



IWSA NEWSLETTER

The Official Publication of the Indian Women Scientists' Association

Volume 45

Issue No. 1

ISSN 0972-6195

January - April 2018



Cancer Detection Camp at Kawthewadi, Raigad District, Maharashtra, 15th January, 2018



Science Academies' Laser Workshop, 20th -21st January, 2018



"Rainbow 2018", 22nd-23rd February, 2018

BRANCHES

Roorkee 1979, Hyderabad 1979, Pune 1980, Nagpur 1982, Kolhapur 1982
Delhi 1987. Kalpakkam 1987, Baroda 1988, Amravati 2010



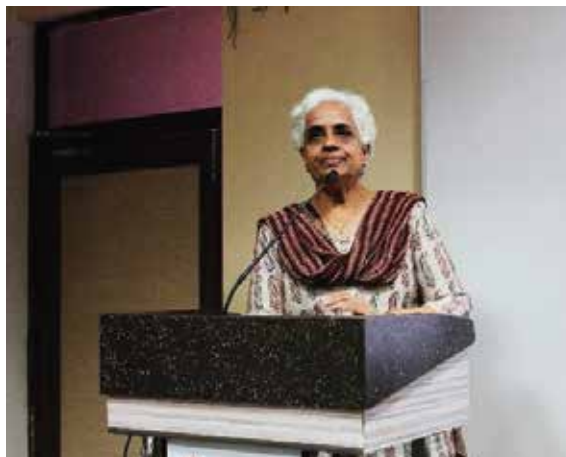
BRNS Popular Science Lecture by Dr. Kavi Arya at Somaiya Institute of Management Studies and Research, Mumbai, 24th January, 2018



Republic Day Celebration by Hostel Girls at IWSA, 26th January, 2018



Inauguration of Science Exhibition at IWSA, 3rd February, 2018



BRNS Popular Science Lecture by Dr. Rita Mulherkar at SIES College, Sion, 14th February, 2018



Free Medical Camp at IWSA on the occasion of International Women's Day, at IWSA, 10th March, 2018



Closing Ceremony of Science Nurture Program at IWSA, 20th March, 2018



From the Editor's Desk

Dear IWSA Members,

In this issue of the Newsletter, you will find reports on 13 BRNS Popular Science Lectures that were held between January-April 2018, which is an indicator of the dedication of IWSA team to popularize science among college students and expose them to the latest excitements in scientific research. We bring you a detailed report on Science Academies' Lecture Workshop on Lasers and their Applications held at IWSA Complex, Navi Mumbai during 20th and 21st January, 2018. This issue includes reports on several science nurture programs organised for school students, such as the Science Exhibition on the theme "WONDERS OF LIGHT", visit of school students to expose them to green initiatives of IWSA etc. The yearly teaching aid exhibition 'Rainbow' 2018 of the TOT trainees was held on 22nd and 23rd February 2018 at IWSA, Vashi, where our trainees showcase their creativity talent and the tiny tots of Nursery and Day Care children enjoyed this event with great enthusiasm. You will find reports on cancer detection camp, free medical check-up camp, scholarships given to deserving students etc., all of which underscore the commitment of IWSA for health care, education and other societal benefits. This issue also brings the interesting activities held at IWSA Branches at Amravati, Baroda, Kalpakkam, Nagpur, Pune and Roorkee. Noticeably these IWSA Branches are competing with headquarters in organizing educational and societal events. One of our senior members and Trustee of IWSA, Dr. B.S. Mahajan has written an article about the exciting collaboration between CUBE--Collaborative Undergraduate Biology Education and IWSA. I have also included a short note about the new technology on Lithium batteries developed by its inventor and now a 94-year old scientist from University of Texas, Prof. John B Goodenough, which can revolutionize electric vehicles. I hope that all of you will enjoy reading about these reports and the scientific information content of this Newsletter.

With best wishes

Shyamala Bharadwaj

shyamala.bharadwaj@gmail.com

Contents

From the Editor's Desk
President's Message
Reports from Headquarters
Reports from other Branches
Articles
IWSA's Partnership with CUBE
Lithium Ion Batteries.

Editorial Board

Dr. Shyamala Bharadwaj (Editor)
Dr. Susan Eapen (Co-Editor)
Dr. Devaki Ramanathan
Dr. Dhanya Suresh
Dr. Nalini Bhat

President's Message



Dear Members of IWSA,

This issue of the Newsletter brings to you our activities from January to April 2018. You will note that it really has been a very busy four months at IWSA, Vashi, Navi Mumbai as well as our branches. A variety of science based activities have been conducted. Each of these has involved different levels of society.

Rainbow 2018 which is our annual teaching aid workshop cum lecture event provided tremendous excitement and a wonderful learning experience for the children in the day care and pre-primary schools in and around Vashi. Rainbow had teaching workshop sessions for the teachers too.

School students from VII Std above participated in the Science exhibition on "Wonders of Light" conducted at Vashi. The green initiatives on our Vashi campus have attracted the attention of schools and they sought visits to understand our efforts to reduce carbon footprints. Our members have brought the excitement of Science, Maths and English to underprivileged students from a neighbouring school. We showcased our fun science based experiments to the primary school children in village Kawthewadi who were thoroughly amazed. Over a 1000 school children in Roorkee participated in the Maths Olympiad held by our Roorkee branch. At the science day activities in Kalpakkam, school children highlighted the life and work of women scientists. Nagpur branch encouraged school children to present their ideas of a Smart City. In Amravati school children made seed balls and threw them down the mountain side to increase the greenery.

The BRNS supported lecture series conducted by headquarters for college students and teachers has updated them with state-of-art information on different areas in biology, physics and chemistry. Nearly 1500 students have benefited from these lectures. The Science Academies' supported lecture workshop on Lasers was another focussed area in science which was attended by about 120 students. Amravati branch has conducted lectures on Hepatitis B and Molecular biology techniques, while Baroda branch conducted conferences on different aspects of botany and climate change. The variety of lectures conducted by Pune branch for students are just amazing.

Amravati branch has dealt with the "no plastic era" with a paper bag making workshop for women. Our Nagpur branch enchanted women with workshops on beauty products from coconut, art and science of cooking as well as entrepreneurship.

All these showcase efforts of IWSA at large to take science to society at all levels. The beginning of the year 2018 has definitely been very promising and I am confident, the team spirit of all our members will ensure we extend our activities further. You will be happy to know that through our activities at headquarters and branches we have reached out to over 11000 recipients during April 2017-March 2018.

I am looking forward to your continued participation with many more exciting activities to meet the mandate of IWSA.

Best Wishes

Surekha Zingde
surekha.zingde@gmail.com

Reports from Head Quarters

Science Awareness Programs

A. IWSA – BRNS Popular Science Lectures

1. BRNS Popular Science Lecture at KBP College, Vashi on 10th January, 2018

Dr. Aparna Bhanushali, Research Scientist & Senior Manager at SRL Ltd, Mumbai, delivered a lecture on “Molecular Diagnostics” at the Karmaveer Bhaurao Patil College, Vashi, Navi Mumbai on 10th January, 2018. Dr. Bhanushali informed the need for Molecular Diagnostics for management of diseases and disorders. In the first part of her lecture she described the principles of the technologies used for diagnosis of genetic disorders. These included the different types of PCRs and Next gen sequencing. Dr. Aparna explained how each of these techniques is used to diagnose some of the genetic disorders which are addressed by SRL. Her presentation was very graphic and simple and she kept the students alert with her questioning to ascertain their attention. The students enjoyed the lecture and they could relate to some of the experiments that they had been taught or read about. There was active discussion during and after the lecture. The lecture was attended by over 200 students and teachers. Prior to the lecture, Dr. Surekha Zingde, President, IWSA gave a brief on IWSA to the students and Dr. Shubhada Nayak, Vice Principal, KBP college spoke about the college activities. Students were served refreshments after the event.

