K. G. Krishnamurthi: "An interesting episode which Dr Atma Ram used to recount often during his later days relates to his visit to a sugar factory during a vacation. One of the technicians in charge of the crystallisation plants had asked him whether he could tell him at what stage the syrup would form crystals. While he was left guessing, the technician demonstrated how by feeling the consistency of the syrup between two fingers, he could exactly say the point at which formation of crystals would set in. This made a lasting impression on his mind. Throughout his entire career, both as a working scientist and later as scientist-administrator in the higher echelons of the scientific establishment, Atma Ram would repeatedly emphasise the importance of technicians in the field of science, technology and industry and the need to recognise their value."

In 1936, Atma Ram joined the Indian Industrial Bureau at Alipore, Kolkata. Later when the newly appointed Director of Scientific and Industrial Research Dr. Shanti Swarup Bhatnagar shifted the Bureau to Delhi University, Atma Ram also moved there. Atma Ram became one of the important members of the nucleus, which in 1942 developed into the Council of Scientific and Industrial Research. While at the Bureau, Atma Ram worked on the production of air-foam solution for controlling petrol fires. At that time it was a high priority war problem.

In 1945, Atma Ram was given the responsibility of setting up the Central Glass and Ceramics Research Institute at Kolkata. His initial appointment was as Officer-in-Charge of the proposed institute. In 1949 he was appointed as Joint Director and then in 1952 he was made its Director. During the initial days of CGCRI, the Indian glass and ceramic industry was at its infancy. The CGCRI played a major role in placing the industry on sound footing. This was largely possible by two major projects undertaken by the CGCRI. The first project was the comprehensive all-India survey of glass and ceramic raw materials with respect to their availability both quantitatively and qualitatively and their usefulness to the industry. This survey established the fact high-grade raw materials were available in the country which could be used in place of imported ones. The second project was detailed testing of the products manufactured and marketed by the industry to ascertain the basic defects in the manufacture of these products and they could be rectified by the industry.

Showing products developed at CGCRI to Pt. Jawaharlal Nehru

In August 1966, Atma Ram became the Director General of the Council of Scientific and Industrial Research.

Atma Ram was deeply interested in applying science and technology to the welfare of society. According to Dr. G. R. Toshniwal, President, Vigyan Parishad Prayag: "He (Atma Ram) was always pragmatic and forthright in his views; his main intention being uplift of the country by quick development of the technology in the country as compared to development of pure science. There is no two opinions that development of pure science is equally important but we cannot forget that as a result of these investigations in pure science, it should be made applicable in some way or the other for the uplift of the country. This was the main thing in his mind. I had an occasion of travelling with him and the late Prof. P. C. Malalanobis in a car from Delhi to Chandigarh and all along, we were comparing notes about the methodology adopted by R&D in industry and those followed in CSIR laboratories. I was surprised to find that his views in many respects and also the views of Prof. Mahalanobis were more

Presenting copies of Bharat ki Sampada *to Smt. Indira Gandhi. Also seen is Shiv Gopal Misra* or less identical as far as the development of scientific instruments in the country is concerned and were in lines of industrial thinking. The main theme being application of scientific knowledge in the development of the country."

It may be mentioned here that Atma Ram lost one of his eyes during his official visit to Germany. Describing this event K. G. Krishnamurthi wrote: "Another important event in Dr. Atma Ram's life which may be mentioned as of some significance was his inclusion as a member of one of the investigating teams to visit Germany at the conclusion of the War (Second World War). As Germany was under military occupation Dr. Atma Ram was given the honorary rank of Colonel and put on uniform. The visit was organised by the Allied Control Commission to laboratories and factories in the field of glass and ceramics and related areas. During his visit shrapnel struck one of his eyes and he had to be hospitalised both in Europe and in England for several months at the end of which he lost one of his eyes and for the rest of his life worked with only one eye. Medical treatment at the time was still not as advanced as at present with the result he developed allergy to most chemotherapeutic drugs as well as antibiotics. He contracted a bronchial problem, asthma and urticaria from which he frequently suffered afterwards."

Atma Ram was appointed Chairman of the National Committee on Science and Technology (NCST) in 1977. As Chairman of NCST, he was Principal Adviser to the Prime Minister and the Union Cabinet on Science and Technology. Under his chairmanship the NCST addressed the following three important issues:

1. The need for giving a fair share to the brightest young in science and technology education.
2. The need to substantially augment the resources of the universities for resource and development.
3. Preparation of the draft Technology Policy Statement for Government's consideration.

With his family members

With M.C. Chagla, Education Minister

In his office

Atma Ram was a great exponent of teaching science in the mother tongue. He displayed keen interest in propagating science in Hindi. The publication of *Bharat Ki Sampada* in several volumes was initiated by the CSIR, when Atma Ram was its Director General. He served as President of Vigyan Parishad, Prayag and encouraged many to undertake original science writing in Hindi. Recognising his contribution in popularising science in Hindi, Central Hindi Institute, Agra founded prizes after his name for encouraging science writing in Hindi. Today, getting *Atma Ram Purashkar* is considered a great achievement by a Hindi science writer. Atma Ram himself wrote a book in Hindi.

Atma Ram was the recipient of the *Shanti Swarup Bhatnagar Medal* of the Indian National Science Academy in 1959 for his outstanding contribution in physical and technological sciences. He was the first recipient of the Gold Medal and Cash Award of the Scientific Research Committee of Uttar Pradesh. He was awarded the K. G. Naik Gold Medal of Maharaja Sayajirao University, Vadodara (then Baroda) and the Plaque of Honour of the Glass Industry of India. The Universities of Banaras, Saugar and Andhra honoured him with honorary doctorate degrees.

Atma Ram was associated with a large number of scientific organisations in the country and abroad. He was an elected member of the International Commission on Glass, and an Honorary Member of the International Academy of Ceramics. He was a member of the Commission on the Chemistry of High Temperature of the International Union of Pure and Applied Chemistry. He was elected an Honorary Fellow of the Society of Glass Technology, Sheffield, UK, considered to be rare honour. He was member of the National Commission for Cooperation with UNESCO and Vice Chairman of its Science sub-committee. He was given the Honorary Degree of Doctor of Technology in Chemical Sciences by the Lenin Soviet Technological Institute of Leningrad of the erstwhile USSR. He was the General President of the Indian Science Congress in 1968. He served as President of the Indian National Academy during 1969-70. He was also the President of the Institution of Chemists and Indian Ceramic Society.

Seen with Morariji Desai

Atma Ram died on 6 February 1983. Commenting on his death, Professor Nil Ratan Dhar, under whose guidance Atma Ram completed his doctoral degree, wrote: "Dr. Atma Ram was a very qualified physical chemist and applied his knowledge and ability in tackling industrial and administrative problems very successfully. He rendered great service to the Ceramic and Glass Research Institute at Calcutta. In Delhi he held the high position as Director General, CSIR. He advanced the progress of science in India with ability. It is rather disappointing that he passed away very suddenly causing considerable loss to the progress of science and technology in India."

Atma Ram should be remembered not only for his scientific and technological contributions alone but also for his humane qualities. R. K. Gupta who worked with Atma Ram at the Central Glass and Ceramic Research Institute, wrote: "Besides technology, he (Atma Ram) gave us a lot more to learn. His simple, almost austere, but well regulated life could be an ideal to follow in the present day world, which is full of tensions and tribulations. His humane approach to problems of life, his subtle sense of humour, his way of dealing with people, his dislike for artificiality and ostentation, all are worthy of emulation for all times to come. The number of persons who received help from him in their careers and personal lives is legion, and those who talked about his so called "stern" exterior did so out of sheer ignorance, for beneath his "stern" exterior was a heart of gold that would bleed at the sight of human suffering."

