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BRANCHES

Roorkee 1979 • Hyderabad 1979 • Pune 1980 • Nagpur 1982 • Kolhapur 1982 •
Delhi 1987 • Kalpakkam 1987 • Nanded 1987 • Baroda 1988 • Lucknow 1997

With Best Wishes

Shri Rajesh Warnankar
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Oscar Enterprises

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Bhandup Industrial Estate
Pannalal Silk Mills Compound
LBS Marg, Bhandup West
Mumbai - 400078

**International Women's Day
at
Indian Women Scientists' Association
IWSA's ICICI Multipurpose Hall, Sector 10 A, Vashi, Navi Mumbai.**

**Saturday, the 6th March, 2010
3.00 p.m. to 5.00 p.m.**

PROGRAMME

**An Interactive Panel Discussion on
'The art of balancing a career and home as a woman'**

PANEL MEMBERS

Dr. Sindhu Joshi ,
Retired Scientist, CRI & Founder Member, IWSA

Dr. Rita Mukhopadhyay,
Scientist, BARC & E.C. Member, IWSA

Ms. Aruna Patil,
Proprietor, Prithvi Construction, Vashi

Ms. Padma Ranji,
Head, Medical Service Section, BARC Hospital

**All are invited to attend & participate.
High tea will be served at 5 p.m.**

From the Editor's Desk

In December 2009, parties to the United Nations' Framework Convention on climate change assembled in Copenhagen to wrangle over the details of a new climate deal, leading to a political agreement to cap temperature rise to 2°C, reduce GHG emissions and provide financial assistance to developing countries to adapt and mitigate climate change issues. The summit represents a small, but significant step to face the threat created by our own deeds having devastating consequences on food security, global health, natural disaster and global economy. However, a road map is missing with no time frame and no legal binding. With only a token agreement in Copenhagen, the ball is pushed to be moving towards 2010 Mexico Summit.

After the success of its maiden moon mission Chandrayan I, India is looking at possibilities of exploration of outer space using planetary missions and also hopes to embark on a human space flight program in the near future.

Last year, the world witnessed the biggest harvest in food grain crops 2226 million tonnes, which is highest in 11000 years since agriculture began. This was followed by a second biggest harvest of this year 2189 million tonnes. In spite of all these developments in food production, there is a food crisis. Number of malnourished people has increased from 842 million in the last decade to over a billion this year. Population of the world with a little over 6 billion is expected to reach 9 billion by 2050. Hence, agricultural production has to rise by 40% in 2050 to feed the world. One in every six persons goes hungry and every six seconds, a baby dies somewhere in the world because of hunger. India has the biggest number of hungry people in the world. Productivity cannot be increased by bringing more land under cultivation. The growth rate of agriculture has been stagnating at 4-5% for several years.

Sustainable land and water management combined with innovative agricultural technologies could mitigate climate change and help poor farmers. New green agricultural technologies such as adaptive plant breeding, pest forecasting, fertilizer micro-dosing and better water management are the need of the day. "Climate proof Crops" to withstand the changing climate need to be developed. With the announcement of Bill and Melinda Gates Foundation supported by International Agriculture Research to initiate a mega project "A revolution to combat world hunger" we have to focus on improving agricultural productivity. With India having the maximum number of hungry mouths to feed, it is essential that we need to have more agricultural scientists working on improvement of crop plants. While 450,000 engineers and 600,000 commerce graduates pass out every year, we have only a few thousands of agriculture scientists graduating from colleges. Those agricultural scientists too do not work on agriculture and shift towards banking and other lucrative jobs. It is essential to have more focus on "agriculture" to improve crop productivity.

An article "AKRUTI" in this issue of the IWSA Newsletter, explains the efforts by the Department of Atomic Energy towards technology intensive programs for the villages. Activities of Head Quarters and branches such as Delhi, Kolhapur and Kalpakkam are also highlighted. This issue also covers a brief description of the Nobel Prizes for 2009, and a special article on the work of Dr. Ramakrishnan Venkatraman who was awarded the Nobel Prize in Chemistry. Information on "Women achievers" is also included in this issue and we congratulate all women winners of various awards. As we bring out this issue, we would like to thank the organization that contributed towards the advertisement and the office staff for their support and efforts towards bringing out this issue of IWSA Newsletter. On behalf of the Editorial Board let me wish you all a very Happy and Prosperous 2010 and a fruitful new decade.

Dr. Susan Eapen
Editor

EDITORIAL BOARD

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(Editor/Convenor)

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Update your data on the internet Management Information System (MIS)

The IWSA members' database is now available on the web and can be accessed on line. The site address is iwsa.net/members, which gives a list of ALL the members whose data has been entered. Anyone can view the data of members and search as well.

You can view the registered members. This is alphabetic (first name wise). Once you locate your name, click to view details for viewing your details. You have a name and password (password is same as name). Using this name and password, you can login as a registered user, view your details, make changes / update your own data and save in the database. All members please note that this updating is absolutely important as, in many cases updated data is not available.

We urge you to update your data ASAP. In case you need any assistance, kindly contact IWSA office at iwsahq@gmail.com or Tel. No. 022 27661806.

You can search the database. The following searches have been incorporated:

Search By Name
Search By Location/Branch
Search By Highest Qualification
Search By Area of Interest
Search By Specialisation

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Short-term meditation training improves attention and self-regulation - *Michael I. Posner*

Recent studies suggest that months to years of intensive and systematic meditation training can improve attention. However, the lengthy training required has made it difficult to use random assignment of participants to conditions to confirm these findings. This article shows that a group randomly assigned to 5 days of meditation practice with the integrative bodymind training method shows significantly better attention and control of stress than a similarly chosen control group given relaxation training.

The training method comes from traditional Chinese medicine and incorporates aspects of other meditation and mindfulness training. Compared with the control group, the experimental group of 40 undergraduate Chinese students given 5 days of 20-min integrative training showed greater improvement in conflict scores on the Attention Network Test, lower anxiety, depression, anger, and fatigue, and higher vigor on the Profile of Mood States scale, a significant decrease in stress-related cortisol, and an increase in immunoreactivity. These results provide a convenient method for studying the influence of meditation training by using experimental and control methods similar to those used to test drugs or other interventions.

(Courtesy: Proceedings of National Academy of Sciences)
<http://www.pnas.org/content/104/43/17152>

2010 L'OREAL-UNESCO AWARDS

L'OREAL-UNESCO for Women in Science Partnership announced the five exceptional women scientists from around the world who will receive the 2010 L'OREAL-UNESCO Awards in the Life Sciences.

An international network of nearly 1,000 scientists nominates the candidates for each year's awards. The five laureates are then selected at a meeting of the jury presided by Pr. Gunter Blobel, Nobel Prize in Medicine 1999. The 2010 laureates are:

Rashika El Ridi (Africa & Arab States): Professor at Cairo University in Egypt, for paving the way towards the development of a vaccine against the tropical disease chistosomiasis/Bilharzia.

Lourdes J. Cruz (Asia-Pacific): Professor at the Marine Science Institute at the University of the Philippines Diliman in the Philippines for the discovery of marine snail toxins that can serve as powerful tools to study brain function.

Elaine Fuchs (North America): Professor at The Rockefeller University in the United States, for her contributions to our knowledge of skin biology and skin stem cells.

Anne Dejean-Assemet (Europe): Professor at the Pasteur Institute in France, for her contributions to our knowledge of leukaemia and liver cancers.

Alejandra Bravo (Latin America): Professor at the Institute of Molecular Microbiology of the Universidad Nacional Autonoma in Mexico, for her work on a bacterial toxin that acts as a powerful insecticide.

The awards ceremony will take place on March 4th 2010 at UNESCO Headquarters in Paris. Each Laureate receives US \$100,000 in recognition of her contribution to the advancement of science.

The award, created in 1998, champions the cause of women in science by honoring outstanding female scientists from around the world, UNESCO said in a statement.

Two winners of the 2008 UNESCO-L'Oreal Award were also this year's Nobel Prize winners, the Israeli scientist **Ada Yonath** for chemistry and the American scientist **Elizabeth Blackburn** for medicine.