2. BRNS Popular Science Lecture at K.J. Somaiya Institute of Management Studies and Research (SIMSR), Ghatkopar (East), Mumbai on 24th January, 2018

A popular science lecture was delivered by Prof. Kavi Arya, PI, e-Yantra, CSE Department, IIT Bombay, on “Who took away my job and what can I do about it?” at K.J. Somaiya Institute of Management Studies and Research (SIMSR), Ghatkopar (East), Mumbai on 24th January, 2018 at 2:30 pm.

Prof. Arya explained that lower-skills jobs are rapidly disappearing due to advances in robotics and machine learning technology. How do we cope? He illustrated the fallout of this problem and how e-Yantra is training students to deal with the challenges by developing skillsets for startup eco-systems.

e-Yantra is an MHRD funded National Robotics Initiative setting up over 1000 robotic labs across India with 270 labs set up till date. e-Yantra runs a National Robotics competition to teach Robotics & Embedded Systems. Robotics labs that serve as the basis for building startup hubs in engineering colleges are being setup. In this lecture, Prof. Arya discussed these issues and the students participated by interacting actively with the speaker. Dr. Lalitha Dhareshwar, Dr. Susan Eapen and Ms. Vijaya Chakravarty from IWSA attended the lecture. Dr. Lalitha Dhareshwar gave a brief account of IWSA activities. About 80 students attended the lecture.

3. BRNS Popular Science Lecture at SIES College for Art, Science and Commerce, Sion West, Mumbai on 1st February, 2018.

A lecture on “NMR Spectroscopy: An Overview” was delivered by Dr. Kakoli Bose, Principal Investigator, Cancer Research Institute, Tata Memorial Centre, ACTREC, Kharghar, Navi Mumbai on 1st February, 2018 at the SIES College for Art, Science and Commerce, Sion West, Mumbai.

Dr Bose explained how Nuclear Magnetic Resonance (NMR) Spectroscopy is an extremely powerful tool to study structure, dynamics and functions of macromolecules in solution. This technique is a unique amalgamation of ideas from quantum mechanics and chemistry that have been successfully applied in chemical, biomedical as well as in the clinical studies, as in Magnetic Resonance Imaging or MRI. The lecture provided basic and simple explanation of NMR theory and instrumentation with a focus on its biomedical applications such as understanding macromolecular structure, dynamics, protein-ligand interactions, protein folding and many more. The lecture also covered its limitations, comparison with complementary techniques, and current advancements in the field.

The lecture was attended by about 100 students. Dr. Bose involved the audience in a question and answer session to ensure that the content was understood by the students. Dr. Surekha Zingde, President, IWSA informed the students about the activities of IWSA.



Dr. Kakoli Bose delivering her lecture at SIES College, Sion and the audience

4. BRNS Popular Science Lecture at Sophia College for Women, Bhulabhai Desai Road, Mumbai on 3rd February, 2018

A popular science lecture titled “Nuclear Medicine in Human Healthcare” by Sharmila Banerjee, HOD, Radiation Medicine Centre, Bhabha Atomic Research Centre, was conducted at Sophia College for Women, Bhulabhai Desai Road, Mumbai on 3rd February, 2018. Dr. Banerjee spoke on radiopharmaceuticals and their use in diagnosis and treatment of diseases.

Molecular diagnostics using radiopharmaceuticals is a technique of imaging a diseased state in the molecular level using radiolabelled agents. Such radiolabelled agents which

are used for diagnosis of a diseased site are known as diagnostic radiopharmaceuticals. The radioisotopes used in diagnosis are chemically complexed with a biologically-avid molecule which has target specificity. The gamma photon of the radioisotope used in diagnosis can be of two types. In the first, the radioisotope emits a gamma photon (^{99m}Tc , ^{111}In , ^{123}I , ^{201}Tl) and this photon is used to image the organ in which the radiolabelled molecule localizes using a gamma camera (Single Photon Emission Computed Tomography, SPECT). The diagnostic radiopharmaceuticals are called SPECT agents. In case of radioisotopes which emit a positron (^{18}F , ^{68}Ga), the resultant annihilated gamma photon is detected using a Positron Emission Tomography Camera (PET). In certain cases the diagnostic radiopharmaceutical provides dynamic functioning information of an organ of interest using SPECT or PET. In contrast to the use of diagnostic applications in nuclear medicine, radiopharmaceuticals designed for therapy are agents which deliver therapeutic doses of particulate and ionizing radiation to the diseased sites. Particulate emission is delivered by radionuclides which decay by emission of α , β^- , Auger- and Conversion-electrons. Recent advances in this area exploit the diversity of receptor-avid and immune-derived molecular vectors as well as a host of therapeutic radionuclides.

The R&D program of BARC has made use of the radioisotopes ^{99m}Tc , ^{68}Ga , ^{131}I , ^{32}P , ^{166}Ho , ^{188}Re , ^{90}Y and ^{170}Tm in preparation of several radiopharmaceuticals, which are used in cancer patients for various applications. Extensive research since 2001, has resulted in standardizing the production of Lutetium-177 in adequate quantity, specific activity and radionuclidic purity. Using this ^{177}Lu , a host of molecular vectors have been labeled, towards development of a variety of agents for use in targeted radiotherapy. A direct outcome of the efforts is the development of ^{177}Lu -DOTA-TATE, presently being evaluated in patients with neuroendocrine cancer. More than 3000 cancer patients in about fifteen hospitals all over India have benefitted from these therapies.

Dr. Banerjee gave a brief overview of the recent strategies employed for designing of radiopharmaceuticals for the management of cancer and the emerging trends in drug development utilizing diagnostic and therapeutic radiopharmaceuticals, with particular reference to the Radiopharmaceutical research and development program in BARC.

Dr. Susan Eapen, Member, Board of Trustees, IWSA spoke about the efforts taken up by IWSA to spread interest in science among college students and other activities of IWSA. Dr. Sudha Padhye, IWSA founder member and Dr. Marukh Joshi also attended the programme. There was an active question answer session. The programme was attended by about 150 students and faculty.



Dr. Sharmila Banerjee delivering her lecture at Sophia College and the audience

5. BRNS Popular Science Lecture at K.C. College, Churchgate, Mumbai on 10th February, 2018

Dr. Archana Joshi Saha, Nuclear Agriculture and Biotechnology Division, Bhabha Atomic Research Centre, Mumbai delivered a popular science lecture at K.C. College, Churchgate, Mumbai on “Radiation for food security and safety” on 10th February, 2018.

The term “radiation” particularly in conjunction with “nuclear” has been viewed as an ominous demon ready to play havoc in our lives. – she said. This is possibly because of the horrors created by ‘Little boy’ and ‘Fat man’- the nuclear bombs- dropped at Hiroshima and Nagasaki respectively during the II world war. Apart from the destructive nuclear weaponry, radioactive material and the radiations, play an important and many a times an essential role in the society. She spoke on different types of radiations, and interactions with biological material. Apart from the well-known application in healthcare and diagnostics, radiations are also useful in the field of agriculture and food preservation. These applications were discussed with some example of recent studies and products developed at Nuclear Agriculture and Biotechnology and Food technology Divisions of Bhabha Atomic Research Centre. She explained how use of radiations had resulted in improvement of oil seeds and grain legumes by inducing mutations and in BARC, 42 crop varieties were released through mutation breeding. Radiation has been also successfully used in food preservation, increasing shelf life, disinfection, quarantine and sprout inhibition. Mangoes have been irradiated to disinfect the weevils and exported. In 2017, thousand tonnes of mangoes were exported to U.S. alone, which was possible only because of disinfection with radiation.

Dr. Susan Eapen, Member, Board of Trustees, IWSA spoke about the various activities of IWSA especially popular science lectures meant to ignite young minds. Ms. Rajitha Sathish and Sagarika from KC college co-ordinated the program. The lecture was followed by active discussion. About 125 students attended the lecture and were greatly benefited from the information provided.

6. BRNS Popular Science Lecture at SIES College for Arts, Science and Commerce, Sion, Mumbai on 14th February, 2018

A lecture on Gene Therapy and Genome Editing was delivered by Dr.Rita Mulherkar, Professor and Scientific Officer ‘H’ (retired), Advanced Centre for Treatment, Research and Education in Cancer, Kharghar, Navi Mumbai on 14th February, 2018 at the SIES College for Art, Science and Commerce, Sion West, Mumbai.