(*The author is grateful to Professor Shiv Gopal Misra, General Secretary, Vigyan Parishad Prayag, Allahabad for making the sources listed in reference 3 and 4 available to the author. Most of the photographs have been reproduced from these documents*)

At CGCRI with Pt. Jawaharlal Nehru

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Radio Serial on Science Fiction Stories

Vigyan Prasar, jointly with All India Radio, Kolkata, has produced a 13-episode radio serial based on science fiction stories written by well-known science fiction writers in Bengali. The programme is to be broadcast from six AIR stations, viz., Kolkata, Shantiniketan, Siliguri, Mushidabad, Silchar and Agartala. The production included varied sound effects exclusively created for the serial to make the episodes livelier. The producer of the programme is Manas Pratim Das of AIR Kolkata. Dr. Amit Chakraborty supervised the project on behalf of Vigyan Prasar. The broadcast of the programme began on 6 January 2008. In a curtain raiser programme broadcast from Kolkata and other Bengali stations of AIR on 3 January 2008, Dr. Subodh Mahanti narrated the efforts of Vigyan Prasar in spreading science literacy through regional language with the help of various AIR stations and Doordarshan Kendras. Dr. Amit Chakraborty, Dr. Hiren Chatterjee and Soumyadeb Basu also participated in the discussion. A Nepali version of the programme has also been produced at Gangtok and is being broadcast from Gangtok and Kurseong.

Participates at the curtain raiser programmes at AIR Kolkata

Communicating Science and Technology:

Present Scenario and the Role of Science Centres

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Science communication in India has its roots in the scientific renaissance in the late nineteenth century in West Bengal and owed it to the efforts of Mahendra Lal Sarkar, Fr. Eugene LaFont, P. C. Ray, Ashutosh Mukherjee, and Jagdis Chandra Bose through the establishment of the Indian Association for the Cultivation of Science. Besides encouraging scientific research, the Association put in efforts to take science to the people through public lectures and exhibitions. It was also around this time that Ruchiram Sahni initiated a movement to take science to the people in the Punjab. People in Punjab would throng to listen to Ruchiram Sahni's lectures by paying a fee of two *annas*. One *anna*, incidentally, represented one-sixteenth of a Rupee! Also, in the late nineteenth century, Madhavrao Namjoshi organised an Industrial Exhibition in Pune with an aim to give an impetus to the industrial development in India. Indeed, people do possess a keen desire to know and understand the new science and new technologies as they become part of their lives. The innate curiosity and the thirst for knowledge always co-exist. Otherwise, over a century ago, people in the Punjab would not have thronged to listen to Ruchiram Sahni's lectures by paying a fee of two *annas*. In the present century, exhibitions on S&T have become an integral part of annual sessions of the Indian Science Congress.

With the impact of science and technology (S&T) on social life and economic development, the importance of S&T popularisation was realized decades ago in India. This concern is reflected in the Scientific Policy Resolution of 1958 and 2003; and even in the Constitution of India. Notable efforts in Kerala in taking science to the people in 1960s culminated in the establishment of Kerala Sastra Sahitya Parishat (KSSP). It is important to note that KSSP was instrumental in pioneering a people's science movement in India.

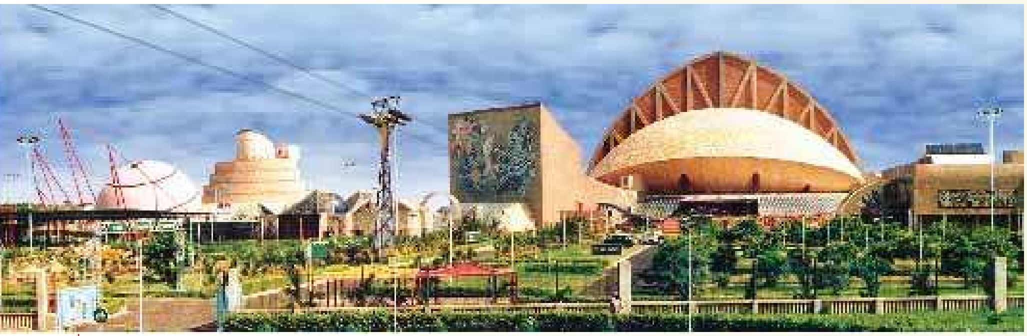
With establishment of governmental agencies like National Council for Science and Technology Communication (NCSTC) and Vigyan Prasar, and other voluntary agencies coming into being in the last twentyfive years or so, a variety of activities now take place all over the country. The National Council for Educational Research and Training (NCERT) and National Council of Science Museums (NCSM) have been contributing to the field of S&T popularisation significantly. A large network of centres for awareness about modern agricultural practices – also called Krishi Vigyan Kendras – under the Ministry of Agriculture serves the farmers and their needs.

A View of Gujarat Science City

S & T Communication: Present Scenario

The National Council of Educational Research and Training (NCERT) has a mandate of developing curricula and preparing textbooks at school level, training and research in the field of education. NCERT also organises programmes like science exhibitions for schools. National Council of Science Museums (NCSM) is the largest network of science centres/museums in the country. Besides, there are science centres such as the Homi Bhabha Centre for Science Education, Mumbai, Vikram A. Sarabhai Community Science Centre, Ahmedabad, and Vidnyan Ashram in Pune, engaged in non-formal science education and popularisation of S&T. There are 24 state-of-the-art planetaria spread in different parts of the country, and zoological parks.

S&T coverage in newspapers and magazines is also steadily picking up. Over the last five years, most newspapers in the country have been carrying a science page/supplement at least once a week. This holds true not only for English and Hindi newspapers, but also for the regional newspapers in other Indian languages. Further, popular science magazines have proliferated in several regional languages. As regards the other traditional media, All India Radio (AIR) broadcasts at least one programme everyday on a scientific topic from all its stations, in addition to the ones on health and agriculture. Several AIR



Science City Kolkata

stations with science cells broadcast three programmes per day. Doordarshan – the National Television Channel – telecasts two programmes every week on the national network, and all regional centres put together produce and telecast some 150 S&T programmes every year. Agencies like University Grants Commission, Central Institute of Educational Technology, Indira Gandhi National Open University, and Vigyan Prasar also have regular slots on Doordarshan. Programmes on S&T popularisation for telecast/broadcast are also produced by several Government/ Non-Government agencies. Vigyan Prasar, in particular, has been regularly broadcasting science programmes / serials on All India Radio, WorldSpace satellite radio, Gyan Vani FM channel of IGNOU; and on various channels of Doordarshan. VP has also established a network of satellite interactive terminals exclusively for science communication.

National Children's Science Congress is being organised by NCSTC for the last fifteen years in the country and has already caught the imagination of a few Western and Asian countries. In this programme some 600,000 school children participate. They undertake studies/projects on specific scientific themes. The reports are then submitted at school, district, state and national levels. The winners then participate in the special session of the annual Indian Science Congress in January every year. School children from a few other countries participate in this event on a regular basis.

Needless to say, the annual National Childrens' Science Congresses, S&T popularisation activities built around the total solar eclipses of 24 October 1995 and 11 August 1999, Venus transit of 8 June 2004, World Year of Physics 2005, Emergence of Modern Science, S&T for the visually challenged, teaching/learning aids and toys, networking of Government/Non-Government organisations for S&T communication, are all pioneering efforts in S&T communication. During the Bharat Jana Vigyan Jatha 1987 and Bharat Jan Gyan Vigyan Jatha 1992, groups of science communicators travelled in different parts of India spreading science awareness and interacted directly with people from nearly 400 districts covering about a quarter of India's population.

Mention also may be made about the Vigyan Prasar Network (VIPNET) of Science Clubs – mostly in rural areas, with nearly 8,000 member clubs as of today. This has laid the foundations of a national science club movement. A countrywide network of Eco-clubs established to spread awareness about conservation of environment, biodiversity and sustainable development has also been established by the Ministry of Environment and Forests.

In 2003, a unique effort was undertaken to take science to the people through a train called the "Vigyan Rail" or Science Exhibition on Wheels that moved throughout India for about eight months from December 2003 to August 2004. During its run, it travelled to 60 destinations covering 15,000 kilometres, the number of visitors being nearly 5 million. It had working models, interactive exhibits, computer games and quizzes, charts, scientific videos and so on. The exhibition was the result of cooperation and collaboration between 18 Ministries/Departments of Government of India engaged in various scientific fields. Incidentally, constituent units of NCSM, science centres, R&D labs and a number of Government and non-Government agencies participated in this gigantic effort.