Hopes grow over potential autism treatment

Hopes are growing that a hormone known to increase feelings of trust could also be used to treat autism. The hormone oxytocin has been linked with various social behaviour traits in animals, including mother-infant bonding and sex. The hormone and neurotransmitter has also been shown to promote trust and other socially useful traits in humans. Now evidence is building that oxytocin could be used to treat people with autistic spectrum disorders, which are often characterized by poor social interaction, repetitive behaviour and lack of communication. Currently there are no known cures or treatments specifically for autism.

Nature News

President's Message



Dr. Uma N. Rao
President,
Indian Women Scientists'
Association
Email: umarao49@gmail.com

This is wishing you all and your family "A Very Happy, Healthy and Prosperous New Year". May your efforts in 'science for the society', flourish well this International year of 'Biodiversity'. As scientists, we are all more than aware of what is happening to the living world around us. It is time now that we do not miss even the smallest of opportunity to educate our fellow common man in society about conservation of it. I would request all IWSAites to pledge for this action through this portal in 2010.

The year 2009 ended with the good scientific news, when we read about the team of CSIR scientists who had unraveled the sequence of the first Indian Human Genome in their laboratory in New Delhi. This put our country with the select group of countries of the world: US, UK, Canada, Korea and China. The last half of the twentieth century had brought in unbelievable achievements in Biological and Medical sciences starting with the discovery of DNA structure by Watson and Crick in 1953. In 2003 the Human Genome project successfully determined the sequences of the three billion chemical base pairs constituting it. Today we have the technology to know the blue print (DNA sequence of the chromosomes) of our own genome at a price of \$10,000 only. It has also ushered us into an era of scientific magic: in vitro fertilization, test tube babies, organ transplants, stem cells, cloning, organ regeneration and many more. Let us concentrate on turning these technological developments towards preservation of our biodiversity as well. Let us not forget we live because they all live with us.

By the time this Newsletter reaches your desk, the IWSA Kolhapur branch would have successfully completed the New Year's first scientific meeting on 'Conservation of our Biodiversity'. Congratulations in advance for choosing the most fitting time for the conference. This should set an example for other branches to reach out to their local area biodiversity and make the awareness drives we have pledged for as responsible citizens of this country. India has passed the Biodiversity Act that is available and accessible. Implement it and apply it with your rights to protect nature.

Should we in IWSA not voice our opinion on some unethical research? If you feel strongly do write and tell us, so we can send a representation to the ethics committee, set up by the government.

Let me wish you success in all your efforts in science.

Uma N. Rao

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IWSA News

News From Head Quarters

Women in Science--Lecture-series by eminent women scientists

1. A talk on: "Radioisotopes - friends in need and not foes". Dr Meera Venkatesh, Head Radiopharmaceuticals Division, BARC & Professor Homi Bhabha National Institute.

On 19th September, 2009, in the 'Women in Science lecture series', IWSA held a collaborative talk with K. B. Patil college, Vashi. Dr Meera Venkatesh, addressed the students on the topic, "Radioisotopes - friends in need and not foes". In a very simplistic manner she told them that radioisotopes have come a long way since their discovery in the 19th century. She enumerated the diverse fields in which radioisotopes are used such as, in medicine, industry, agriculture, food preservation, water resource management, forensic science and environmental studies. She specially presented an overview of the immense benefits derived from radiation and radioisotopes for better health care and for the diagnosis and treatment of several diseases, especially for cancer.

2. A talk on: "Biotechnology therapy to wonderland.

Dr. Neelima. Khairatkar - Joshi, Senior V P, Biological Research, Glenmark Research Centre, Navi Mumbai.

On 14th December, 2009 Indian Women Scientists Association in collaboration with ICLES'M.J. College, Vashi organized a lecture on "Biotechnology- Therapy to Wonderland" by Dr. Neelima Khairatkar-Joshi [Senior V P, Biological Research, Glenmark Research Centre, Navi Mumbai] This was a fourth lecture of "Women in science-Lecture series" by eminent women scientists. This is a project undertaken by IWSA for exposing students to excitements in science and is financially supported by Department of Atomic Energy.

Dr. Anita Jadhav of ICLE College extended a warm welcome to the audience and introduced the chief speaker.

Prof. Bakhtaver Mahajan [Immediate Past president of IWSA and convener for the Women in science- Lecture series program] elucidated the outlook of the program by giving details about previously delivered lectures by eminent women scientists from varied areas of science. She also emphasized about the important role women play in development of science without compromising their family responsibilities. Dr. Uma Rao [President of IWSA] elaborated on the different activities of IWSA.

Dr. Neelima Khairatkar began her talk with brief introduction of biotechnology and focused mainly on its applications in medical fields involving treatment, diagnosis and research. It has been more than two decades since

insulin the first biotechnology-based protein drug -- was launched in pharmaceutical market. Since then, biotechnology in health care segment has been continuously evolving proving its therapeutic utility. It is also a fascinating area for scientific explorations and innovations. She also discussed some creative global biotechnology research initiatives and therapeutic innovations. She ended her talk with some interesting future scientific explorations in biotechnology. Her lucid presentation was very well received by the audience, which comprised of mainly students. The meeting ended with a very interesting question answer session.

Visit to Ahmedabad

IWSA organizes a short tour every year for its members and ensures to visit a place of scientific Interest. The organizing committee decided to visit Ahmedabad this year. A few members joined together and made the programme for 2 days and launched the trip on 3rd December 2009 night.



First day visit was to CERC, Consumer Education Research Centre. One may wonder what is this CERC and in what way it has got scientific interest!! To our surprise, though the set-up is meant for protecting the Consumer Rights, they have excellent scientific test apparatus and established chemical and electrical test facilities are used to test food items, medicines, cosmetics, electrical appliances etc. This lab is a NGO set-up, established in 1978, with grants from Government of Gujarat. It has a huge library and they regularly publish a consumer magazine titled "INSIGHT". Their main task is to address and analyze the various consumer complaints in the field of medical and life insurance claims, bank transactions dispute, cosmetics, household electrical appliances etc. They adopt ISI and ISO certification for their test methods. The visit was quite interesting and enlightening.

On the second day, the team's focus was on Archeology and History. First a visit to famous Sabarmati Ashram was arranged. While going through the photo gallery covering Mahatma Gandhiji's complete life and the library consisting of books used by him, we got glimpses of the personality of

our Father of the Nation. Seeing his personal articles kept at the museum made us feel 'how humble a life he led'!!

Akshardham, the world famous Swami Narayan Temple at Ahmedabad was our next target. To promote World Harmony, the temple has got centre for Applied Research in Social Harmony. One can continue seeing and appreciate the architectural beauty of this temple structure.

Lastly, the team had time to do some Gurjari shopping & enjoy boating at Kankaria Lake. The team returned to Mumbai at early hours on 6th December morning and back to regular routine.

Report of the Programme “Clean & Green Cities: Initiative in Solid Waste Monitoring & Upgradation of Science Laboratory Skills”.

Indian Women Scientists' Association (IWSA) has been working consistently to promote scientific temper in the society, via a variety of activities. On October 31st, 2009, at 11.00 a.m., we have launched the next phase of the Environment Education project: “Clean and Green Cities: Initiative in Solid Waste Monitoring & Upgradation of Science Laboratory Skills”.



India is known to be a good recycler of different waste items, but this is at great cost to our environment and health. With large population, scarce space and increasing consumerist attitudes, little attention is being paid to the large amounts of wastes being generated in different sectors. Besides safe disposal and recycling, the root cause of waste has to be addressed in terms of safe and sustainable patterns of production and consumption. The current program of IWSA is an attempt to address this aspect.

Over one academic year, participating high school science teachers and students will scientifically track different wastes/plastics, electronic, medical, building materials, thermocol, etc. and check out their disposal/management in well defined sectors/areas. An interacting session was held on 12th December with resource persons from IWSA. In the final analysis, the program should provoke students to critically examine the 'waste crises' in the context of reducing the green house gases. So far 26 schools have enrolled for this program.

Report of IWSA's Pirojshah Godrej Foundation Library

IWSA's Pirojshah Godrej Foundation Library has over 3500 books on a variety of subjects. There is a science reference section and reference books for the Teacher's Training Course affiliated to SNDT women's University conducted by IWSA.