Dr. Mulherkar informed that Gene Therapy is a new form of treatment where DNA is used as a drug. It has been an experimental form of treatment for more than 3 decades although it is a rapidly growing field. Like any other new drug it has to withstand the rigours of laboratory tests, animal tests and finally trials in human subjects before it can get approval for commercialization. However, unlike recombinant proteins and chemically synthesized drugs, the regulatory mechanisms for gene therapy are much more stringent.

The first successful gene therapy trial was started at NCI, USA in 1990, for Severe Combined Immuno-Deficiency caused due to a mutation in the Adenosine Deaminase gene. However, majority of the ongoing gene therapy clinical trials are for cancer which is

a disease difficult to treat with the existing therapies. In the last two decades, there have been more than 2400 gene therapy clinical trials, of which 1590 were for cancer (~65% of all gene therapy trials; source - www.wiley.co.uk).

From the beginning, gene therapy has gone through a lot of publicity – both good and bad. After the death of 3 patients, there was scepticism whether gene therapy is safe and whether it will deliver. Added to that is the exorbitant cost involved in preparing gene therapy reagents. If GMP guidelines are to be followed for preparing clinical grade reagents in an academic setting it will be almost impossible to carry out such trials. Dr Mulherkar informed that another related point that needs attention is the Biosafety and Regulatory issues. Most developing countries, including India, do not have guidelines for gene therapy clinical trials. China has not only overcome the problems but has successfully launched the first gene therapy based drug – **Gendicine**, in the market in October 2003 and later the first oncolytic virus – **Oncorin**, for cancer gene therapy in November 2005. The first gene therapy drug to be approved in Europe is **Glybera** for patients deficient in Lipoprotein Lipase (LPL) in 2012. The first drug under gene therapy to be approved in USA is **CAR T-cell therapy** in 2017. The number of drugs approved in Europe and USA is slowly increasing.

One of the techniques which has given a boost to cell and gene based therapies is **Genome Editing**. With this technology genetic material can be added, removed, or altered at specific locations in the genome. Several approaches to genome editing have been developed although the most successful one is known as CRISPR-Cas9 - clustered regularly interspaced short palindromic repeats and CRISPR-associated protein 9. This technique was borrowed from the bacterial immune system to ward off viruses. The CRISPR-Cas9 system has generated a lot of excitement in the scientific community. Besides being an excellent tool to generate knock-out and knock-in animals, it could also be a powerful therapy for many diseases. After carrying out animal studies, the first few human clinical trials are being approved in the West and in China.

The lecture was attended by over 125 students and there was active discussion following the presentation. Dr. Surekha Zingde, President, IWSA informed the audience about the activities of IWSA.

7. BRNS Popular Science Lecture at St. Xavier's College, Fort, Mumbai on 16th February, 2018

Prof. Arvind Lali, Professor, Chemical Engineering and Head DBT-ICT Centre for energy biosciences delivered a lecture on 'Renewable Carbon Engineering: Confluence of Biological & Chemical Sciences' at St. Xavier's College, (Autonomous), Fort, Mumbai on 16th February, at 3.00 p.m.

The increased energy demands in the world today are mainly met using petroleum and agriculture based resources. The drawback associated with petroleum based products is the resultant of global warming on account of emission of greenhouse gases. Besides, India depends heavily on petroleum products for its energy and chemical needs. Therefore, India has charted for itself an aggressive path towards reducing carbon emissions and the dependency on import of crude oil by exploiting renewable sources of

carbon. Renewable carbons can be a combination of first generation (food derived), second generation (non-food derived), third generation (non-land use change) and fourth generation (CO₂). Today India has attained food self-sufficiency and there is substantial under-utilized non-fodder surplus agricultural wastes and other wastes such as municipal solid wastes, municipal liquid waste and industrial waste that put together have the potential to fully substitute petroleum fuel and energy requirements of the country. He said that sustainable technology platforms have been designed at DBT-ICT Centre for Energy Biosciences using chemical processes and biological routes that can convert waste into renewable fuels ensuring energy security for our country.

The lecture was attended by about 75 students and there was an active discussion. Dr. Susan Eapen, Member, Board of Trustees, IWSA spoke about the various activities of IWSA and emphasized on popularization of science. Dr. Priya Sundarajan coordinated the programme from St. Xavier's College and said that the college looks forward to more collaborative activities with IWSA.



Prof. Arvind Lali delivering a lecture at St. Xavier's College the audience

8. BRNS Popular Science Lectures at NMIMS, Vile Parle, Mumbai on 19th February, 2018

Two popular science lectures were organised at Sunandan Divatia School of Science, NMIMS (Deemed-to-be) University, Vile Parle (W), Mumbai on 19th February, 2018.

Dr. Vivek Polshettiwar, Department of Chemical Sciences, Tata Institute of Fundamental Research, Mumbai spoke on "Nanocatalytic Solutions for Climate Change" at 10:30 hrs and Dr. Dharendra Bahadur, Department of Metallurgical Engineering and Materials Science, Indian Institute of Technology Bombay, Mumbai delivered a talk on "Towards *in vivo* Cancer Therapy through Nanohybrids" at 11:45 hrs.

Energy and environment are two of our critical societal challenges. Dr. Polshettiwar explained the use of hybrid nanomaterials to harvest solar energy as well as capture and convert CO₂ and went on to show that this method seems to be the best way to combat

climate change. He described the synthesis of a new class of dendritic fibrous nano-silica (DFNS). Fibrous morphology observed in these nanospheres has not been seen before in silica materials. Uniqueness of DFNS is, its high surface area is by virtue of its fibrous structure instead of pores (unlike MCM-41 and SBA-15 silicas), which makes it easily accessible. More than 100 groups worldwide are now using the DFNS, which has been patented by Dr. Polshettiwar and his group, for various applications such as catalysis, solar-energy harvesting, energy storage, self-cleaning antireflective coatings, surface plasmon resonance-based ultrasensitive sensors, CO₂ capture, and biomedical applications. He explained the successful utilization of DFNS for a range of important catalytic applications such as metathesis, hydrogenolysis, oxidation, hydrogenation, coupling reactions etc. as well as for CO₂ capture. A new method of fabricating active photocatalysts by TiO₂ coating of DFNS has been developed in his group. In his talk, he discussed at length, about the synthesis and application of fibrous nano-silica (DFNS) for confronting with climate change, more specifically for catalysis and CO₂ capture.

Dr. Bahadur discussed some of the recent work related to *in vitro* and *in vivo* cancer therapeutics, where complete regression of tumor has been achieved with different nanohybrid systems using dual therapy. The hybrid systems include lipid, dendrimer and graphene based systems. He discussed the design of a new pH and thermo sensitive dual drug delivery system consisting of thin lipid layer encapsulated mesoporous magnetite nanoassemblies (LMMNA) for thermo-chemotherapy in cancer. This hybrid system was thoroughly characterized and investigated for its ability to carry two anticancer drugs as well as its ability to provide heating effect under an applied AC magnetic field (ACMF). A very high loading and release efficiency triggered through a change in pH and temperature have been observed. With the application of an ACMF, the cell killing efficiency is improved substantially due to simultaneous thermo and chemotherapy. Further, he described the therapeutic potential efficacy of the above system in mice bearing both cisplatin sensitive (A2780^S) and resistant (A2780-CisR) ovarian cancer tumor xenografts. Non-invasive bioluminescence imaging of mice bearing A2780^S tumor and administered with the formulation followed by ACMF application revealed 65% less luminescence signal and 80% mice showed complete tumor regression within eight days. A six months follow-up study revealed absence of relapse in 70% of the mice. Interestingly, the A2780-CisR tumor which did not respond to drug alone (DOX:TXL) showed 80% reduction in luminescence and tumor volume after thermo-chemotherapy within eight days. Thus, these novel stimuli sensitive nanoassemblies hold great promise for therapy resistant malignancies.