Public Understanding of Science

The *India Science Report 2005* (ISR) presents the state of science and technology in India. Incidentally, this is the first quantitative report that also gives an insight into the public understanding of science. In particular, it states that there is no decline in interest in the proportion of students who wish to study science. But, a third of the students said they did not study science as they did not feel motivated enough and another 40% said the number of students in a class were too many for them to understand what was being taught! On the other hand, half the teachers interviewed believed that more computers/equipment were required for teaching science subjects since inadequate science training was a serious issue. Since every generation of top quality scientific manpower starts at the school level; a lot also depends on the way science is taught at school levels. Surely, this is an area where we need to focus our attention.

But what is of prime concern *is the extremely low percentage of people visiting science museums, planetaria, aquaria, science fairs, etc.* Is this due to less awareness or less motivation? This needs to be ascertained, for, these are places that document scientific and technological developments and could be a great source of scientific information as well as inspiration for children. While 32% of Indians have never visited a cinema hall or seen a video, the figure is more than 66% for places such as a science institute/park/ museums/ planetarium and zoos/aquariums. Under three per cent of the families (5.7% in urban areas and 1.7% in rural ones) have visited a science institute once while around 12% have visited a museum once, a fifth have been to a zoo, and just eight per cent to a library. Indeed, these are the stark realities on which the future strategies of science centres and museums would need to be based.

Pushpa Gujral Science City, Jalandhar, Punjab

Science Centres: A Few Milestones

After Independence, there were a few examples of establishment of science museums through individual initiatives. Notably among them was the establishment of the Arthropoda Museum in Pune – the very first natural history museum of India housing a large collection of crustaceans, insects, lobsters, prawns, crabs, beetles, worms and cockroaches – by S. M. Ketkar in 1961.The museum conducts educational and research activities, biological competitions for zoology students, nature study tours and short-term courses in entomology; and has become a tourists' attraction in Pune. Much later, the National Museum of Natural History was set up in 1978 at New Delhi.

Community Science Centre established at Ahmedabad in 1966 by the visionary scientist Dr. Vikram A. Sarabhai, the Father of the Indian space programme, is engaged in the non-formal science education and science popularisation among the schools and the general public. It has been the fountainhead of inspiration for establishment of science centres in different parts of the country. It is interesting to note that Science Playground is a unique concept that travelled from the tiny Community Science Centre to the West through National Council of Science Museums (NCSM). Of late, Exploratory Science Centre has come up at Pune with similar objectives. It conducts enrichment activities for school children and engages them in investigative projects. In the last five years or so, the concept of science parks has even penetrated the schools. It is not uncommon to find science parks in schools today, especially in urban areas.

NCSM is the largest network of science centres/museums in the country under a single administrative umbrella in the world. 27 science centres/ museums of NCSM located in different states in India and are visited by around 6.5 million people every year. Establishment of the Science City at Kolkata by NCSM was a milestone indeed in the history of S&T communication in India. Spread over a huge area, it offers a journey through the Jurassic period with different species of dinosaurs, a popular science hall, large format theatre showing 3-D scientific movies, and a science park. Over the years, two more science cities have come up at Ahmedabad in Gujarat and Kapurthala in Punjab.

Role of Science Centres

In view of the fact that our world is largely shaped by science, it is assumed that everyone needs to understand science. Surely, many science related topics – say, construction of a dam, construction of a nuclear power plant, or introduction of genetically modified crop - do have implications as regards public policy. There could be a long list of such highly important issues. But, quite often, in many science centres one sees an over-emphasis on fun and entertainment. One reason could be to attract children who form the largest group of visitors to the science centres. Another reason could be the revenue generation on which heavily depend many science centres.

However, in the process, important scientific issues like global warming and climate change are lost sight of. It is equally true that in bigger cities, science centres compete with a host of other options of entertainment and fun. This could be one reason why science centres often shy away from complex issues the society faces, but it deprives the adult audiences from learning about issues of relevance. It is here where the science centres need to re-invent themselves.

Science centres often present static exhibits and dioramas giving drab information which visitors may or may not find interesting or relevant. Surely, such exhibits hardly ever generate any interest among visitors. The result is few visitors pay second visit to the science centre. In order that a science centre continues to attract visitors time and again, it must present exhibits, live events such as lectures / demonstrations, video, animations, digital updates, and live links to scientists working in specific fields. Further, interactive exhibits provide hands-on experience, help generate interest and understand a scientific concept in an effective manner. Development of thematic galleries on current topics, cutting-edge technologies, and issues like nanotechnology, global warming and climate change, need to become a continuous process thereby helping attract visitors more often to the science centre.

Over the years, the distinction between a science centre and a museum is slowly getting blurred in terms of activities. With growth in literacy in the developing countries, changing socioeconomic scenario, and the revolution in the communication and information technology have made science centres and the science museums to redefine their roles. A museum is no longer a place with a mere collection of items and exhibits, or a science centre with a few activities for children. Their prime responsibility is to make people scientifically literate, trigger an interest in science among them – especially the young, and make them understand that science is everywhere and for everyone.

The primary role the science centres and museums must assume today is to act as a bridge between the people and the R&D labs from where new technologies flow and explain their possible impact on the environment and society. The fact that science centres are educational institutions where education takes place through informal learning needs no over-emphasis. Science centres have an important role to play in preparing teachers and parents to teach science. Science centres provide a first-hand experience to people of all age groups in a rich learning environment that is free from the constraints of the formal system.

Issues that Need to Be Addressed

Literacy in India has significantly gone up over the years. Over 65% of the people can read and write today. Higher literacy rate along with liberalization of economy have raised the expectation of the people from the science centres. We are on the brink of exciting developments in science that will affect everyone's lives. Along with the benefits development of new technologies come potential risks which cause concern. People rightly expect proper safeguards against risks, and full and open discussion about the values, benefits and risks of scientific developments.

New technologies are fast replacing the "what-were-once-new" technologies as they become obsolete. How fast the "latest" model of a computer purchased by you becomes obsolete, or how fast compact fluorescent lamps are replacing the good old tube lights. In the field of medicine, terms like ultrasonography, magnetic resonance imaging (MRI), organ transplant, and in-vitro fertilization have almost become a part of everyday life. Consider the advances in the field of biotechnology. Genetically modified food products, transgenic crops, cloning, gene replacement therapy, stem cell harvesting and similar jargon is fast becoming a part of our everyday vocabulary. We are faced with issues like the global warming and climate change; and the issue is further aggravated by the pumping of greenhouse gases as a result of anthropogenic activities. Science centres must not shy away from addressing these issues that have a profound social relevance.

There has been a marked change in the social fabric over the last decade as a combined result of the liberalization in economy and the phenomenal growth in the field of information technology. This process of development has its own associated problems. More and more students have been opting for professional courses and fewer and fewer for a career in pure science, which could result into an acute shortage of scientific manpower in near future. This imbalance will need to be corrected, since science and technology need to go hand in hand for an all round growth of a society. It is here that science centres and museums can make a difference. Active participation of science centres and museums contiguous with programmes like the National Children's Science Congress, science exhibitions, Emergence of Modern Science, contact programmes for school and college students with scientists, and visits to R&D laboratories, would go a long way in explaining to them the thrill and challenge offered by a career in pure science.

Looking Ahead

In view of what *India Science Report 2005* says on public understanding of science, what should be the role and responsibilities of science centres and museums? For the development and growth of a society, the spirit of enquiry and scientific attitude need to be inculcated at every level in every system. There is no gainsaying the fact that spirit of enquiry does not relate only to scientific matters, but, it equally permeates other spheres of human activity as well, say, language, society, sports, administration and so on. Indeed, the aim of a science centre or a museum should be to disseminate scientific and technological information to the people on various aspects and issues that directly affect their lives and to inculcate a spirit of enquiry among them in order that they can make informed choices.