It has 120 outside members, 40 from teacher's trainees and fifty from the hostel. Library has a study facility which is availed by 25 girls with a nominal fee of Rs.25/- per month. The library timing is from 10 a.m. to 8.30 p.m. Monday through Saturday. Library subscribes following magazines and newspapers.

- 1) News Papers 7 (one Hindi).
- 2) Children's magazines -3 Tinkle, Dim-Dima & Chandamama).
- 3) Science magazines Down to earth, Scientific American, National Geographic.
- 4) Marathi Magazines 16
- 5) English magazines 14
- 6) Hindi magazines -7

Report of IWSA Nursery School Education Committee

On 5th September, 2009 Teacher's Day was celebrated with the IWSA Nursery & Day Care Centre children. Teacher trainees enacted various roles of community helpers in our society.

On 9th September, 2009 trainees got an opportunity to visit the Helen Keller Institute and Saushalya, which gave them an insight on how to handle and teach them. Kilbil at B.A.R.C. taught them the set up and organizing of a day care centre.

On 2nd October 2009, Ms. Gargi Lagu and her colleague conducted an origami workshop that taught our trainees 12 different applications.

The Diwali group lesson in October, 2009 was fun as the trainees educated the Nursery & Day Care children, on the festival Diwali and how we celebrate it.

Nutrition Competition was conducted on 7th November. Their topic was “tiffin snacks for pre-schoolers”. Judges Ms. Anuradha Shekhar, Dr. Usha Thakare and Ms. Monal Velangi found it difficult to judge as all the trainees had done a fantastic job.

This year, Children's Day was celebrated in a different way. Trainees themselves had an opportunity to rediscover their hidden talents. Many performed by singing, dancing and depicting their own respective cultural items. Games too were conducted for them.

Training of Teachers (TOT) Results of TOT batch (2008-09)

IWSA is proud to announce 100% results of Training of Teachers (TOT) for the year 2008-09. The results were declared on 2nd November 2009. Total 33 students appeared for the examination, 28 from English medium and 5 from Marathi medium.



From the English medium, 8 trainees passed with Distinction, 15 trainees with 1st class and 5 with 2nd class. In Marathi medium, 4 trainees passed with Distinction and 1 trainee with 1st class.

IWSA Delhi Branch Activities August to November 2009

A. General Body Meeting of IWSA, Delhi Chapter was held on September 11, 2009 wherein;

- 1) Dr. S. A. Agnihotry, Convener, Delhi Chapter, gave the welcome address.
- 2) Mrs. S. Mehtani, Secretary, Delhi Chapter, presented the minutes of the previous General Body meeting, which was held on 14th September' 2007.
- 3) A report on the activities conducted by IWSA during 2008-09 was presented by Mrs. S. Mehtani.
- 4) Mrs. Parvati Chopra, Treasurer, Delhi Chapter, presented the audited account statement for the financial year 2008-09.
- 5) Ms. Maitreyi, Advisor, made some comments on the evolution of IWSA and invited more participation from the members.
- 6) The election for the Executive Committee was conducted by Mrs. Agrawal.
- 7) The following members were elected to the various positions.

- (I) Advisor: Ms. Maitreyi Choudhary
- (II) Convenor: Dr. S. A. Agnihotry
- (III) Jt. Convenor: Mrs. S. Mehtani

(IV) Secretary: Mrs. Sushila Khilnani

(V) Jt. Secretary: Dr. Rina Sharma

(VI) Jt. Secretary: Dr. Annapoorni

(VII) Treasurer: Mrs. Parvati Chopra

(VIII) Jt. Treasurer: Dr. Sunita Joshi

(IX) Jt. Treasurer: Dr. M. Deepa

8) Following members were elected to the executive committee:

(I) Mrs. Shikha Mandal

(II) Mrs. Urmila Dhavan

(III) Mrs. Pramod Singla

(IV) Mrs. Kanika Malik

(V) Ms Anjali sharma

(VI) Mrs. Santosh Manrai

(VII) Mrs. Vinita Singhal

(VIII) Mrs. Rita Rath

9) Dr. S. A. Agnihotry proposed Vote of Thanks.

B. The following lectures were organized as a part of an on-going activity of IWSA Delhi Branch.

Dr. Rina Sharma, Scientist, Length Standards Division, National Physical Laboratory, New Delhi on Metrology in Today's world on 21st August 2009.

Dr. Nita Shah, Head Vulture Advocacy Programme, Bombay Natural History Society on Wild Life - My Career on 1st October 2009.

C. IWSA, Delhi Branch organized its seventh annual seminar on Gynaecological Malignancies:

Breast & Cervical Cancer on 13th November 2009 (Sponsored by CSIR) at National Physical Laboratory, New Delhi.

The theme of this year's seminar was a step towards creating awareness about cancer amongst women and thereby contributing to the health and well being of the nation. The seminar spanned over three sessions on "Women & Cancer" "Breast Cancer" & "Cervical Cancer" and included lectures by experts from **AIIMS, NISCAIR, INDIAN CANCER SOCIETY, and MAX CANCER CENTRE.**

Following the seminar, an on-the-spot check-up by Indian Cancer Society was organized for the delegates who registered for it. The overwhelming response to the seminar

and also the high notes of appreciation expressed by the speakers and participants were ample reward for the organizers.

Meet Convenor, Kolhapur Branch



Dr. (Mrs.) Dhanashri Sagar Patil.
M.Sc., B.Ed., M.Phil., Ph.D.

Head, Botany Department of GKG College, Kolhapur, Dr. Dhanashri Patil obtained her Ph.D. for the thesis "Exploration of Biopesticidal Potential of Some Plants". For M.Phil., she had "Physiological Studies of Soybean (*Glycine max*)" as her thesis. She has to her credit 7 national and 4 international presentations in various conferences. Her papers have been published in "Plant Archive" and "Journal of Biopesticides" on Biopesticides and she is Editor of "Rosette" an annual magazine of Garden's Club, Kolhapur.

Besides being the current Convenor of IWSA Kolhapur Branch, she is also actively involved in various activities as can be seen from the following:

- 1) Counsellor, Yashvantrao Chavan Mukta Vidaypeeth.
- 2) Project Officer, Horticultural and Nursery Management Course under community Development Centre, Shivaji University, Kolhapur.
- 3) Vice President, Garden's Club, Kolhapur.
- 4) Convenor, TEAK Nature Club, GKG College, Kolhapur.

Activities of IWSA Kolhapur Branch 2009 (June to Nov)

1) General Body meeting:- 24th June 2009.

2) Workshop on "Flower arrangement":-

24th 25th July 2009. IWSA, Kolhapur in association with Gardens Club, Kolhapur organised 2-days training workshop on flower arrangement. Experts spoke on "Ikebana & History of Flower arrangement". Dr. Sushama Rote, President, Gardens Club, explained its importance. M/s. Kalpana Sawant, Neeta Shinde, Jui Latkar, Dhanashri Patil and Sunita Deshmukh gave training to 50 participants.

3) Lecture on "Eclipses: Science and Myths":- By Dr. Kamal Hardikar, was arranged for Simantini Mahila Mandal. 35 women participated in the discussion following the lecture.

4) Awareness and informative film on " Swine Flue-status and approaches":- Dr.B.S.Mohite presented a film

with informative lecture on "Swine Flue". 200 students from schools and colleges were benefited. The programme was organized by IWSA in collaboration with Rotary Heritage, Kolhapur; at Library Hall, Gokhale College, Kolhapur.

5) Vasundhara Din:- 23rd sept.2009 An equinox day was celebrated as "Vasundhara Din". 700 students and staff of Gokhale College and IWSA members took oath of water conservation.

6) Documentary film on "Chandrayan":- The film was shown to college and school students on 1st October 2009 by Prof. Rajesh Agale, Director, Mission Avishkar, Science Training Center. The film explored important aspects related to space science, "ISRO", DRDO and NASA, which motivated students. Such programs are necessary to popularize basic sciences among students. Mrs. Smita Giri introduced the guest. The programme was organized by IWSA in association with Science Association, GKG College, Kolhapur. 125 students attended and enthusiastically participated in discussion on traces of water molecules on moon and other current issues regarding 'Chandrayan'.