He also discussed the recent *in vitro* studies that suggests that dendritic Fe₃O₄ nanoparticles (DMNPs) are promising platforms for improved cancer therapeutics. A major challenge in stepping up the successful *in vitro* therapies to *in vivo* scenarios is the uncontrolled biodistribution. To overcome this limitation, magnetic drug targeting (MDT) presents itself as a promising alternative. He then went on to describe the synthesis of polymer stabilized iron oxide graphene (PIG) hybrids. PIG has the ability to load and release both hydrophobic and hydrophilic drugs with a good loading efficiency and capacity. The drug loading efficiency of PIG is measured to be ~87% and ~91% for doxorubicin (DOX) and paclitaxel (PTXL), respectively. Under an AC magnetic field, superparamagnetic PIG (2.5 mg/mL) takes less than 16 min to reach the stable hyperthermia temperature. A time-dependent cellular uptake of doxorubicin-conjugated PIG has been studied to optimize the parameters for thermo-chemotherapy of cancer. The synergetic effect of both the drug and hyperthermia is observed in the killing of the cancerous cells.

About 120 students from different colleges, attended the lectures. Several students actively participated in the discussions after the lectures. They were seen discussing with the Dr. Polshettiwar during the tea break and with Dr. Bahadur after his lecture.

Dr. Susan Eapen, IWSA spoke on the various activities of IWSA and Dr. Shyamala Bharadwaj introduced the speakers.



Dr. Vivek Polshettiwar



Dr. Dharendra Bahadur

9. BRNS Popular Science Lectures at Ramnarain Ruia College, Matunga, Mumbai on 24th February , 2018

Two popular science lectures were organised at Ramnarain Ruia College, Matunga, Mumbai on 24th February, 2018.

Dr. Devashish Rath, Molecular Biology Division, Bhabha Atomic Research Centre, Mumbai, delivered a lecture on “CRISPR: A revolutionary tool for biomedical research and biotechnology” at 9:30 am. Dr. S.M. Yusuf, Head, Solid State Chemistry Division, Bhabha Atomic Research Centre, Mumbai delivered the second lecture on “Advanced Magnetic Materials: Basic Properties and their Applications” at 11:30 am.

Recently discovered CRISPR (Clustered Regularly Interspersed Short Palindromic Repeats)-Cas (CRISPR-associated) systems are microbial defence systems that provide immunity against foreign nucleic acids such as viruses and plasmids. These systems have been adapted for gene editing and gene silencing applications. The rapidly emerging CRISPR-Cas toolbox has ushered in a revolution of sorts in genome engineering and synthetic biology. The versatility of the system has ensured that it has found further applications in gene regulation and metabolic engineering. Innovative applications of this technology are continuously emerging. CRISPR-Cas tools complemented by next generation sequencing approaches, together, provide a very powerful combination in the hands of biologists for genome scale interrogation of structure and function. CRISPR-Cas approaches are now being exploited in food, medical and plant biotechnology. Exciting applications like gene therapy in humans, development of new age anti-microbials, better diagnostics and vaccine development are being explored with renewed vigor. The prospects of genome editing in human embryos with CRISPR-Cas have also sparked debate on ethical and safety concerns.

Dr. Susan Eapen, Member, Board of Trustees, IWSA spoke on the various activities of IWSA specially its effort to reach out to college students through popular science lectures. Dr. Jessy Puis welcomed the speaker and coordinated the programme. The lecture was attended by about 150 students.

In the second lecture, Dr. Yusuf informed that rational design of magnetic materials enables one to tailor magnetic properties for specific applications. A tremendous effort is on for finding appropriate magnetic materials that are better suited for magnetic memory devices, sensors applications, magnetic refrigeration, permanent magnets, magnetic high permeability device applications, bio-medical applications, etc.

Scientists at the Bhabha Atomic Research Centre (BARC), Mumbai are working on a variety of technologically important magnetic materials, such as oxide based magnetic nanoparticles, high magnetocaloric effect materials, multifunctional molecular magnets, multiferroic materials, solid oxide fuel cell (SOFC) materials, high magnetoresistive materials, etc.

Some of the experimental results from these studies have immense potential for device applications, such as spintronics, volatile magnetic memory technology, supercapacitance, giant magnetodielectric devices, thermally assisted magnetic random access memory (TA-MRAM), thermo-magnetic switches, self-driven constant temperature bath, light weight hard and soft magnets, magnetic sensors, magneto-cooling in magnetic refrigerator technology, magnetically assisted drug delivery, separation of radionuclides from nuclear waste, good interconnect materials for SOFC devices. A prototype magnetic-nanoparticle-loaded bio-compatible membrane device for use in artificial heart pump support and other bio-medical applications has been built in BARC.

The results of some of these magnetic investigations, carried out in BARC, Mumbai were presented by Dr. Yusuf in a broader perspective for a general audience, and their implications for practical applications in several areas, as mentioned above, were discussed. Dr. Lalitha Dhareshwar, Vice President, IWSA briefed the audience about the activities of IWSA and introduced the speaker. About 100 students attended the lecture and interacted actively with the speaker after the lecture.



Prof. Yusuf (left) and Dr. Rath (right) delivering lectures at Ruia College

10. BRNS Popular Science Lecture at Wilson College, Chowpatty Seaface Road, Mumbai on 5th March, 2018

An IWSA popular science lecture titled "Adult neurogenesis and its relevance on basic and clinical Neurobiology" was delivered by Dr. Bhaskar Saha of St. Xavier's College at Wilson College, on 5th March at 11.00 a.m.

The central dogma of neurobiology that new neurons are not synthesized in adult vertebrates is no longer valid. New neurons are generated in adult mammals as well, which has created an interest among scientists to understand whether these neurons can be of any use in ameliorating neurodegenerative diseases. However, studies so far do not support this notion. Therefore, cell replacement therapy in neurodegenerative diseases has been in limelight for a while now. Stem cell based therapies for Parkinson disease are being developed to produce dopaminergic neurons from stem cells under in vitro conditions to be used for patients.

Dr. Saha spoke on how dopaminergic neurons can be developed from nasal epithelial stem cell and used for Parkinson's disease treatment. His lecture generated lot of interest in the audience and there was an active discussion.

Dr. Susan Eapen, member, Board of Trustees IWSA spoke on various activities in IWSA, especially the programs to ignite young minds. Dr. Neha Koshy, Wilson College coordinated the programme, which was attended by 140 students and teachers.



Dr. Bhaskar Saha delivering his lecture at Wilson College and the audience

11. BRNS Popular Science Lecture at K.J. Somaiya College of Science and Commerce, Vidyavihar, Mumbai on 6th March, 2018

An IWSA popular science lecture titled "Particle Accelerators- the rise of the machines" was delivered by Dr. Srinivas Krishnagopal at K.J. Somaiya College of Arts and Science on 6th March, 2018. After giving a brief history on the genesis of the particle accelerators from the simple cathode ray tubes, he spoke about the very small machines set up about 50 years ago. He elucidated the basics of particle accelerators, both electron and ion accelerators and their growth in currents and the size. He described the machines built

in India, the Synchrotron at RRCAT, the medical cyclotron at VECC, the LEHIPA at BARC and the electron accelerator 'KALI' and their various applications. He also gave a beautiful exposition on the world's largest accelerator, The Large Hadron Collider and the wonderful work on Higgs particles. Thereafter, he described the principle of the sub-critical reactor (ADS) making use of an accelerator and a spallation neutron source to initiate the reactor. In this lecture Dr. Krishnagopal also gave insights into the various career opportunities for researchers and students.

Dr. Lalitha Dhareshwar and Dr. Devaki Ramanathan represented IWSA at this lecture and briefed the audience about the activities of IWSA. About 100 students attended the lecture and the student-speaker interactions were excellent.