Surely, the major function of science centres and museums is to supplement the formal system of education as imparted in schools and colleges. One encounters science in every walk of life, say, in agriculture, in medicine, in nursing, in child care, in mitigating disasters and so on. It is important to realise how various disciplines of science come together in an integrated manner when we observe a natural phenomenon. Even in social context, while dealing with problems and issues related to health, environment, water, energy, and so on, one needs to consider physical, chemical and biological aspects simultaneously. It is hence imperative that a holistic and integrated view of the phenomena we observe in our environment – both physical and social – is given. This will help people appreciate the intimate relationship of science with their lives.

This article is based on a paper presented by the author at the 5th International Conference on Enhancing Change through Science Centres organised by the Centre for Science & Technology of the Non-aligned and other Developing Countries (NAM S&T Centre), New Delhi at Johannesburg, South Africa, during 25-28 February 2008. The author is grateful to NAM S&T Centre for their concurrence to publish the article in "Dream-2047".

Blood Pressure: Getting down to the brass tacks

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Each minute, about a seventy times or more, a wave hits the several kilometres of arteries, which course through the length and breadth of the human vastness. Waxing and waning with the rhythm of life, these pressure waves expand with each pumping stroke of the heart, and contract between its beats. They carry the river of life, the blood, through our circulatory system, and exert a rolling force upon the walls of the arteries. This pressure is critical to the way the incredible human machine works.

Called blood pressure, it rises and falls with each beat of the heart. Your blood pressure is at its greatest when the heart contracts and is pumping the blood. This is called *systolic* pressure. When the heart is at rest, in between beats, your blood pressure falls. This is the *diastolic* pressure. Blood pressure is always given as these two numbers, the systolic and diastolic pressures. Both are important. Usually they are written one above or before the other, such as 120/80 mm Hg, with the top number being the systolic and the bottom the diastolic.

Blood pressure is never static. At its lowest as you sleep, it swings into its waking stride when you spring in harmony with your everyday routine. It also can rise when you are excited, nervous, or active. Throughout the day, blood pressure can vary. Still, for most of your waking hours, your blood pressure stays pretty much the same. That level should be normal, around 120/80 mm Hg.

Measuring blood pressure

Since high blood pressure often has no warning signs or symptoms, it's often found out during a visit to a doctor or a routine physical examination. The doctor uses a device called a sphygmomanometer to measure your pressure.

The test is simple. A blood pressure cuff is placed around an arm and inflated with air until blood circulation in the artery is temporarily stopped. A valve is opened and the air is slowly let out from the cuff, which allows the blood flow to start again. Using a stethoscope, the doctor listens to the blood flow in an artery at the inner elbow. The first sound heard indicates the systolic or the maximum pressure in the artery. This is the pressure when the heart contracts and pushes the blood into the arterial circulation.

More air is slowly released from the cuff. When the beating sound is no longer heard, this indicates that the heart is at rest. The pressure at this time is the lowest in the artery. This is the diastolic pressure.

The unit of measurement for blood pressure is millimetres of mercury, or mmHg (where Hg is the chemical symbol for mercury). This is because the traditional sphygmomanometer uses a column of mercury to measure pressure. The same units are used for all types of blood pressure monitors.

Blood pressure monitors

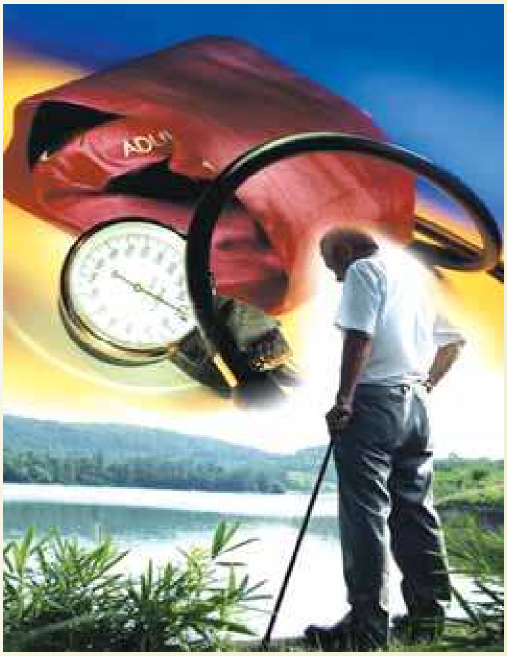
Today, a variety of blood pressure monitors are in use. While some use a column of mercury, others use a gauge to record the systolic and diastolic sounds. The electronic blood pressure monitors are even one step better. On them, the blood pressure reading appears on a small screen, and no stethoscope is used. Since it's so friendly, you might consider getting one to use yourself at home. If you do decide to buy one, go for a model that takes a measurement from your upper arm rather than your wrist or finger. And look for evidence that it has been clinically validated; that is, proven to consistently match the readings given by professional monitors.

Accuracy is vital

Getting an accurate reading is essential for a true assessment of your problem. There are certain rules to it, and, unless you are careful to follow them, the reading could be falsely high or low. The rules are as follows:

- At the time of measurement, you should be seated in a chair with your back supported and your arms bared and supported at heart level. Measurement should begin after *at least* 5 minutes of rest.

- You should refrain from ingesting tea, coffee, and cola drinks or smoking during the 30 minutes preceding the measurement.



- The appropriate cuff size must be used to ensure accurate measurement. The bladder within the cuff should encircle at least 80 percent of the arm. A smaller cuff will result in an inaccurate high reading.
- Measurements should be taken preferably with a mercury sphygmomanometer; otherwise, a recently calibrated aneroid manometer or a validated electronic monitor can be used.
- Two or more readings separated by two minutes should be averaged. If the first two readings differ by more than 5 mm Hg, additional readings should be obtained and averaged.

How do you rate?

If you are an adult age 18 or older, blood pressure readings below 120/80 mm Hg are taken as normal. A systolic measurement between 120 and 139, and a diastolic between 80 and 89 is considered pre-hypertensive. If the systolic blood pressure stays at 140 mm Hg or greater, or the diastolic pressure stays at 90 or greater, you have high blood pressure.

High blood pressure is categorized into two stages. As blood pressure goes up, your risk of health problems increases. The higher the pressure, the more is the risk. For instance, if you suffer from a stage 1 high blood pressure, your risk of a heart attack or stroke doubles. But as it rises to stage 2, this risk triples. So taking action to control your pressure is important.

Normal blood pressure for young people

No one is safe from hypertension. Children are considered hypertensive if their pressure is consistently at or above the 95th percentile for their height, age and sex. Here are the average pressures for average-height children and teens under 18:

Blood pressure categories for adults age 18 and older

Category	**Systolic** (mm Hg)	**Diastolic** (mm Hg)	**Steps to take**
Normal	***Less than 120***	Less than 80	Keep it this way!
Danger zone, call it the *pre-hypertensive stage*, if you like!	120-139	80-89	Watch out, you are on the brink! Initiate lifestyle changes, and lower your blood pressure.
High Blood Pressure			
Stage 1	140-159	90-99	You must be vigilant. Initiate lifestyle changes, and start with anti-hypertensive pills.
Stage 2 High Blood Pressure might	160 and above	100 and above	Initiate lifestyle changes. In addition, to control the pressure, you need a combination of two anti-hypertensive pills.

Boys	**Age**	**Girls**
85/37	1	86/40
88/42	2	88/45
91/46	3	89/49
93/50	4	91/52
95/53	5	93/54
96/55	6	94/56
97/57	7	96/57
99/59	8	98/58
100/60	9	100/59
102/61	10	102/60
104/61	11	103/61
106/62	12	105/62
108/62	13	107/63
111/63	14	109/64
113/64	15	110/65
116/65	16	111/66
118/67	17	111/66

Recent Developments in Science and Technology

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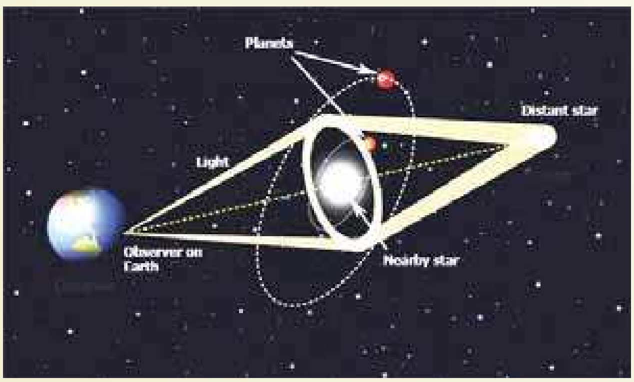
New 'solar system' discovered by microlensing

Physicist Albert Einstein shot into fame almost overnight in 1919 when one of the predictions of his general theory of relativity – that of bending of light under the influence of gravity



Gravitational microlensing

– was dramatically demonstrated during a total solar eclipse. Einstein had predicted that the path of light travelling close to a massive body would be bent due the warping of space-time in its vicinity. Since then several instances of 'gravitational lensing' caused by gravitational bending of light passing near massive galaxies have been observed by astronomers.