7) 2nd October 2009 - on the occasion of " Mahatma Gandhi Jayanti" :- Lecture and discussion was arranged on "Value education" by Dr. Azadi of Bahai academy, Panchagani. Students and college lecturers participated in the programme. Mass prayer was organized for peace by lighting candles.

8) 21st November 2009 - Lecture and poster display on Diabetes :- Dr. Aparna Nandedkar Vaidya who was honoured by president of India for patenting an Ayurvedik formulation to control diabetes, spoke about precautions to be taken by women to avoid and manage diabetes. 47 women participants clarified their doubts regarding physiological, genetical, physical phenomena of insulin secretion. Glycemic index was explained for diabetic diet. Posters were displayed and pamphlets were distributed to create awareness regarding diabetes management.

9) One-day workshop on "Health Management, capacity building and stress management":- The workshop was conducted for women at Nipani, Karnataka at the Indian Medical Association, Nipani Branch. Sixty women participants from Pratipha Mahila Kendra, Nipani, a small town at Karnataka Maharashtra border took advantage of workshop.

10) Guidance was given by the following experts:-

Dr. Aparna Vaidya Nandedkar
(Diabetes).

Dr. Samrudhi Ingavle
(Menopause awareness & management).

Mrs. Dhanashri Patil
(Stress management and capacity building)

Mrs. Smita Giri
(Diet for women in 40s).

KALPAKKAM BRANCH NEWS

The new Managing Committee

The new Managing Committee which took over the administration of the branch, as reported in our earlier newsletter, is as follows:

Convenor : Dr. Rani P. George (Email: rani@igcar.gov.in)

Secretary : Smt. Premila M.

Co-Secretary: Smt. Padma S.K.

Treasurer: Judy Gopal

Members : Dr. Vineetha, Dr. Vineetha Viswakarma. Dr. Geethakumari, Ms. Parimala, Ms. Shivagamy, Ms. Sivai Bharasi

AKRUTI - 'Advance Knowledge and Rural Technology Implementation'- Technology Intensive programme for villages

Ms. Smitha Mule



India's young population is expected to be the largest in the world in decades ahead. Creating gainful and productive work for over 500 millions is the greatest challenge. Technical know-how generated in national laboratories related to basic needs such as water, food, energy and environment has been under-utilized. Deployment and adaptation of this know-how to the rural needs could provide a creative opportunity for expected 500 million youths in rural and urban India to contribute to the national wealth with prosperity for everybody including villagers.

Considering the wealth of technology and innovative capability generated in BARC & DAE units as an off-shoot of R&D in Nuclear Energy and its applications in power and non-power areas, Department has launched DAE Societal Initiative for utilization of Non-Power Applications (NPAs) and Spinoff technologies (Spinoffs) in the area of water, land, agriculture, food processing and urban-rural waste management. Within this framework of societal initiative, structured programme called "AKRUTI - KRUTIK - FORCE"

has been formulated and is being implemented by BARC for techno-economic growth of the rural sector, as one of the many schemes for large-scale deployment of NPAs and Spinoffs. This programme will enable to take the fruits of technology to grass-root level to every villager in the remote corner and provide inclusive growth to the rural sector and tap the hidden innovative capability of large rural population.

In this programme, technologies implemented in villages are 'Water Filter' without electricity for bacteria free clean drinking water, Soil Testing Kit for detection of Organic Carbon content of the soil in field by farmer himself, Vibro Thermal Disinfector, and Foldable Solar Dryer for agriculture produce, new mutant seeds for sowing, promoting organic farming and renewable energy through advanced biogas plant called 'NISARGRUNA', consultancy in Isotope Hydrology for underground water management and setting up of Tissue culture laboratories. All these technologies are deployed by villagers themselves in a village at a place called AKRUTI Node, with their resources under the guidance of BARC scientists/engineers, with interface and financial support by NGOs. So far 14 AKRUTI Nodes are set up, 7 in Maharashtra State and 7 in other states.

The 'AKRUTI' programme, promotes further rural techno-preunership through offer of a technology package at an affordable cost called "AKRUTI Tech Pack" consisting of technologies and technical consultancy service exclusively for rural sector.

WHO CAN PARTICIPATE

Technically oriented NGOs engaged in S&T based rural activities who can manage HR, finance and required resources for deployment of BARC technologies.

Financial institutes, Banks, social organisations like Lions Club, Rotary Club and Religious Trusts may also participate by providing financial support to the above NGOs.

Big Business-Houses and Corporates through their CSR (Corporate Social Responsibility) schemes can also participate in this programme for progress of rural sector - the future markets.

State and Central government departments having schemes for rural development based on S&T work programmes deployed through rural organisations with financial support can utilize this S&T based AKRUTI work plan with technologies.

CONCLUSION

This programme compliments, supplements and augments the efforts of all existing programmes of different organizations, department and ministries to facilitate large scale deployment of several BARC-DAE technologies in rural area.

BARC working in high-tech area, not only uses its knowledge base for benefit of industry alone, but also for the

larger weaker community base in rural sectors through 'AKRUTI' programme. BARC has demonstrated the feasibility of this programme by setting up more than 10 AKRUTIs in villages in different states and making them operational through NGOs with the help of rural manpower. This has provided new opportunities for entrepreneurship and employment throughout the year to villagers, raising their moral, self respect and desire to live better life. Participation by Industry and MNCs in this program through use of CSR (Corporate Social Responsibility) funding and integrating with R&R (Rehabilitation & Redeployment) plan for Mega projects where large number of villages are disturbed due to displacement will strengthen this activity and build the technical capacities in the rural sector creating new markets.

Livelihood security of the rural sector will ensure the food security of the nation. Details of AKRUTI programme and application form can be availed from BARC website: www.barc.gov.in/akruti-tp/index.html

For further queries contact:

Smita Mule,
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Bhabha Atomic Research Centre, Trombay, Mumbai-400085.

WOMEN IN SCIENCE

Dr. Rohini M. Godbole

The Council of the Indian Academy of Sciences (IAS) had, in January 2003, constituted a committee to address issues concerning women scientists. This led to the formation of a Panel "Women in Science" (WiS), in January 2005, to study the current status of women scientists as well as the problems faced by them, in the Indian context, and to recommend suitable remedial measures. The Panel, currently chaired by **Prof. Rohini M. Godbole**, has the following members:

1. **Vineeta Bal** (National Institute of Immunology, New Delhi)
2. **R. J. Hans-Gill** (Panjab University, Chandigarh)
3. **Raghavendra Gadagkar** (IISc, Bangalore)
4. **Vidyanand Nanjundiah** (IISc, Bangalore)
5. **Ramakrishna Ramaswamy** (JNU, New Delhi)
6. **Pratima Sinha** (Bose Institute, Kolkata)

Some major initiatives are undertaken by the Panel and the details are given below:

1. Role Model Programme

This programme helps women students to interact with working scientists and help them in their career, both

academic and social, by conducting a series of national seminars under the broad programme 'Women in Science: A Career in Science'. In these seminars women scientists talk about their work, usually followed by a panel discussion on issues of women in science. The panel includes speakers as well as invitees who have given a serious thought to the subject. This programme is aimed at inspiring and motivating young women to take up a career in science. The seminars also provide information on career options for women in the field of science, which will hopefully inspire and motivate young women to take up a career in science. The seminars organized so far by the WiS Panel are in the following venues.

(A) Cochin University of Science and Technology, Cochin April 05, 2008.

(b) St. Xavier's College, Ahmedabad September 13, 2008.

(C) Sanatana Dharma College, Alappuzha November 29, 2008

(D) IIT Madras December 20, 2008.

More such seminars are planned for the later part of 2009. Publication of motivating books which will help young women to make career choices also is undertaken by the Panel.

'Lilavati's Daughters: The Women Scientists of India'

This volume published by the Academy is a collection of (auto)biographical essays of about 100 women scientists from India and is a small but important step in understanding how a woman can manage a successful career in science, despite the constraints. It is coedited by Ramakrishna Ramaswamy and Rohini Godbole, and was released by the President of the Academy D. Balasubramanian during the Annual Meeting of the Academy on 31 October 2008. Covering a range of disciplines, these women scientists talk of what brought them to science, what kept their interests alive, and what helped them achieve some measure of distinction in their careers. What makes a successful career in science possible? Many answers to this question can be found in these essays.