Dr. Krishnagopal delivering his lecture at K.J. Somaiya College

12. BRNS Popular Science Lectures at Guru Nanak Khalsa College, Matunga, Mumbai on 17th March, 2018

Two popular science lectures were organised at Guru Nanak Khalsa College of Arts, Science and Commerce, Matunga Mumbai on 17th March, 2018. Dr. Madhumita Goswami, Glass & Advanced Materials Division, Bhabha Atomic Research Centre, Mumbai spoke on "Introduction to Glass and Glass-Ceramics – a Special Category of Technological Materials" at 10:30 hrs and Dr. A.V.R. Reddy, Former Head, Analytical Chemistry Division, Bhabha Atomic Research Centre, Mumbai delivered a talk on "Radioanalytical Techniques" at 11:45 hrs.

Glass/glass-ceramics belong to a special category of technological materials and find applications almost in every aspect of our life. Glass has advantages over other materials in terms of their transparency, isotropic properties, intricate shaping and economic. Glasses which are known since ancient age, became an inevitable functional material with progress of advance research and technological development. On the other hand, glass-ceramics are polycrystalline materials prepared from base glass using controlled crystallisation to improve the mechanical, thermal, electrical properties and tailor made the product. In this talk, Dr. Madhumita Goswami introduced the subject of glass and glass-ceramics system with respect to their thermodynamic and structural aspect. In addition, basic criteria for glass formers, categories of glass systems and their synthesis processes were highlighted. Further conversion of glass to glass ceramics using controlled nucleation and growth process was presented. Tuning of the properties of the glass-ceramics by controlling the nature and concentration of crystalline phases in few exemplary glass ceramic systems were discussed. Few technically important glass/ glass ceramics along with few characterisation techniques were also presented in brief. The students

actively participated in the discussion after the lecture. They found this topic quite novel and technologically interesting.

Dr. Reddy started his lecture with interesting anecdotes about the discovery of radioactivity, Madam Curie's monumental chemical separations work, in an open shed in Paris, that led to the discovery of radium and polonium and can be considered as the beginning of radio analytical chemistry. Characterization of radiations by Rutherford and the concept of isotopes by Soddy earlier, and further developments that gave impetus to this subject were discussed. He described how Soddy and Rutherford developed chemical separations and radiation measurement techniques on terrestrial radioactive substances and later how the discovery of radioactivity and discovery of neutron, and construction of accelerators and reactors, were instrumental in the evolution of powerful radio analytical techniques.

Dr. Reddy gave a detailed account of radiochemical separations and applications of radioisotopes, activation methods, particularly neutron activation analysis and highlighted the significant contributions made in this area by Analytical Chemistry Division, Radiochemistry Division, Environmental Assessment Division and many Universities in collaboration with various Divisions in BARC, particularly with Radiochemistry Division.

During the talk, a few examples on the use of tracers and principles associated with a few techniques like isotope dilution, radioimmunoassay, NAA methods (with emphasis on the contribution of BARC), XRF and PIGE methods were presented. The students were immensely benefited from this talk as Dr. Reddy cleared many of their misconceptions about this subject and analytical techniques in general.

About 120 students attended the lectures and actively participated in the discussions with the speakers. Before the start of the talks, Dr. Meeta Rakesh Head, Department of Chemistry of G N Khalsa College welcomed the audience and gave a brief description about the subject matter of the lectures. Dr. Kiran Mangaonkar, Principal of the College addressed the students and emphasized the fact that the BRNS Lectures organised by IWSA are helpful to them to think beyond their bookish knowledge and expand their vision about scientific concepts and applications of scientific research to society at large. Dr. Shyamala Bharadwaj, Secretray, IWSA gave a brief account of activities undertaken by IWSA. Dr. Dhanya Suresh, one of the senior members of IWSA introduced the speakers to the audience.



Dr. A.V.R. Reddy (left) and Dr. Madhumita Goswami (right) delivering Lectures at G.N. Khalsa College

13. BRNS Popular Science Lectures at SIES Indian Institute of Environment Management, Nerul, Navi Mumbai on 7th April 2018

Two popular science lectures were conducted at SIES Indian Institute of Environment Management, Sector 5, Nerul East, Navi Mumbai on 7th April, 2018 at the auditorium of School of Packaging. Dr. Mahesh Zingde, an independent environmental consultant to industries spoke on 'Coastal Zone of India and its Management'.

The 7500 km long coastline of India is endowed with an extensive network of back waters, estuaries, creeks and bays several of which (as well as the open coast) sustain specialized ecosystems like mangroves habitats, coral reefs and seagrass meadows. The coast is also blessed with vast sandy beaches, rocky shores, extensive mudflats and chains of sand dunes. The coastal area has vital oil, gas and mineral deposits. In addition, the coastal zone has high potential for wind, tidal, wave and ocean thermal energy. Fishing in India is a major industry in its coastal states, employing over 14 million people. India is a major supplier of fish in the world with exports to nearly 100 countries. The coastal areas of the country are also conducive for brackish water aquaculture.

The Government of India has established an environmental, legal and institutional framework to meet the challenges of environmental and ecological degradation. Among the several acts promulgated to protect the environment and ecology, the Environment (Protection) Act 1986 is the pivotal legislation with respect to the protection of ecology in the coastal zone of India. Two important notifications issued under this act are the Coastal Regulation Zone (CRZ) Notification (1991, 2011) and the Environmental Impact Assessment Notification (2006). The former regulates developments in the coastal zone defined in the notification and specifies the permitted and prohibited activities in the CRZ, while, the latter makes prior environmental clearance mandatory for specified development activities in the Country. Dr. Zingde said that several mangrove areas are declared reserved or protected forests under the Forest (Conservation) Act (1980) and many bio-rich coastal and marine areas have been protected as national parks and wildlife sanctuaries under the Wild Life (Protection) Act of 1972.

Dr. Faby Sunny, a senior scientist from BARC, Mumbai spoke on 'Environmental modelling: A tool for environmental impact assessment'. Environmental impact assessment (EIA) can be defined as the systematic identification and evaluation of the potential impacts of proposed projects, plans, programs, or legislative actions relative to the physical, chemical, biological, cultural, and socio-economic components of the total environment. The prime purpose of the EIA process is to encourage the consideration of the environment in planning and decision-making to ultimately arrive at actions that are more compatible with the environment. Environment comprises of the biosphere, atmosphere, hydrosphere and geosphere. In order to better understand environmental systems, to predict their behaviour and to develop effective management strategies it is necessary to bring together ecological, socio-economic and technological aspects of environmental problems. Some most often used tools to secure such an interdisciplinary analysis of numerous factors are the modelling techniques. Environmental Models are important tools in environmental studies and management. Dr. Sunny also said that the models can be used to stimulate consensus-building among various experts and to facilitate more explicit and comprehensible communication of findings to decision-makers.

Dr. Surekha Zingde, President, IWSA spoke about the various activities of IWSA and Dr. Seema Mishra, HOD, SIES Indian Institute of Management delivered the welcome address. Dr. Zingde released the e-magazine of the institute. About 40 participants attended the programme.



**Dr. Mahesh Zingde and Dr. Faby Sunny delivering Lectures at SIES IEM.
Dr. Surekha Zingde releasing the e-magazine of SIES IEM.**

B. Science Academies' Lecture Workshop

Science Academies' Lecture Workshop on Lasers and their Applications held at IWSA Complex, Navi Mumbai on 20th and 21st January, 2018

A Two Day Science Academies' Lecture Workshop on Lasers and their Applications for Graduate and Post Graduate level students, Researchers and Teachers was held on 20th and 21st January 2018 by Indian Women Scientists' Association (IWSA) at their premises at Vashi, Navi Mumbai. The workshop was supported by the Science Education Panel of Indian Science Academy, Bangalore (IAS); Indian National Science Academy, New Delhi (INSA) and National Academy of Sciences, India (NASI), Allahabad.

The objective of this lecture workshop was to clear the fundamental aspects of lasers as well as introduce some of the advanced topics. Topics were chosen after going through the BSc and MSc syllabus of Mumbai University. The workshop was thus designed to enhance the knowledge as well as trigger the curiosity in the participants.

The two day Lecture Workshop covered the fundamentals of Lasers and their applications, topical subjects relevant to graduate and post graduate courses. Participants were introduced to some of the exciting frontier areas.