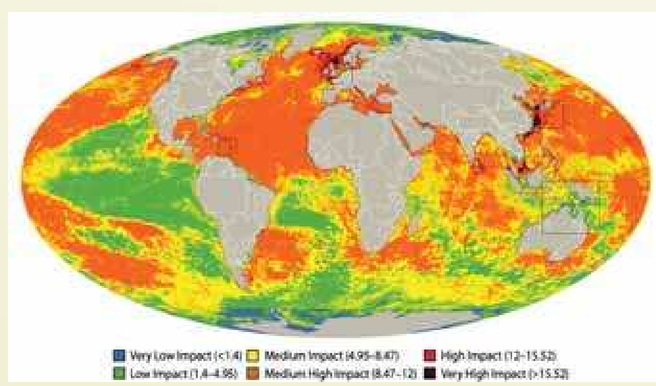
Conventionally, astronomers use the so-called 'radial velocity' technique, which searches for telltale wobbles in a star caused by the gravitational tugs of an orbiting planet, to detect extrasolar planets. Today astronomers are using an astronomical technique called 'gravitational microlensing' to detect planets using the gravitational lens effect. Unlike typically bright objects that emit lots of light (stars), darker objects that emit little or no light are difficult to study by conventional methods. Microlensing allows the study of such objects.

Microlensing is based on the gravitational lens effect. It detects planets by watching how their gravity bends and focusses the light of a distant background star. As one star passes by a more distant star as seen from Earth, light from the background star is gravitationally bent and magnified for a period of days to weeks during the event. If the nearer star has planets around it, the planets' gravity can give an added boost to the background star's light for a few hours. For microlensing to happen, however, the intervening object must pass extremely close to our line of sight to the star, and this happens very rarely. But computerized monitoring of millions of faint stars has made it possible to find even these rare events.

Recently, a microlensing study carried out by an international team of scientists from 11 countries, led by Scott Gaudi of Ohio State University in Columbus, USA, has revealed two planets around a single star, about half the size of our Sun, lying about 5,000 light years from Earth (*Science*, 15 February 2008). This is the first multiple-planet system discovered with the new technique. Not only that, the two planets show uncanny similarity in size and orbit with Jupiter and Saturn of our solar system. One planet appears to be about 71% the mass of Jupiter, while the other weighs in at 27% Jupiter's mass, or 90% Saturn's mass. The newly found planets are also colder than Jupiter and Saturn because their host star is relatively dim. The larger planet is about -191° C, while the smaller one is a frigid -214° C, the astronomers say.

New ocean map charts human impact

The oceans represent the last major scientific frontier on planet Earth – a place where expeditions continue to discover not only new species, but even new phyla. The role of these species in the ecosystem, where they sit in the tree of life, and how they respond



Global map of human impact on marine ecosystems

to environmental changes are matters about which not much is known.

Nonetheless, humans depend on ocean ecosystems for important and valuable goods and services, and in the process alter the oceans through direct and indirect means. Land-based activities affect the runoff of pollutants and nutrients into coastal waters and remove, alter, or destroy natural habitat. Ocean-based activities extract resources, add pollution, and change species composition. These human activities vary in their intensity of impact on the ecological condition of communities and in their spatial distribution across the seascape.

Despite technological advances that now allow people to access, exploit or affect nearly all parts of the ocean, till recently scientists knew very little of the ocean's biodiversity and how it is changing under our influence. A new study now shows that over 40% of the world's oceans are heavily affected by human activities and few, if any, areas remain untouched. The least impacted areas are largely near the poles, but also appear along the north coast of Australia, and small, scattered locations along the coasts of South America, Africa, Indonesia and in the tropical Pacific (*Science*, 15 February 2008). According to the researchers, "The goal of the study was to estimate and visualize, for the first time, the global impact humans are having on the ocean's ecosystems."

To arrive at the finding, a team of scientists from USA and Canada gathered or created maps (with global coverage) of all types of human activities that directly or indirectly have an impact on the ecological communities in the ocean's ecosystems. In total, they used maps for 17 different activities in categories like fishing, climate change, and pollution. They also gathered maps for 14 distinct marine ecosystems and modelled the distribution of six others. The researchers developed a standardised, quantitative method, on the basis of expert judgment, to estimate ecosystem-specific differences in impact of 17 anthropogenic causes of ecological change. The greatest threats were found to be increasing sea temperature, destructive deep-water fishing, and point-source organic pollution. Rocky reef, coral reef, hard-shelf, mangrove, and offshore epipelagic (the oceanic zone where enough light is present for photosynthesis to occur) ecosystems were identified as the most threatened.

The data summarised in the map provides critical information for evaluating where certain activities can continue with little effect on the oceans, where other activities might need to be stopped or moved to less sensitive areas, and where to focus efforts on protecting the last pristine areas. As management and conservation of the oceans turns toward marine protected areas (MPAs), ecosystem-based management (EBM) and ocean zoning to manage human influence, the researchers hope their study will be useful to managers, conservation groups and policymakers.

Early bats couldn't find their way in the dark

Bats represent one of the largest and most diverse orders of mammals, accounting for one-fifth of all living mammal species. They are flying mammals that are active at night. They use echolocation; that is, the echo of sound waves, to find their way in the dark and also locate their prey.

There has been a longstanding debate about how bats evolved, centred mainly on three points – whether the ability to fly and navigate using sound evolved together; whether the ability to fly came first; or whether the ability to navigate using sound developed first. Now the discovery of a remarkably well-preserved fossil representing the most primitive bat species known to date demonstrates that the animals evolved the ability to fly before they could use sound waves for navigation (*Nature*, 14 February 2008). The study was done by a team of American and German scientists led by Nancy Simmons of the American Museum of Natural History, New York.

The fossil of the new species, named *Onychonycteris finneyi*, was un-

Fossil of Onychonycteris finneyi

earthed in 2003 in southwestern Wyoming, USA. Dating the rock formation in which the fossil was found put its age at 52 million years. The *Nature* paper describes several surprising features of *Onychonycteris* revealed after a careful examination of the fossil's physical characteristics. For example, it had claws on all five of its fingers, whereas modern bats have, at most, claws on only two digits of each hand. The limb proportions of *Onychonycteris* are also different from all other bats – the hind legs are longer and the forearm shorter – and more similar to those of climbing mammals that hang under branches, such as sloths and gibbons. *Onychonycteris*'s teeth indicate that its diet consisted primarily of insects, just like that of most living bats.

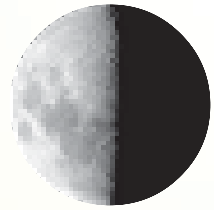
Despite *Onychonycteris*'s resemblance to modern bats, however, its skull lacks features in and around the ear seen in bats that use echolocation to navigate and hunt. This indicates that *Onychonycteris* did not have the ability to use sound waves for navigating and locating prey in the dark, as modern bats do. Thus in bat evolution, flying evolved first, echolocation later.