The book is directed towards the reading public. A young student with research ambitions will find this an important collection where she or he can learn first-hand of women who functioned and achieved their goals in the Indian social and academic environment. Others will also find the essays to be of value and interest for what they say, and, as is often the case for what they do not say...

Reviews and feedback about Lilavati's Daughters

Since its release the book has been getting positive feedback from readers with several interesting reviews in journals such as Nature (Vol. 460, 27 August 2009, p.1082) and Chemical & Engineering News and reviews in newspapers and magazines such as The Hindu, The Indian

Express, Deccan Herald and The Mint. The volume has already been translated and published into other Indian languages, such as in Loksatta (Marathi), Sandarbh and Srote (Hindi). Translation into other languages is in progress and efforts will be made to make the book reach as many people as possible.

The Department of Science & Technology, New Delhi is also helping in promoting the book by releasing funds for distributing 1000 copies of the book in India and abroad.

2. Discussion: Women in Science

During the 74th Annual Meeting of the Academy held at IIT Delhi, in November 2008, a Panel discussion on women in science was organized. The members who participated were Vineeta Bal, Raghavendra Gadagkar, Saman Habib, Indira Nath and Sujatha Ramdorai.

There was a lively discussion between the panel and the audience and many relevant points were made. Issues such as gender bias, under-representation and promotion of women in science were discussed at length. The summary of these discussions will form the basis of a possible position paper on the subject.

3. Study of "leaky pipeline"

A survey on 'Trained scientific woman power: How much are we losing and why?' has been undertaken by the WiS Panel to identify factors involved in the choices made by women to choose careers outside science, and in the process, to address the issue of "leaky pipeline".

It aims at identifying women who have a Ph.D in pure and applied sciences, engineering and medicine but have chosen, for various reasons, careers that do not make use of their academic qualification. The survey also includes men and women who are practicing science at different levels, with a view to understanding factors responsible for the loss of women scientists in our country (leaky pipeline). Separate databases with over 2000 women scientists and 400 men scientists have been created and questionnaires sent to them. The unique feature of this survey is the participation by both natural and social scientists in its formulation. With the data collection part of the survey completed, the analysis of the data is in progress and a report of the study is expected by the end of this year.

The Academy particularly seeks the assistance of its Fellowship in furthering the role model programme by conducting more seminars in the country. Suggestions from Fellows for further programmes to be instituted under the activities of the Panel are also welcome.

NASI YOUNG SCIENTIST AWARD (2009)

In recognition of her success as an independent researcher and contribution to plant science as well as biomedical science, Dr. Gitanjali Yadav has been selected for the 2009 NASI Young Scientist Award.



Dr. Gitanjali Yadav

Dr. Gitanjali Yadav is a specialist in molecular computational Biology and is presently working as a scientist at the National Institute of Plant Genome Research, (NIPGR), New Delhi, India. She has graduated with honors in Botany and post graduated with in Biomedical Science, both from the University of Delhi. In 2005, she obtained her Ph.D. degree from the National Institute of Immunology (NII), New Delhi.

Her efforts during her thesis revealed that a knowledge based computational approach is particularly suitable for addressing intractable problems in Biology involving protein architecture, interactions, and biosynthesis. One of her predictions regarding the substrate specificity of mycobacterial polyketide synthase (PKS) multienzymes, when subjected to experimental validation, resulted in the successful alteration of a virulent cell wall lipid in *Mycobacterium tuberculosis*. In 2005, Dr. Yadav became the first recipient of the prestigious Innovative Young Biotechnologist Award (IYBA) instituted by DBT, Govt. of India, for nurturing new and innovative talent in the country. In 2006, her work on natural product biosynthetic mechanisms led to the prediction of a novel intermolecular iterative mechanism for mycoketide biosynthesis in bacteria. Her comprehensive studies on the mechanistic aspects of secondary metabolite biosynthesis and regulation led to the development of automated method for prediction of natural products of biosynthetic gene clusters. In 2008, Dr. Yadav's insights regarding molecular interactions of the hyaluronidase enzyme in *Streptococcus pneumoniae* led to the discovery of a novel mechanism of mammalian defense against bacterial invasion, paving the way for peptide inhibitors as alternatives to chemicals in anti-bacterial research.

Dr. Yadav has been selected for the 2009 Senior IYBA award also. She has several publications in highly reputed international journals to her credit and has compiled the results of her work in the form of several online resources freely available to the scientific community. Her current interests lie in the area of plant immunity and the study of plant stress response mechanisms, covering signaling and communication at all levels

DAE Scientific and Technical excellence awards- 2008-2009

Women scientists and engineers have contributed significantly to the atomic energy programme and many of them have received different DAE awards this year. A short summary of the recipients of individual awards of 2008 was presented on October 31, 2009.

The Scientific and Technical Excellence Awards



Dr. (Ms) D. Alamelu, Fuel Chemistry Division, BARC for her significant contributions towards the development of novel methodologies based on radiometric techniques and thermal ionisation mass spectrometry (TIMS) for actinides isotopes.



Dr. (Smt.) Jaya Mukherjee, Laser & Plasma Technology Division, BARC for her pioneering contributions in two important R&D project, viz. Atomic Vapour Laser Isotope separation (AVLIS) and the Uranium-233 Clean-Up Facility (UCUF). Under her leadership, 1.3 mg of U-232 was successfully produced by irradiating Pa-231 in the DHRUVA reactor.



Dr. (Smt.) Saroja Saibaba, Powder Metallurgy Division, Indira Gandhi Centre for Atomic Research, Kalpakkam

She has made significant contribution to the design of reactor materials and development of advanced ferritic steels for fast breeder reactor programme. She was responsible for the development of a special alloy for application in the fuel reprocessing plants and also associated with its the industrial production.



Dr.(Ms) R. Sandhya, Mechanical Metallurgy Division, Indira Gandhi Centre for Atomic Research, Kalpakkam

She has contributed significantly in the field of Low Cycle Fatigue and Creep-Fatigue Interaction behaviour of fast breeder reactor materials in dynamic sodium environment. She has made innovative contributions to the design and evaluation of the effects of flowing sodium on the mechanical properties of indigenously developed materials for applications in PFBRs.

Young Scientist Awards



Dr. (Smt) Rajul Ranjan Choudhury, Solid State Physics Division, BARC

Dr. Rajul made valuable contributions in the area of structural investigations on hydrogen bonded materials of potential technological relevance. She has carried

out important studies to enable deeper understanding of the ferroelectric behaviour of Triglycine Sulphate (TGS), an important ferroelectric crystal used extensively for IR detection.



Dr. Usha Pandey, Radiopharmaceutical Division

Her work on ⁹⁰Yttrium based molecules as potential radio-pharmaceutical has played an important role in demonstration of the utility of ⁹⁰Y (Yttrium-90) 188Re and ³²P as promising therapeutic radionuclides, useful for mould brachytherapy treatment of superficial tumors and this modality is being tried by the clinicians for treatment in humans.

Young Engineer Awards



Smt. Neetu Baveja, Chemical Engineering Division, BARC has made highly valuable contributions in the development of a fluidized bed thermal denitration technology by way of designing novel non-mechanical valve systems for controlled powder feeding/withdrawal from fluidized bed reactor.



Smt. Gargi Choudhuri, Quality Assurance Division, BARC contributed significantly in the field of Microstructural Characterization and Corrosion Studies of stainless steel and Zircaloy used for critical nuclear components Her investigations helped to enhance productivity in the DHRUVA reactor.



Ms. Priya Kurup and **Dr (Smt) A.U. Bhanu** were awarded Special contribution awards in recognition of their valuable contributions in the field of Nuclear Science & Technology and to the programme of the Department of Atomic Energy.