Announcement for the lecture workshop was sent to almost 50 colleges of Mumbai and Navi Mumbai by end of November. There were totally 120 participants from various colleges. They comprised of UG, PG, PhD and faculty from these colleges.

Experts from the field of Lasers from BARC, TIFR at Mumbai and RRCAT at Indore were invited to give the lectures. Each of the speakers was allotted 90 minutes for lecture and discussions as per the Academies' guidelines. In addition to the lectures, some demonstration experiments on Lasers and their applications were arranged.

The lecture workshop started with a brief inauguration, in which Dr. Surekha Zingde, President, IWSA informed the participants about the various Science Education as well as community welfare activities of IWSA. This was followed by Prof. Nagarajan, Convener of the Workshop describing the various programs of the Science Education Panel of the Academies. He presented the slides covering the fellowship programs, Refresher courses and Lecture workshops conducted and publications by the Academies. He particularly stressed Science Academies' Summer Research Fellowship Programme for Students and Teachers. This was followed by a brief overview of the Lecture workshop by Dr. Lalitha Dhreshwar, Coordinator of the workshop. Shri U.K. Chatterjee, former Head, Laser and Plasma Technology Division, BARC, Mumbai, who was the first person to demonstrate and put to use a semiconductor laser in India, reminisced about early days of Laser in India and expressed his appreciations for the workshop on Lasers being organized.

The Workshop then started with two lectures by Prof. Ravindra Kumar of TIFR, who is a very well known Indian researcher in the field of basic research in applying lasers (Fellow of the Academies and recipient of Infosys Prize). He covered the fundamentals and overview of Lasers. Further lectures covered different types of lasers, high resolution spectroscopy, and application of lasers in the field of Physics, Chemistry, Biology, Medicine, Industry and including exciting frontier areas such as, Laser Plasma simulating astrophysical conditions in the laboratory, fusion etc. It may be noted that amongst the lecturers, apart from Dr. Ravindra Kumar, Dr. Pushan Ayub and Dr. Indira K. Priyadarshini are Fellows of the Academies.

In addition to the lectures, there were four major demonstration experiments (Michelson interferometer, Faraday Rotation of polarized light, Polarization analysis, Double refraction). In addition, a simple Laser Microscope, a laser display set up to show Lissajous patterns was also set up. These experiments were set up by Prof. Nagarajan and his team from Univ. Mumbai-Dept. Atomic Energy Centre for Excellence in Basic Sciences (UM-DAE CEBS). The apparatus belonging to CEBS were transported and set up at IWSA. Prof. Nagarajan and his colleagues also set up some additional minor, but interesting, demonstrations and also arranged display of a CO₂ laser system. To make efficient use of time, lunch and tea breaks were used as working time and utilized for the demonstrations.

One of the highlights of the workshop was the Lecture cum demonstration on the topic- "Sculpting Light- Holographic applications of Lasers". In this lecture, Dr. Ajith Kumar gave a hands-on experience to the participants in recording holograms with a laser. This session and the experiment demonstrations were appreciated by one and all.

Every participant was given a booklet (about 45 pages) of about "**A Tribute to Laser pioneers**" containing brief biography and valuable contribution of 20 pioneers (starting with Einstein and ending with Nakamura who invented the blue / violet diode laser and recipient of Nobel Prize in 2014) in the field of laser science, produced by Raja Ramanna Centre for Advanced Technology (RRCAT), Indore. We are indeed grateful to Director, RRCAT for providing this booklet free of cost for distribution at this workshop.

Participants interacted actively with all the speakers during the lecture as well as during lunch and tea time. All of the speakers expressed appreciation of the workshop, for its content and for its organization.

We would like to place on record, that we thank the Science Academies for enabling us to organize this workshop and for their full support.

C. Science Day Celebration on 3rd February , 2018

Science day is celebrated every year in February, in honour of Sir C.V. Raman who was awarded the Nobel Prize, to mark his breakthrough discovery of Raman Effect in light. This year, Indian Women Scientists' Association celebrated Science Day by organizing a Science Exhibition on the theme "WONDERS OF LIGHT" for the school students on 3rd February, 2018 at the IWSA campus at Plot No 20, Sector 10A, Vashi. In this exhibition, school students (6th -10th STD) displayed about 30 projects on interesting applications and demonstrations of light.

The exhibition was inaugurated by the Chief Guest, Dr. B.A. Dasannacharya, Former Director, Physics Group, BARC. It was free and open to school children and teachers from 12 noon to 4 p.m. Projects were evaluated by three judges (Dr. Dasannacharya, Dr. Meena Sharma and Dr. Lalitha Mittal) and three trophies, first, second and third prize were awarded to schools for the best three projects. Individual prizes were also given to the students who were part of the winning team of the three projects, on the same day at 5 p.m.

D. Closing Session of Science Nurture Program for the Academic Year 2017-18 on 20th March, 2018

The closing ceremony of the Science Nurture program for the year 2017-18 was celebrated on 20th March 2018. As in the past, this academic year also, the Science, Maths and English (writing skills/ spoken English) classes were held for students of Std VII and VIII from Sainath English School. At the beginning of the year, the number of students enrolled were 11 in Std VII and 6 in Std VIII. However, at the end of the year there were 5 students of Std VII and 4 students of Std VIII.

Parents of the students and IWSA E.C members were present along with the Science Nurture teachers and one school teacher were present for the closing session. The Chief Guest at the function was Dr. Nutan Bhakal, member of IWSA, EC.

The program started with a welcome address by Dr. Lalitha Dareswar to Chief guest and other guests. She also gave a small brief on the activities of science Nurture Program this year and the various steps taken to make the classes effective, including the mid-day meal. Ms. Tripta Tewari introduced the chief guest. This was followed by a drama by the Science Nurture students. In this drama, the students enacted some of the anecdotes from the

lives of famous scientists, mathematicians, astronauts etc. The characters of Sir Isaac Newton, Madam Marie Curie, Srinivasan Ramanujan and his magic number, Sakuntala Devi as a human computer and Kalpana Chawla were enacted.

Dr. Devaki Ramanathan conducted a Science- Maths Quiz programme. Dr Nutan Bhatkal gave an inspirational speech to the students. The program concluded with a vote of thanks proposed by Ms. Tripta Tewari.

E. Visit of School Students to IWSA Campus to understand the Green Initiatives of IWSA

The students of VI and VII std, about 60 of them from Lokmanya Tilak School from Koparkhairne visited IWSA campus on 1st March, 2018 to see the green initiatives of IWSA. They were given a brief in the beginning and taken around the campus and shown the Biogas plant, Rain water harvesting, Solar electricity generation, Solar water heating system and IWSA garden with all the special plants. The children enjoyed the trip and a letter of appreciation from the Principal has been received by IWSA.

On 26th and 28th March, 2018, 120 students of Vishwajyot School, Kharghar visited IWSA in two batches of 60 students each, to see the green initiatives of IWSA.

Nursery School and Education Committee

The yearly teaching aid exhibition 'Rainbow' 2018 of the TOT trainees was held on 22nd and 23rd February 2018 at IWSA, Vashi. This is an opportunity for the trainees to showcase their creativity talent.

On both the days a moppet show 'Bachake Rahana Re' was put up by the trainee students. There was footfall of more than 1000 pre- primary students from schools in and around Vashi to watch the moppet show.

On 22nd Feb 2018 a workshop on "Building Emotional Wealth and Emotional Equity was conducted by Dr. Harish Shetty, an eminent psychiatrist. This was attended by over 50 middle school teachers, including NMMC teachers.

On 23rd Feb. 2018 a workshop "Bheja Fry" "Dimag ki Batti Kholo" was conducted by an IWSA teacher for pre-primary school teachers. This workshop was based on brain development and multiple intelligence. This was attended by about 75 teachers including about 30 teachers from NMMC Balwadis.

There were two corners – one on 'Learn while you Play' and 'Sharpen your Senses'. The tiny tots got hands on experience at both the corners.