Sky Map for April 2008

Full Moon

20 April

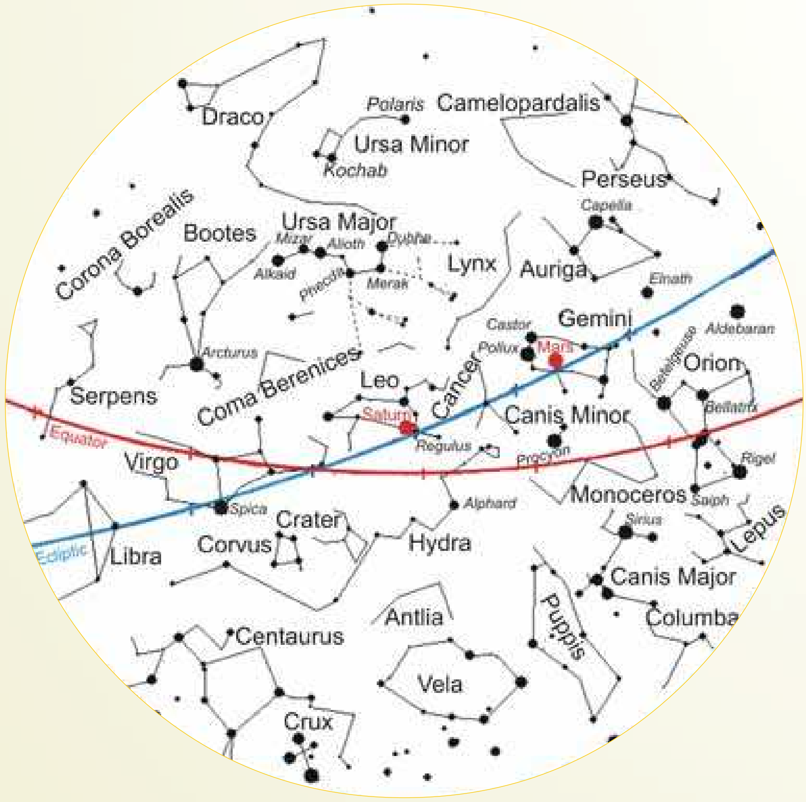
Moon - Last Quarter



28 April

North

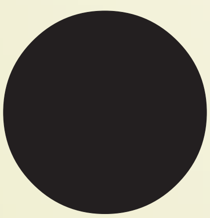
East



West

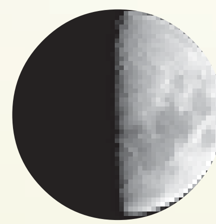
South

New Moon



6 April

Moon - First Quarter



12 April

The sky map is prepared for viewers in Nagpur (21.09⁰ N, 79.09⁰ E). It includes bright constellations and planets. For viewers south of Nagpur, constellations of the southern sky will appear higher up in the sky, and those of the northern sky will appear nearer the northern horizon. Similarly, for viewers north of Nagpur, constellations of northern sky will appear higher up in the sky, and those of the southern sky will appear nearer the southern horizon. The map can be used at 10 PM on 01 April, at 9:00 PM on 15 April and at 8 PM on 30 April.

Tips for watching the night sky :

(1) Choose a place away from city lights/street lights (2) Hold the sky-map overhead with 'North' in the direction of Polaris (3) Use a pencil torch for reading the sky map (4) Try to identify constellations as shown in the map one by one.

Planet/Dwarf Planet Round Up:

Mars : In the constellation Gemini (*Meethun Rashi*) up in the Western sky.

Saturn : In the constellation Leo *(Simha Rashi)* up in the Zenith sky.

Prominent Constellations: Given below are prominent constellations with brightest star therein (in the parenthesis). Also given are their Indian names.

Eastern Sky : Bootes (Arcturus), Corona Borealis, Libra/*Tula Rashi*, Serpens, Virgo (Spica) / *Kannya Rashi (Chitra)*.

Western Sky : Auriga (Capella), Gemini (Castor, Pollux)/ *Meethun Rashi*, Lepus, Monoceros, Orion (Betelgeuse, Rigel, Saiph).

Southern Sky : Antlia, Canis Major (Sirius), Centaurus, Columba, Corvus, Crater, Crux, Hydra (Alphard), Puppis, Vela.

Northern Sky : Camelopardalis, Draco, Perseus, Ursa Major/ *Saptarishi*, Ursa Minor (Polaris) / *Dhurva Matsya* (*Dhurva Tara*).

Zenith : Cancer / *Karka Rashi*, Canis Minor (Procyon), Coma Berenices, Leo (Regulus) / *Simha Rashi (Magha)*, Lynx.

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Earthquake Tip-22

Why are short Columns more Damaged During Earthquakes?

Which columns are short?

During past earthquakes, reinforced concrete (RC) frame buildings that have columns of different heights within one storey, suffered more damage in the shorter columns as compared to taller columns in the same storey. Two examples of buildings with short columns are shown in Figure 1 – buildings on a sloping ground and buildings with a mezzanine floor.

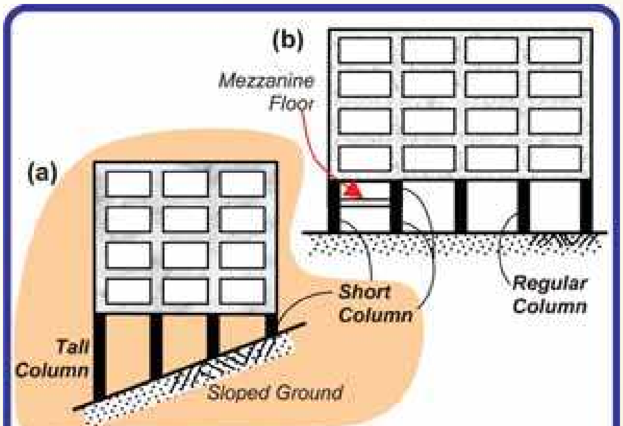

Figure 1: Buildings with short columns – *two explicit examples of common occurrences.*

Poor behaviour of short columns is due to the fact that in an earthquake, a tall column and a short column of same cross-section move horizontally by same amount D (Figure 2). However, the short column is stiffer as compared to the tall column, and it attracts larger earthquake force. Stiffness of a column means resistance to deformation – the larger the stiffness, the larger is the force required to deform it. If a short column is not adequately designed for such a large force, it can suffer significant damage during an earthquake. This behaviour is called 'Short Column Effect'. The damage in these short columns is often in the form of X-shaped cracking – this type of damage of columns is due to 'shear failure' (see *IITK-BMTPC Earthquake Tip 19*).

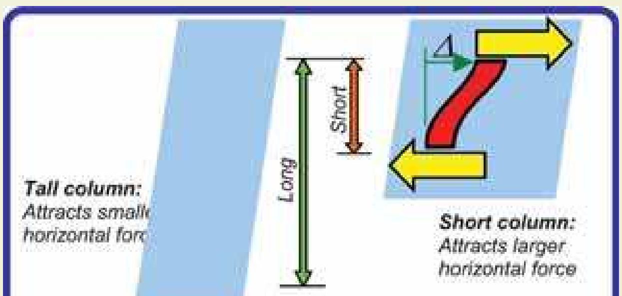

Figure 2: Short columns are stiffer and attract larger forces during earthquakes – *this must be accounted for in design.*

The short column behaviour

Many situations with short column effect arise in buildings. When a building rests on sloped ground (Figure 1a), during earthquake shaking all columns move horizontally by the same amount along with the floor slab at a particular level (this is called 'rigid floor diaphragm action'; see *IITK-BMTPC Earthquake Tip 17*). If short and tall columns exist within the same storey level, then the short columns attract several times larger earthquake force and suffer more damage as compared to taller ones.

The short column effect also occurs in columns that support mezzanine floors or loft slabs that are added in between two regular floors (Figure 1b).

There is another special situation in buildings when short-column effect occurs. Consider a wall (masonry or RC) of partial height built to fit a window over the remaining height. The adjacent columns behave as short columns due to presence of these walls. In many cases, other columns in the same storey are of regular height, as there are no walls adjoining them. When the floor slab moves horizontally during an earthquake, the upper ends of these columns undergo the same displacement (Figure 3). However, the stiff walls restrict horizontal movement of the lower portion of a short column, and it deforms by the full amount over the short height adjacent to the window opening. On the other hand, regular columns deform over the full height. Since the effective height over which a short column can freely bend is small, it offers more resistance to horizontal motion and thereby attracts a larger force as compared to the regular column. As a result, short column sustains more damage. Figure 4 shows X-cracking in a column adjacent to the walls of partial height.