Nobel Prize-2009



Venkatraman Ramakrishnan

Molecular Biophysics and Biochemistry and Howard Hughes Medical Institute Investigator, Yale University, and Ada E. Yonath, Director

The 2009 Nobel Prize in chemistry is awarded to group leaders of three different groups for their work on the crystal structure of ribosomes, namely, Venkatraman Ramakrishnan, Structural Studies Division, MRC Laboratory of Molecular Biology, Cambridge, UK, Thomas A. Steitz, Sterling Professor of



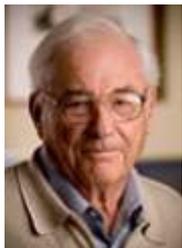
Thomas A. Steitz

Kimmelman Center for Biomolecular Structure & Assembly, at Weizmann Institute of Science, Rehovot, Israel. They used high-resolution functional ribosome complexes to unravel mysteries of protein synthesis. Basic science and medicine benefit immensely from these findings. Venkatraman Ramakrishnan is the 6th



Ada E. Yonath

person of Indian origin, winning a Nobel Prize and his contribution is discussed in detail in another article.



Dr. Willard Boyle

development of optical fibers for telecommunications. The part of the prize associated with Boyle and Smith recognizes the huge advantage of capturing images in digital rather than film form. Pictures can be sent through wires more easily, can be manipulated and processed in creative ways (e.g., you can see a moving comet or supernova in sky scans by subtracting tonight's pixel map from last night's map), and can be stored more handily. Devices such as photomultiplier tubes for converting light into an electric signal have been around for decades. But the CCD allowed whole two-dimensional fields of optical data to be read out more quickly and efficiently and CCD's have been the backbone of the commercial digital camera industry. The part of this year's award associated with Mr. Kao underscores the fact that optical fibers carry an increasing

The 2009 Nobel Prize in physics has gone to Drs. Willard Boyle and George Smith, formerly of Bell Labs, for their invention of the charge-coupled device; and to Dr. Charles Kao, of Standard Telecommunication Laboratories, Harlow, UK, and Chinese University of Hong Kong, for his work in



Dr. George Smith



Dr. Charles Kao

fraction of phone calls, television programs, and internet traffic into homes and it is responsible for the instantaneous communication across the globe. Data can move down silicon fiber more quickly than through copper wire because nothing is faster than light, and light signaling offers higher bandwidth for electronic circuitry. Encoding information in the form of light pulses rather than as electric pulses allows more data to flow down a line. Kao's principal achievement was in making the fiber more efficient; excluding impurities in the fiber material and developing a material that absorbed less of the light carrying signals over long distances.

The Nobel Prize in Physiology or Medicine was awarded to Elizabeth Blackburn of University of California, San Francisco, Carol W. Greider of Johns Hopkins University School of Medicine, and Jack W. Szostak of Massachusetts General Hospital, Harvard Medical School and Howard Hughes Medical Institute for the discovery of how the chromosomes are protected by telomeres and the enzyme telomerase against degradation. Their discoveries added a new dimension to the scientific community's understanding of the cell, shed light on disease mechanisms, and introduced new directions for the development of potential new therapies.

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Jack W. Szostak

Carol W. Greider

Elizabeth Blackburn

Cancer and aging research merge in the study of telomeres, the tails at the ends of chromosomes that become shorter as a cell divides. All telomeres have the same short sequence of DNA bases repeated thousands of times. Rather than containing any genetic information, these repetitive snippets help keep chromosomes intact. The enzyme telomerase, which builds telomeres, enables the entire length of the chromosome to be copied without missing the end portion. During cell division, the ends of the chromosomes are not completely copied, so telomeres become progressively shorter. Over time, scientists theorize, telomeres become so short that their function is disrupted, and this, in turn, leads the cell to stop proliferating. Average telomere length, gives some indication of how many divisions the cell has already undergone and how many remain before it can no longer replicate. In cancer cells, telomeres act abnormally they no longer shrink with each cell division. Dr. Blackburn and Dr. Greider discovered the enzyme telomerase, which is not active in most adult cells but becomes active in advanced cancers, enabling cells to replace lost telomeric sequences and divide indefinitely. This finding has led to speculation that if a drug could be developed to block telomerase activity, it might aid in cancer treatment. In addition, some inherited diseases are now known to be caused by telomerase defects, including certain forms of congenital aplastic anemia, and some inherited skin and lung diseases. Szostak, Greider and Blackburn thus revealed one of life's

basic mechanisms, and paved the way for new medical strategies.



Oliver Williamson

The Nobel Prize in economics has been awarded to Elinor Ostrom and Oliver Williamson. Ostrom is the first woman to win the prize in economics. She has demonstrated how common property can be successfully managed by user associations, challenging the conventional wisdom that common property is poorly managed and should be either regulated by central authorities or privatized. O. Williamson has developed a theory where business firms serve as structures for conflict resolution. He has argued that markets and hierarchical organizations, such as firms, represent alternative governance structures which differ in their approaches to resolving conflicts of interest.



Elinor Ostrom

Venkatraman Ramakrishnan's Contribution to Ribosome structure : Nobel Prize Winner in Chemistry 2009



Venkatraman Ramakrishnan was born on 1952, at Chidambaram in Cuddalore district of Tamil Nadu, India. He moved to Vadodara at the age of three where he studied upto B.Sc. in physics at M.S. University of Baroda. He went to U.S. To further his studies, earning a Ph.D. in physics from Ohio University in 1976. He then spent two years studying biology as a graduate student at the University of California, San Diego, making a

transition from theoretical physics to biology. Ramakrishnan joined Brookhaven in 1983, where he worked as a biophysicist and used BNL's Synchrotron Light Sources to produce atomic level pictures of 30S subunit of ribosome. In 1999, he moved to England to take on his current position as Group Leader, Structural Studies Division, Medical Research Council Laboratory of Molecular Biology.

This year's Nobel Prize in Chemistry awards Venkatraman Ramakrishnan, Thomas A. Steitz and Ada E. Yonath for having showed what the ribosome looks like and how it functions at the atomic level. All three have used a method called X-ray crystallography to map the position for each and every one of the hundreds of thousands of atoms that make up the cellular protein factories. Ribosomes are complex biological machines that make proteins taking information from gene sequences in the form of codons (trinucleotides). The body contains tens of thousands of different proteins that control what happens in the body with an astounding precision. Ribosomes exist in all cells of living organisms from bacteria to human beings. The antibiotics attack the ribosomes of bacteria, but leave those of human alone.

The general theory of evolution published by Charles Darwin in 1859 assumed that an organism's properties are inherited and successful changes in hereditary material are carried forward to future generations. After the establishment of DNA as hereditary molecule, the scientific questions arose about where and how the random changes occur, which are manifested in living organisms. The 2009 Nobel Prize in Chemistry is the 3rd in a series of prizes that show how Darwin's theories actually function at the level of atom, affirming the chemical foundations for the evolution of life processes. This year's award recognized three group leaders who contributed in generating 3D atomic models of ribosomes to develop understanding of structural basis of action of antibiotics for disrupting bacterial protein synthesis. Ramakrishnan and collaborators published the structure of the smaller of the two ribosome subunits, and a collaboration led by Yale University researchers published the structure of the larger subunit. Many of today's antibiotics cure various diseases by blocking the function of bacterial ribosomes in different ways. Without functional ribosomes, bacteria cannot survive. This is why ribosomes are such an important target for new antibiotics. Elucidation of the structure of the ribosomes has made it possible for scientists to rationally design new molecules to fight infections and reduce human sufferings.

In the August 26, 2000 issue of Nature, Ramakrishnan and his co-workers published the structure of the small ribosomal subunit of *Thermus thermophilus*, a heat-stable bacterium related to one found in the Yellowstone hot springs. With this 5.5 Angstrom-resolution structure, Ramakrishnan's group identified key portions of the RNA and, using previously determined structures, positioned seven of the subunit's proteins. In the September 21, 2000 issue of Nature, Ramakrishnan published two papers. In the first of these, he presented the 3 Angstrom structure of the 30S ribosomal subunit. His second paper revealed the structures of the 30S subunit in complex with three antibiotics that target different regions of the subunit. In this paper, Ramakrishnan discussed the structural basis for the action of each of these drugs.

After his postdoctoral fellowship, Ramakrishnan joined the staff of Brookhaven National Laboratory in the US. There, he began his collaboration with Stephen White to clone the genes for several ribosomal proteins and determine their three-dimensional structures. He was also awarded a Guggenheim fellowship during his tenure there, and he used it to make the transition to X-ray crystallography.