The Nehru Science Centre's 'Mobile Science Van' was stationed at IWSA for both the days. More than 500 secondary school students from schools in Vashi got an opportunity

to understand various concepts in Science. Ten volunteers from Sacred Heart School, Vashi did an excellent job of explaining the exhibits to the students.

The preliminary exams of the TOT students were held between 26th and 30th March, 2018 in the Multi-Purpose Hall, IWSA Campus, Vashi,

The farewell party for the TOT students was on 6th April 2018 at 4.30 pm.

The SNDT University examinations were held between 16th and 20th April 2018 and IWSA was a centre for the same.

The last working day for the Nursery School was 7th April 2018.

The Nursery School will reopen for the next academic year on 18th June 2018.

IWSA's Murli Laj Chugani Health Care Centre

1. Visit to Kawthewadi, near Neral, Raigad Dist, Maharashtra for cancer detection camp and conducting a Science Nurture Program.

Kawthewadi is a small village of 50 homes and a population of about 250 residents. It is about 65 km from Kharghar, Navi Mumbai. This village has been adopted by SIES College of Arts, Science and Commerce, Sion, Mumbai under their Institutional Social Responsibility program. On **15th Jan 2018**, members of IWSA joined the college students and teachers to conduct a cancer detection camp at the village. A team from Tata Memorial Hospital, Preventive Oncology Dept conducted the screening for the hundred residents who attended the camp. In parallel members of IWSA met with the twenty five children in the primary school of the village. All the 25 children who belong to Stds. 1 to IV are taught together with a single teacher in this school. IWSA members showed the children some simple experiments which included, expansion and cooling of air using a balloon as an indicator, the magnetic field generated around a magnet, generation of electricity with a magnet, the working of a ceiling fan, looking at microbes under a microscope and looking through a Kaleidoscope. The children were explained in very simple terms the science behind each of these experiments. As the festival of Sankranti was celebrated a day before, the children were shown a video on how sesame is grown in the field and how jaggery is made. Story books, games, and drawing material were given to the school as a donation from the IWSA members. The children thoroughly enjoyed the experiments and videos and were enthralled with what they saw.

2. Free Medical Check up at IWSA Campus on 10th March , 2018

Free Medical check up was organized on 10th March 2018 IWSA Campus, Vashi. This was done in collaboration with Wockhardts Hospitals. The arrangement was facilitated by Ms Usha Nair.

Sixty seven people, female and male, attended the camp. The camp included, RBS, blood pressure, height, weight, consultations with physiotherapist, doctor, and dietician. Our dentist, Dr. Raichel Thomas conducted the oral check up.

IWSA's Satish Haware Computer Education Centre

IWSA Computer Centre enrolments for FY 2017-18

The centre has offered a variety of computer courses during the year

Course	Number of Students
Visual Basic	3
MSCIT	2
JAVA	9
Movie Maker/Scratch/MS Office	18
C++	1
Olympiad	11
TOT	20
Bio Informatics Workshop	15

It is a proud moment for IWSA, as this year, in Cyber Olympiads, gold, and silver medals have been won by the students.

IWSA's Hostel and Day Care Committee

Hostel Day Celebrations

Hostel Day was celebrated on 6th January 2018, where the hostelites presented a lovely entertainment program. Prizes were given for the clean and well kept room in different categories, winners of the Badminton Tournament and to all program participants.

Republic Day Celebration by Hostelites and Day Care Children

Republic Day was celebrated by the Hostelites and IWSA Nursery Children with great pomp and show on 26th January, 2018. After the flag hoisting, hostel girls took a pledge to contribute to the development of India. They presented a few patriotic songs and a talk on the topic "Significance of Republic Day". The nursery children danced to tune of the song 'Nanha Munha Rahee Hoon.' which was very much appreciated by all.

IWSA's Scholarship Committee

Scholarship Awards function; one of the Annual events of the Indian Women Scientists' Association (IWSA) took place on 13th January, 2018 at IWSA's "ICICI" Multipurpose Hall,

Sector 10A, Vashi, Navi Mumbai 400703 at 2.30 p.m. Dr. Shubhada Chiplunkar, Director, ACTREC, Kharghar was invited to be the Chief Guest. All the awardees were informed and invited to attend with their parents. The function started with a short talk by the President, IWSA, Dr. Surekha Zingde on the IWSA's objectives and varied activities. Dr. Devaki Ramanathan, Convener, Scholarship Sub-Committee briefed the audience about the scholarships: the objectives, the donors, the different categories and a short description of each achiever in whose name the scholarship was framed. There were 10 categories of scholarships: from H.Sc to B.Sc, M.Sc and upto Ph.D and a few special awards for excellence. All the awardees were girl students and most awards were decided on merit-cum-means basis. There were 3 scholarships for Ph.D students (under different names), 2 for M.Sc, 8 for B.Sc, 2 special awards and 3 for our Nursery Teacher's Training students. Dr. Nootan Bhakal introduced the Chief Guest and read out the names of the awardees who received a certificate and a cheque/cash prize from Dr. Chiplunkar. One of the scholarship awards – Dr. Suresh Mahajan Memorial scholarship for Ph.D. in life sciences got a trophy besides the certificate and cheque. Dr. Vibhav Sanzgiri, Vice President from Hindustan Lever and one of the early students of Dr. Mahajan, had instituted this award. He was present for the function with his wife.

Dr. Shubhada Chiplunkar addressed the audience and congratulated all the scholarship recipients. She impressed upon them to be alert, curious and focused and show passion and dedication in their education and career building. She cited the example of the Noble Laureate and Physicist, Prof. Richard Feynman, his lifestyle and his book on "The pleasures of finding things out" which illustrates his extraordinary curiosity in everything around him from computers, to pseudoscience and even religion.

Dr. V. Sudha Rao, Trustee, IWSA delivered the vote of thanks, to the Chief Guest, the special guests, to all the donors both individuals and trusts who have contributed generously for this programme of IWSA.

BOARD OF TRUSTEES

Dr.Niyati Bhattacharyya	Chairperson
Dr.Bakhtaver S. Mahajan	Secretary
Dr. V. Sudha Rao	Treasurer
Dr.Sunita Mahajan	Member
Dr. Susan Eapen	Member

Reports from Branches

Amravati Branch

1. Plantation and Seed Ball Throwing

“Seed balls” provide a larger window of time when the sowing occurs and they also are convenient for dispersal on hill tops and road side spaces. Therefore, this monsoon the students of Eco-Club and IWSA members of Bharatiya Mahavidyalaya, Amravati prepared seed balls and saplings of many plants like Neem (*Azadirachta indica*), Tamarind (*Tamarindus indica*), Karanj (*Millettia pinnata*), Jamun (*Syzygium cumini*), etc. Over 500 seed balls were thrown on a hill top near Chatri lake and the road side of the Lake on **19th August, 2017**. All members and students had fun in throwing them on the hill and the road side spaces. The site was chosen in order to improve habitat for the avian visitors to the lake. At this time 25 saplings were also planted in this area.

2. “Hepatitis B” Awareness Programme

Increasing cases of liver disorder is really a matter of great concern. *Hepatitis B infection could be one of the causes*. It is a viral infection that attacks the liver and can cause both acute and chronic disease. For creating awareness about this infection, a programme was arranged by IWSA, Amravati branch in association with Bharatiya Mahavidyalaya, NSS unit on **8th February, 2018** in the Conference Hall, Bharatiya Mahavidyalaya, Amravati.. On this occasion, Dr. Amit Kavimandan, a renowned Gastroenterologist, Hepatologist and Digestive Endoscopist in Amravati guided the students and staff about causes, symptoms and prevention of Hepatitis B. He stated that many people have no symptoms during the initial infection while some develop a rapid onset of sickness with vomiting, yellowish skin, tiredness, dark urine and abdominal pain. Proper care and vaccination at right age could help to protect them from the disease. Pharmaceutical company “Cipla” provided a free blood check up and concession rate Hepatitis B vaccination coupon to 160 students on this occasion.