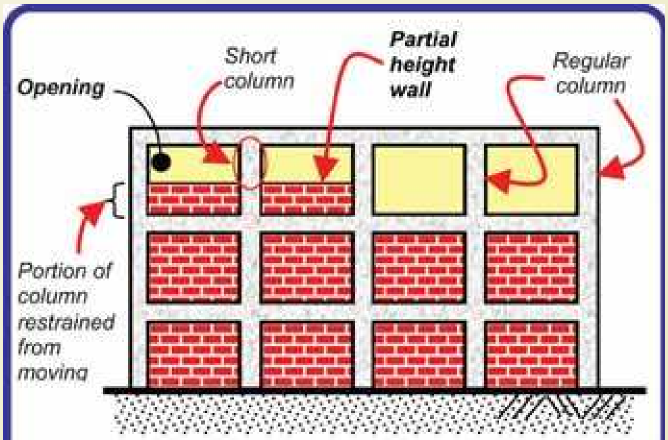

Figure 3: *Short columns effect* in RC buildings when partial height walls adjoin columns – *the effect is implicit here because infill walls are often treated as non-structural elements.*

Figure 4: Effective height of column over which it can bend is restricted by adjacent walls – *this short-column effect is most severe when opening height is small.*

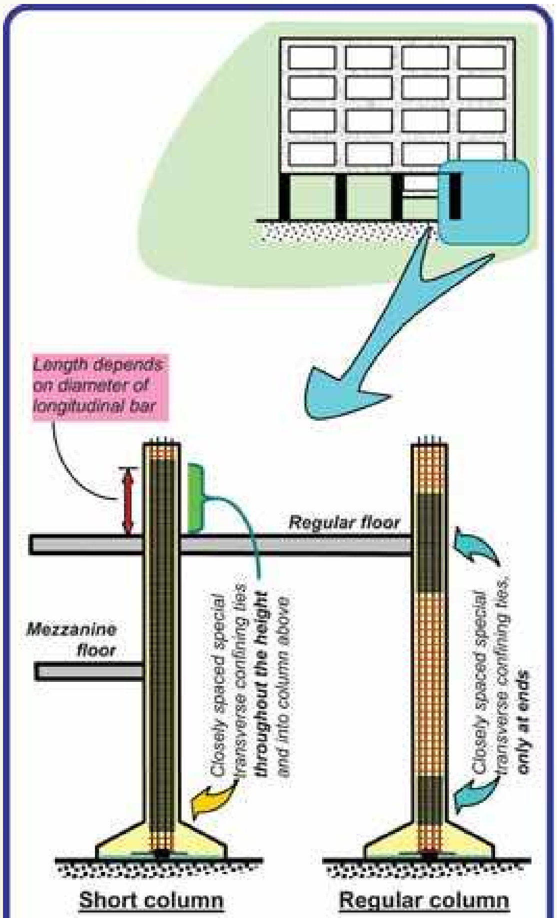

Figure 5: Details of reinforcement in a building with short column effect in some columns – *additional special requirements are given in IS:13920-1993 for the short columns.*

The solution

In new buildings, short column effect should be avoided to the extent possible during architectural design stage itself. When it is not possible to avoid short columns, this effect must be addressed in structural design. The Indian Standard IS:13920-1993 for ductile detailing of RC structures requires special confining reinforcement to be provided over the full height of columns that are likely to sustain short column effect. The special confining reinforcement (*i.e.,* closely spaced closed ties) must extend beyond the short column into the columns vertically above and below by a certain distance as shown in Figure 5. (See *IITK-BMTPC Earthquake Tip 19* for details of the special confinement reinforcement.)

In existing buildings with short columns, different retrofit solutions can be employed to avoid damage in future earthquakes. Where walls of partial height are present, the simplest solution is to close the openings by building a wall of full height – this will eliminate the short column effect. If that is not possible, short columns need to be strengthened using one of the well established retrofit techniques. The retrofit solution should be designed by a qualified structural engineer with requisite background.

Related IITK - BMTPC Earthquake Tip

Tip 6 : How Architectural Features Affect Buildings During Earthquakes?

Tip 17 : How do Earthquakes Affect Reinforced Concrete Buildings?

Tip 19 : How do Columns in RC Buildings Resist Earthquakes?

Resource Material

IS 13920, (1993), *Indian Standard Code of Practice for Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces*, Bureau of Indian Standards, New Delhi.

Acknowledgement :
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Editorial (Contd. from page 39)

Zoonoses, diseases that can be transmitted to humans from animals, are harder to eradicate. Further, they may be bacterial (anthrax, plague), viral (rabies, cowpox), parasitic (amoebiosis, tapeworm), or fungal (ringworm). Incidentally, rickettsia is a group of microorganisms having characteristics between bacteria and viruses and can cause many diseases (typhus fever, spotted fever) that are transmitted by parasites like fleas, lice, mite and ticks. Recent example of probable zoonosis is SARS, which has been found in the civet cats and Chinese bats. Avian Influenza commonly found in wild birds and poultry has also infected humans. Even Human Immunodeficiency Virus (HIV) is believed to have jumped from the chimpanzees to humans in Africa and then spread in different parts of the world. We may note that global climate change has already altered the species ranges of a number of animals and plants. Further change could increase the range of vectors such as mosquito that transmit diseases like malaria and dengue.

There is no gainsaying the fact that new human infections continue to emerge all over the world, but the risk is higher in some regions than others; and that the identification of emerging diseases and their "hotspots" warrant greater surveillance. It is in this context that a research paper published in a recent issue of the leading scientific journal *Nature* (21 February 2008) by a team of scientists led by Kate E. Jones assumes significance. It provides a systematic, quantitative analysis of recent patterns of disease emergence. The scientists studied and analyzed 335 emerging disease 'events' (that is, outbreaks of human disease associated with new species or variant of an infectious agent of any type of pathogen) between 1940 and 2004. Of the 335 events, 182 events were caused by bacteria or rickettsia, reflecting a large number of drug-resistant microbes that are present all around us, followed by viruses (85), protozoa (36), fungi (21); and helminths or parasitic worms (11).

The scientists found that more new diseases emerged in the 1980s than in any other decade. According to them, this could be due to the HIV/AIDS pandemic creating a large population that is highly susceptible to concomitant infections that led to a range of other new diseases in people. An interesting finding of the study has been that zoonoses are the current and most important threat in causing new diseases to emerge - accounting for 60 per cent of events. And most of these, including SARS, Ebola virus, and the H5N1 bird influenza originated in wildlife. The authors have provided the first ever definitive proof that emerging infectious diseases like HIV, SARS, West Nile Virus and Ebola are indeed on the rise. Antibiotic drug resistance has been cited as another culprit, leading to diseases such as extremely drug-resistant tuberculosis.

The authors did not stop with determining the causes and origins of emerging infectious diseases. They took it a step further. To help predict and prevent future attacks, sophisticated computer models were used to help design a global map of emerging disease "hotspots". Their results confirm that emerging infectious diseases are significantly associated with socio-economic, environmental and ecological factors that provide a basis for identifying regions where new emerging infectious diseases are most likely to originate – emerging disease "hotspots". Such hotspots, particularly in Central America, tropical Africa and South Asia warrant greater surveillance. Areas that present the biggest potential source for new zoonoses are the whole of the East Asia region, the Indian sub-continent, the Niger Delta, and the Great Lakes region in Africa.

It is interesting to note that most reports of emerging disease events came from developed countries. In the United States alone, there have been more than 100 events reported – almost one third of the total. Such infections include several species of hantavirus (carried by rodents and passed on to humans through infected urine, saliva or droppings causing deadly respiratory disease); fungal infections in hospital patients; and a range of bacterial infections acquired from animal reservoirs. This could be due to significant under-reporting of emerging infectious diseases from other regions of the world due to lower levels of surveillance, as the authors suggest.