- Ms. Manjula Mathur, MBD, BARC

Homi Jehangir Bhabha The Leonardo of India

Compiled from various documents released by Department of Atomic Energy during Homi Bhabha's birth centenary celebrations by Umasankari Kannan and Paramita Deb

Dr. Homi Jehangir Bhabha A world renowned particle physicist, an outstanding institute builder, a shrewd engineer, a skilled artist and a great lover of music. It is no

wonder that Sir C.V. Raman called Dr. Bhabha as "The Leonardo of India".

As India is celebrating the birth centenary of this great son of India, IWSA is joining the celebration by attempting to get a flavour of his contributions to physics and engineering and his ingenuity in pioneering the atomic energy programme in India. It is extremely difficult to pen down all of Dr. Bhabha's achievements in these few paragraphs, but we have tried to capture a few aspects of his life and work.

Early years

Born on October 30, 1909 to Jehangir H. Bhabha and Meherbai Framji Panday, Bhabha belonged to an illustrious and well reputed family which was committed to learning and service to education in India. Homi's schooling was at Cathedral and John Canon, Bombay. He later studied at Elphinstone College and Institute of Science, Bombay. At 17, he left Indian shores to study engineering at Caius College, Cambridge in the year 1927. After he obtained the Mechanical Sciences Tripos in 1930, he switched over to physics, in particular, high energy physics, which was very exciting for him.

Bhabha the physicist

Bhabha persuaded his parents to let him take up the Mathematics Tripos and later work as a researcher at Cambridge. It was at this initial research phase, that several important and exciting developments like the discovery of the neutron, transmutation of light elements, high-speed protons, demonstration of production of electron pairs by cloud chamber photographs, discovery of positron, Dirac's theory and experiments on Cosmic ray showers, were being investigated. Bhabha threw himself to active research in the wide open field of high energy and particle physics.

The two pioneering work of Dr. Homi Bhabha, were the relativistic electron-positron scattering called Bhabha Scattering and the theory of cosmic ray showers. In an electron-electron scattering, it is well known that exchange effects have to be considered. While if the positron is regarded as an independent particle, the positron-electron scattering should not show any exchange effects. Bhabha pointed out that in positron electron scattering too exchange effects do contribute. This can be proved and quantified if viewed as an annihilation of electron-positron pair followed by the creation of a new electron-positron pair.

When cosmic rays interact with the earth's atmosphere, they interact with the nuclei in the atmosphere. Due to this, secondary particles are produced which in turn interact again with the atmosphere and produce more particles and photons and thereby produces a cascade known as cosmic ray showers. Bhabha and Heitler introduced this cascade theory which explained the presence of highly penetrating particles at ground level which were later shown to be μ -mesons.

Bhabha the artist

Dr. Homi Bhabha attached a lot of importance to mathematics and physics and also thought that the arts were just as important to his life. For him the arts were, in his own words "what made life worth living". At a young age he took lessons in painting and music, and he grew up in a culturally

interesting atmosphere at home. He remained passionately devoted to all forms of art during his life time and devoted a lot of time to his paintings and drawings.

Return to India

The outbreak of World War-II made Bhabha stay in India and he decided to work at IISc Bangalore where Sir C.V. Raman was the head of the physics department. Bhabha was given the position of a reader, in-charge of the Cosmic Ray unit. It was here that Bhabha carried out his famous experimental studies to measure the hard component of the cosmic ray intensity. His novel methods for studying the cosmic ray intensities backed by his strong theoretical treatment received worldwide attention and he was elected Fellow of the Royal Society in 1941, at a very young age of 31 years.

During his years in Bangalore, the bond between him and his country deepened and led him to firmly believe that the economic prosperity of India lay in advancement of science and technology. He detailed his objective in 1944 in a letter to Sir Sorab Saklatvala, Chairman of Sir Dorab Tata Trust for starting a school of research in fundamental physics which would not only offer research and teaching in several topics of theoretical physics, but also in problems concerning immediate practical application in industry.

In June 1945, the Tata Institute of Fundamental Research (TIFR) was inaugurated in the Kenilworth building. TIFR had researchers working in the field of nuclear physics, cosmic ray research, geophysics, mathematics and other areas of fundamental physics. The humble beginnings of the Indian atomic energy programme took shape in TIFR.

Bhabha and the Indian nuclear power programme

Bhabha had proposed in a very convincing manner that India's energy problems could be solved by using our natural uranium and thorium. But this required a large scale investment. He formulated a lucid three stage power programme and also the detailed scheme of how the government should go about doing it. In 1948 the atomic energy act was formulated. Work on survey for atomic minerals began on an industrial scale, research in several aspects of harnessing atomic energy on theoretical and experimental scale, and development of scientific and technical manpower started in great vigour. In 1954 a separate Ministry, Department of Atomic Energy was established directly under the prime minister. Bhabha was appointed secretary to the Government of India.

A comprehensive research capability was established in Bhabha Atomic Research Centre (BARC), the erstwhile Atomic Energy Establishment. India's first nuclear reactor APSARA designed entirely indigenously became operational in 1956. India had leapfrogged into nuclear technology. Another milestone was when the Canada India Reactor went critical in July 1960. If India has to be self-reliant in Nuclear technology, all aspects of fuel fabrication, fuel irradiation, separation of plutonium, waste management, electronics, metallurgical, chemical and thermo-mechanical properties of nuclear fuel etc. had to be established. Several world class laboratories were initiated in BARC.

Though India's first power reactor was of the boiling water kind using enriched fuel, Bhabha's roadmap for atomic

energy was to build several Pressurised Heavy Water Reactors (PHWR) with natural uranium fuel and heavy water as moderators. This is the first stage and the plutonium from this stage would fuel the second stage which would be of the fast breeder variety. This second stage would multiply the fissile base in India and lead to a third stage based on our potential thorium resources. To this end several other aspects of the atomic power research, like heavy water technology, reprocessing technology, fast reactor fuel studies, material sciences and the like were initiated.

Bhabha was very effective and persuasive as an advisor to the Government on science and technology. His committed atomic energy vision gave him an international recognition too. He was appointed as the president of the 1955 Geneva conference on Peaceful uses of Atomic Energy. His presidential address was a brilliant treatise on energy and population and its direct impact on the human development index.

His untimely death in 1966 sent shockwaves throughout the world. Smt. Indira Gandhi, the Prime Minister during this period, put it beautifully in her tribute "Homi Bhabha had so much unfinished work and his most creative years was yet to come". To summarise, Bhabha's work, like his personality was multi-disciplinary and involved many styles. Be it the phenomenon based on cascade theory, the speculative muon component of penetrating radiation, experimental studies on cosmic rays, the mathematical group theory in his relativistically invariant wave equation, the shrewd administration of science and technology in India, the clarity in formulation of the atomic energy programme, Bhabha's ingenuity stood apart.

Billy's pugmarks - By Rohit Brijnath

In the forests of India there is mourning. Billy Arjan Singh, an old tiger, is dead. Fortunately, he has gone to his own paradise, an animal heaven where only some humans are allowed entry. And so there he is, reunited finally with his dog Elie, leopards Prince, Harriet and Juliet, tigress Tara, monkeys Elizabeth Taylor and Sister Guptara, his fishing cat Tiffany. With them, Billy will be home.

The two-footed Billy, 92, spoke for the four-footed unheard. He argued on behalf of those who inhabited the jungles and asked only to live. To say he was India's finest tiger conservationist (winner of the World Wildlife Fund gold medal), sounds silly because it is not a contest. It is a calling, and empathy for the natural world. There is a wonderful photo of him, wearing a cap, with a bird sitting on it. Was the bird tired, disoriented, who knows, but maybe it knew: this man I can trust.

Billy was extraordinary, a writer of books who seemed to emerge from one written by Hemingway. We were distantly related and I went occasionally to Tiger Haven in Uttar Pradesh's Dudhwa National Park where this fascinating character lived; a bow-legged, badly-dressed, wind-breaking, well-read hero and a committed man with a Charles Atlas handshake, courteous with women, brusque with the ignorant, owner of a humour dryer than London gin, cornering me about boxers and batsmen because he admired athletes.