Finally, the study calls for substantial investment in the capacity to detect, identify and monitor infectious diseases in regions of the world where the need is greatest. At present, richer countries in Europe, North America, Australia and parts of Asia have much greater efforts channelled in this direction. The authors recommend reallocation of surveillance resources to Latin America, tropical Africa and Asia. Surely, the benefits would just not be felt locally. "In an era of increasing globalization, emerging infectious diseases are everybody's problem", says Mark Woolhouse, in an accompanying *Nature* News and Views article.

☐ Vinay B. Kamble

Letters to the Editor

Good for reference

I just received the February 2008 issue of *DREAM 2047*, which I find is an excellent magazine. It carries useful articles that can be used as reference material. The photographs, especially of the scientists add to its value, as the same are rarely available. I have asked my teachers to read this magazine regularly and also to motivate students to read it.

Dr. Ram Kumar
Principal, Kendriya Vidyalaya
NHPC Gingal Uri, PO. Mohra,
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National Science Day 2008 – Release of a CD

An interactive multimedia CD on Optics, brought out by Vigyan Prasar was released by the Minister of Science and Technology and Earth Sciences Shri Kapil Sibal on National Science Day at Technology Bhavan, New Delhi. Present on the occasion were Dr. M. S. Swaminathan, member, Rajya Sabha; Dr. T. Ramasami, Secretary, Department of Science and Technology and other dignitaries.

The CD contains 37 novel experiments/activities on different concepts of optics like reflection, refraction, dispersion, interference etc., and is aimed at attracting students and teachers to physics in general and optics in particular.

Shri Kapil Sibal releasing the CD on Optics. Also seen (from left) Shri Anuj Sinha, Dr. T. Ramasami, Dr. M. S. Swaminathan and Professor Ved Ratna (extreme right)

The CD will help students and teachers CD in understanding practical applications of the concepts in real life situations.

Professor Ved Ratna, Vice President, Indian Association of Physics Teachers and his associates Shri Sher Singh, HOD (Physics), NDMC Navyug School, Delhi and Miss Ramneek Kapoor, HOD (Physics), Jaiswal Kaur Public School, Delhi conceptualised most of the experiments.

National Seminar on Changing Trends in Science Communication

Vigyan Prasar jointly with Institute of Management Studies (IMS), Noida organised a two-day (9-10 February 2008) national seminar on "Changing Trends in Science Communication"

In the inaugural session, Prof. Dr. Devesh Kishore, Dean SJMC, IMS NOIDA welcomed the dignitaries. Dr. Vinay B. Kamble, Director, Vigyan Prasar briefly described the activities of Vigyan Prasar with special emphasis on its audio programmes. He expressed his happiness about the collaboration of IMS, Noida with Vigyan Prasar. Dr. Akhilesh Kumar, Director, IMS elaborated on the development of science communication since the early 80's at the international level. Prof. V. S. Ramamurthy, formerly Secretary Department of S&T, Govt. of India and presently chairman, Board of Governors, IIT Delhi and DAE Homi Bhabha Chair Professor, Inter-University Accelerator Centre, New Delhi inaugurated the seminar. Quoting recent examples, Prof. Ramamurthy observed that science communication needs to be more effective and meaningful to meet people's needs. He emphasised the role of S&T communication for social development. Shri Rajeev Kumar Gupta, President, IMS, Noida was also present on the occasion. Dr. Subodh Mahanti, Vigyan Prasar proposed the vote of thanks.

Prof. V.S. Ramamurthy, delivering the Inaugural Address. Also seen on the dais (from L to R) Dr. S.Mahanti, Prof. Devesh Kishore, Shri Rajeev K. Gupta, Dr. V.B. Kamble and Prof. Akhilesh Kumar.

The were six technical sessions namely, 'Role of Print Media S&T Communication'; 'Role of Electronic Media in Science Communication'; 'Role of Scientists in Science Communication'; 'Role of S&T Communication in Social Development and Region Specific Impact of Science Communication'; 'Emerging New Technologies/New Media Science Communication'; and 'Enhancement of Scientific Temper Through Traditional Media'.

Among the speakers were Prof. Ashok Tnadan, Director, Makhanlal Chaturvedi Rashtriya Patrakarita Evam Sanchar Vishwavidyalya, Noida; Shri Pramod Joshi, President Editor, *Hindustan*, New Delhi; Shri Pradeep Srivastava, Senior Scientist, Central Drug Research Institute (CDRI), Lucknow; Shri T.V. Jayan, Science Editor, *The Telegraph*, Delhi; Shri Navneet Anand, Senior Journalist, New Delhi; Sri Vinod Varshney, Joint Bureau Chief, *Hindustan*, New Delhi; Prof. Devesh Kishore, Dean, SJMC, IMS, Noida; Shri Gauhar Raza, Senior Scientist, NISTADS, New Delhi, Smt. Ratnabali Mitra, Programme Executive, AIR, New Delhi; Mrs. Deepa Chandra, Director, Doordarshan Kendra, Delhi; Prof. Ifthekar Ahmed, Director, MCRC, Jamia Milia Islamia University, New Delhi; Shri Amit Chakraborty, Ex-Director, AIR Kolkata; Dr. C.M. Nautiyal, Senior Scientist, Birbal Sahni Institute of Palaeobotany, Lucknow; Prof. Dinesh Kumar, Director, Institute of Mass Communication in S&T Head of Botany Deptt. Lucknow University, Dr. T.P. Sasikumar, Scientist, Deptt. of Space, Secundrabad, Dr. B.K. Kuthiala, Director, International Institute of Communication, Kurukshetra University and Shri B.K. Tyagi, Scientist 'D' Vigyan Prasar; Prof. Pradeep Mathur, IIMC, New Delhi, Prof. Arun D. Ahluwalia, Geology Deptt. Punjab University, Ms. Kavita Sharma, Lecturer, IMS, Noida, Prof. Tapati Basu, HOD & Dean, Deptt of Journalism & Mass Communication, University of Kolkata, Dr. Manoj Patairiya, Director, National Council for S&T Communication; Dr. A.K. Sharma, Prof. of Zoology, Dr. Ambarish Saxena, Director, Central for Media Studies, New Delhi; Shri Puskar Srivastava, Media Consultant, CNEB, Shri Biman Basu, formerly Editor *Science Reporter*; Dr. Patnesh Pathak, Professor, IMS, Noida and Shri Sandeep Nigam, correspondent, Star News, and Shri Abhay Kothari, Director, MEPS, Ahmedabad.

The valedictory address was delivered Dr. R. Sreedher, Director, Commonwealth Educational Media Centre for Asia, New Delhi. At the end of the valedictory function Shri Nimish Kapoor proposed a vote of thanks. The proceedings of the seminar will be published.

New Release

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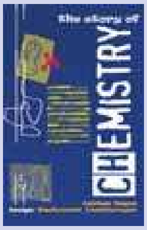
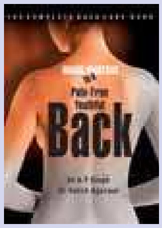
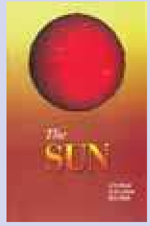
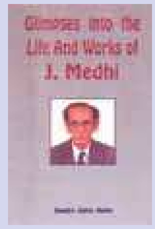
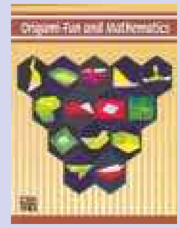
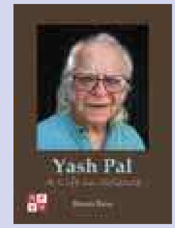
 The Story of CHEMISTRY (Author: Anirban Hazra) Rs. 75/-	 MAGIC MANTRAS to a Pain-Free Youthful Back (Authors: Dr. A.P. Singh Dr. Yatish Agarwal Rs. 395/-	 The Sun (Authors: J.N. Desai, N.M. Ashok, H.S. Shah) Rs. 75	 Glimpses into the Life And Works of J. Medhi (Author: Chandra Kanta Chetia) Rs. 95/-	 Origami-Fun and Mathematics (Author :V.S.S. Sastry) Rs. 65/-	 Yash Pal - A life in Science (Author : Biman Basu) Rs. 225/- H/b, 150/- P/b

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