He was strong, in muscle and belief. As the morning mist clung to the trees, you could hear metal clinking. Billy was lifting barbells and this was fitting for he was an unbending

man. He once locked poachers into a granary where his python, the harmless Monty, snoozed in the rafters. Animals surrounded him. In the evenings, Tom Dooley the peacock would come twitching by and the elephant, Bhagwan Piari, her eye fixed adoringly on him, would gulp chapatis thicker than dictionaries.

The conservationist's life is of disappointment. He is going to be defeated, he can only delay some extinctions. Populations are exploding, man has forgotten his place, he wants the animal's domain too. Billy's life was struggle. He sweated for the revival of the swamp deer, battled to turn Dudhwa into a sanctuary, experimented with rearing leopards and a tigress in an attempt to rehabilitate them into the wild.

His hiccuping typewriter produced wildlife papers, he wrote books, drove to Delhi to pester officials. His persistence won Indira Gandhi's admiration, and she wrote in 1973 to the UP chief minister: "It is easy to come by armchair conservationists, but rare indeed to find a man with the dedication and perseverance to act in support of a cause he loves." He was crusty, cantankerous, unwilling to compromise.

It was the only way and the wrong way: to save the tiger required obstinacy, but it hardly helped with officials. He talked of tigers, with deep affection and terrible sadness. He wore a devotion I have never seen. Once a hunter, he put down stakes in a jungle after World War II and never left. He just lived there among the coughing leopards; studying, tracking, fighting and protecting every single, damn day for a lifetime. Sometimes, as he trudged into the forest, I wondered: what are the rewards for such men? Just one fresh tiger pugmark imprinted in the dust to reassure him not all were gone?

Legacy is not easily defined. But we can say of Billy that he was a first and an original, a tiger explorer who built an entire life around a single cause. Like Salim Ali with his birds, he was unique.. He saw the tiger as the apex of the food chain, wherein a healthy cat population meant a healthy jungle. To save this species was akin to saving it all.

Billy taught us this, he taught us there was a little of William Blake in him, writing: "... the stentorian bugling of the swamp deer, the urgency in the rutting bray of the cheetal, the lilting crow of the jungle cock, and the clarion call of the peacock, all combine to make up the pulsating rhythm of the great forest". He taught us this animal was worth fighting for, worth marching against governments for, worth giving to charities for, worth sitting still for an hour to see it for a second.

He taught men that devoting a life to the tiger was worth it, helping to spawn a generation of conservationists. So I give quiet thanks for Billy. And for people like Ulhas Karanth, Fateh Singh Rathore, Valmik Thapar, Bittu Sahgal, Ashok Kumar, Belinda Wright, Raghu Chundawat. All those who fight for the tiger, and fail, and fight more.

I last saw Billy three years ago, sunken into a chair, fading, his spirit tattered but not extinguished. Even to the end, I suspect, he feared not for himself, but for his forest companions. So many whom he saved, so many he could not.

(Courtesy: The Hindustan Times. Rohit Brijnath is a Senior Correspondent with 'The Straits Times', Singapore. The views expressed by the author are personal)

Science news

Heart disease in Indians and the MYBPC3 gene Heart

An estimated 17 million people around the world die of cardiovascular diseases every year, particularly heart attacks or strokes. The World Health Organization estimates that by 2010, India will have 60% of the world's heart patients. For a country that traditionally frowns upon smoking and embraces the idea of a vegetarian diet, it was unexpected to find such a high percentage of the disease. The risk of dying from a heart attack is twice higher and more severe among Indians than Americans and Europeans. Thus, Indians need to be tested early and treated more aggressively.

An international study comprising of a team of 25 scientists and doctors from four countries provided a partial answer to this unexpectedly common defect, in the gene MYBPC3, encoding the cardiac myosin binding protein C. Research explains how a genetic mutation (deletion of 25 bits of its genetic code in this gene), affecting four per cent of Indians and one per cent of the world's population, leads to a formation of an abnormal protein that disrupts cardiomyocyte structure in vitro (Nature Genetics, January 2009). One of the main researchers Kumarasamy Thangaraj, of Centre for Cellular and Molecular Biology, Hyderabad, said, "Young people could degrade the abnormal protein and remain healthy but with ageing, it builds up and results in symptoms which include hypertension and weakening of the heart called cardiomyopathy, and death due to sudden cardiac arrest." Chris Tyler-Smith, a senior investigator at The Wellcome Trust Sanger Institute, Hinxton, UK, (Jan. 2009) and one of the study authors said the mutation probably arose around 30,000 years ago and is associated with a seven fold increase in heritable cardiomyopathies and increased risk of heart failure in Indian populations. The mutant gene accounts for not more than 5 % of heart disease in India, but affects tens of millions of people who are carriers maintaining the gene in the population, he said. (Mumbai Mirror, January 2009). In a follow up study of 2000 indigenous individuals from 26 countries across five continents, the mutation showed prevalence in Pakistan, Sri Lanka, some presence in Malaysia and Indonesia, but nowhere else.

Heart disease is one of the world's leading killers, but now that researchers have identified this common mutation, carried by one in 25 people of Indian origin, we have hope of reducing the burden that the disease causes. This research should lead to better screening to identify those at risk and may ultimately allow the development of new treatments. And perhaps eventually new drugs could be developed to enhance the degradation of the abnormal protein and postpone the onset of symptoms. Three-quarters of Indian heart-disease patients are from low socio-economic backgrounds. The poorer patients receive medical attention late, for reasons including lack of awareness of the symptoms and poor access to medical aid. Also, the increasing obesity epidemic, high rate of smoking in certain

populations, and variable availability of modern medications and treatments creates a situation where coronary prevention efforts are far from optimal in India. With this outsized share of the global burden of heart disease which India has, what is the remedy? In principle, it would be extremely easy to test people at a young age for the gene, but at the moment all that doctors can do, would be to offer healthy lifestyle advice.

An Indiana University study had found that hospital admissions for such heart attacks dropped 70 percent for non-smokers after a countywide smoking ban was implemented. Benefits of the ban appear to come more from the reduced exposure to second-hand smoke among non-smokers than from reduced consumption of tobacco among smokers, said Dong-Chul Seo in the Journal of Drug Education. This was the first study to examine the effect of public smoking bans on heart attacks in non-smokers, who had no risk factors for heart disease, such as high blood pressure, high cholesterol or previous heart surgery. Exposure to second-hand smoke for just 30 minutes can rapidly increase a person's risk for heart attack, even if they have no risk factors. The smoke, which contains carbon monoxide, causes blood vessels to constrict and reduces the amount of oxygen that can be transported in the blood. If we are serious about reducing heart disease in our country, ban of smoking in public places is a positive step, and should be enforced strictly for successful reduction of risk factors. Women's role in promoting awareness starts in the home. The importance of regular exercise, (walking for 30 minutes at least every day) and games starting from childhood, yoga and meditation, healthy diet (Indian vegetarian diet is fairly well balanced), preventing smoking, need to be emphasized. For vegetarians, eating fresh fruits and vegetables, salads, yoghurt, nuts, whole grains, pulses is wholesome. Non-vegetarians can do with less red meat (monthly) and have chicken (once a week), fish (thrice a week, it is a rich source of omega 3 fatty acids). Olive oil as in Mediterranean diets is also recommended but is expensive and does not go with our cooking styles. Instead for Indians, limiting the use of ghee, butter, vanaspati and using more than one source of cooking oils can be beneficial. Some of the cues developing countries should adapt for successful strategies to reduce risk factors for heart disease are banning smoking in public places, increasing taxes on tobacco and promoting awareness of diet and exercise.

(Courtesy: Science & Development Network.)

Nature news

The ancient human genome- For the first time, the sequence of a near-complete nuclear genome has been obtained from the tissue of an ancient human. It comes from permafrost-preserved hair, about 4,000 years old, of a male palaeo-Eskimo of the Saqqaq culture, the earliest known settlers in Greenland. Functional single-nucleotide polymorphism (SNP) assessment was used to assign possible phenotypic characteristics. The analysis provides evidence for a migration from Siberia into the New World some 5,500 years ago, independent of the migration that gave rise to the modern Native Americans and Inuit.

Photo Gallery





A Self Potrait at the Age 17
Homi Jehangir Bhabha
(1909 - 1966)

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