3. Science Day Celebration

National Science Day was celebrated by IWSA, Amravati Branch by arranging a guest lecture on “Modern Techniques in Biology”, for the students of B.Sc. on **28th February, 2018** in the Conference Hall, Bharatiya Mahavidyalaya, Amravati. Dr. Pratibha Rohankar, Associate Professor in Zoology, G.V.I.S.H., Amravati delivered the lecture. She is a member of IWSA, Amravati Branch. She described the techniques like RIA, PCR, Southern, Western and Northern blotting techniques, DNA finger printing, etc. and their applications in her lecture. B.Sc. Students from Bharatiya Mahavidyalaya, Vidyabharati and Brijlal Byani Science College were benefitted by this lecture.

4. Paper Bag Making Workshop

International Women’s Day 2018 was celebrated on **8th March, 2018** by the members of IWSA, Amravati branch and Bharatiya Mahavidyalaya, by giving a demonstration cum

training for the preparation of waste paper and hand made paper bags.. The workshop was arranged at a small slum (Bajrang Tekadi) at Rajapeth area of Amravati. Before the training Dr. Deeplaxmi Kulkarni, Convener IWSA, Amravati branch addressed the gathering about adverse effects of plastic on health and environment. She urged women of Bajrang Tekadi to look at the Maharashtra Government's ban on use of plastic carry bags as an opportunity for more wages and clean environment by preparing the paper and cloth bags.

On this occasion Ms. Kamal Jadhao, Senior Police Officer gave information about girl protection acts. She emphasized importance of self defence to the girls. Over 80 women and girls of Bajrang Tekadi and Bharatiya Mahavidyalaya, Amravati were present for the workshop.

Baroda Branch

1. National Workshop on “Current Facets of Botany”

National Workshop on “Current Facets of Botany” was organised by Indian Women Scientists' Association (Baroda Branch) in association with Department of Botany, Faculty of Science, The Maharaja Sayajirao University of Baroda, Indian Science Congress Association (Baroda Chapter), Indian Society of Geomatics (Vadodara Chapter) and IEEE Geoscience and Remote Sensing Society (Gujarat Chapter) in the Prof. U.N. Singh Seminar Hall of Department of Mathematics, Faculty of Science, The Maharaja Sayajirao University of Baroda during **24th- 30th July, 2017**. The workshop focused on following two themes.

- 1) Concept of Remote Sensing and GIS with special emphasis on Biodiversity and Resource Assessment
- 2) Hands-on training on HPLC and GC.

Both these themes were designed considering their role in understanding the Plant resources and their processes to the Scientists, Engineers, Research students and other Government Officials. Renowned experts in different areas of remote sensing as well as HPLC-GC were invited to deliver lectures and share their expertise with the participants. The workshop received an overwhelming response from researchers, professionals, academia, students and geospatial industry from across the country. In total, nine participants were enrolled for theme 1 and 10 were registered for theme 2. The workshop started with Invocation and Prof Ajai, (Emeritus Scientist, SAC, ISRO, Ahmedabad) and Dr. Satyanshu Kumar (Principal Scientist, ICAR, Anand) were the Chief Guests for theme 1 and theme 2 respectively. During this workshop after theory class, the participants were given hands on training through the practical sessions.

2. National seminar on “Impact of climate change on Biodiversity-III”

Indian Women Scientists’ Association (Baroda Branch) coordinated **National Seminar on Impact of Climate Change on Biodiversity-III** in association with Department of Botany and Department of Zoology, Faculty of Science, The Maharaja Sayajirao University of Baroda, Indian Science Congress Association (Baroda Chapter), Indian Society of Geomatics (Vadodara Chapter) and IEEE Geoscience and Remote Sensing Society (Gujarat Chapter) on **29th November, 2017** in the C.C. Mehta Auditorium, The Maharaja Sayajirao University of Baroda, Vadodara.

The theme of the seminar was “An Approach to Reach the Unreached through Science and Technology”. Chief Guest of the seminar was Dr. Ashok Saxena (Ex. President, Ex. General Secretary, Executive Committee Member of ISCA) and Guests of Honour were Dr. Vijay Laxmi Saxena (Ex. General Secretary, Chairperson, ISCA-Kanpur), Shri. A. K. Srivastav, IFS (Chairman, Gujarat Biodiversity Board) and Dr. Yogini C. Pathak (Ex General Secretary, Council Member of ISCA). The inaugural function was presided over by Patron of the Seminar and Vice-chancellor of the Maharaja Sayajirao University of Baroda, Prof. Parimal Vyas. Prof. H.R. Kataria (Head, Department of Mathematics and Vice-Dean, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara) welcomed all the dignitaries, distinguished guests and participants of the seminar. Introduction to the theme of the seminar was given by Prof. G. Sandhya Kiran, (Head, Department of Botany, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara, Chairperson, ISG, IWSA and ISCA (Vadodara Chapters)). All the dignitaries on the dais explained how and why biodiversity is important for human beings and why it is mandatory to know the impact of climate change on the biodiversity. The seminar received a huge response from all over the country and was attended by more than 240 participants. More than 70 different papers pertaining to 7 themes of the seminar were presented in Oral sessions and Poster sessions. The souvenir cum abstract volume of the seminar was released by the dignitaries on the dais. Prof. P.C. Mankodi (Head, Department of Zoology, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara) gave the vote of thanks to invited guests, speakers, organizers and all the participants.

Kalpakkam Branch

1. STHREE Awards Event

STHREE Award Event by IWSA (K) was organized on **7th February, 2018** to motivate the topper girl students from the science stream from the neighbouring village schools. This year six girl students received the awards and citation for the academic year 2015-16 and 2016-17. The awards were presented to the students by Smt. Indirani Bhadhuri.

Director IGCAR, Dr. A.K. Bhadhuri, Dr. B. Venkatraman, Director HSEG and Smt. Jayanthi, Convener STHREE addressed the gathering and inspired the students to continue to perform well in their higher studies. There were 100 participants in this event.

2. Technical Talk #1

The first technical talk was given by Ms. Jayanthi Erusappan, Senior Research Fellow from Chemical Group, IGCAR on 15th **February, 2018**. She spoke on the topic Sensing Behaviour of Room Temperature Amperometric H₂ Sensor with Pd Electrodeposited from Ionic Liquid Electrolyte as Sensing Electrode. It was attended by 20 research scholars, women scientists and engineers. It is planned to have many such technical talks to share, motivate and interact with young minds.

3. Science Day Event

In order to celebrate International Science Day, IWSA (K) organized an elocution event for all the schools of Kalpakkam and Anupuram, namely AECS1-3 and KV1 & 2 on **24th February, 2018**. Topic of the elocution was, life and work of women scientists Irene Joliot Curie, Youyou Tu, Maria Goeppert Mayer, Ada E Yonath and Carol W Greider. The students participated enthusiastically and enjoyed. Top three students were selected and felicitated. The prizes were books and citation. Sadras Students: Champions of Invention, First Prize: The Origin of Species – Charles Darwin, Second Prize: Albert Einstein – Relativity, Third Prize: Autobiography of Benjamin Franklin/ Hellen Keller. In addition IWSA (K) felicitated Sadras Government Higher Secondary School Children for representing their school in National level for the project titled “Modern Technology in Fishing”. These students demonstrated their project at the National level at the 25th National Children Science Congress at Gujarat Science City, Ahmadabad.

4. International Women’s Day

International Women’s Day, was celebrated by IWSA(K) on **24th March 2018** by organising a half day seminar. There were two invited speakers for the seminar; Smt. Uma Seshadri, the First Woman Chemical Engineer, IGCAR, Kalpakkam and Ms. N. S. Tanvi, Lawyer, High Court, Chennai. Dr. S Kalavathi, Convener, IWSA(K) welcomed the gathering. The program was inaugurated by Smt. T Jayanthi, Associate Director, EIG, IGCAR and she presented an inspiring talk.

Dr. Kallol Roy, CMD, BHAVINI as a special invitee sketched the history of women’s day and brought out the struggles by women on which our freedom rests today. Smt. Uma Seshadri (Retired) IGCAR, who is the first women chemical engineer from IGCAR spoke on her experiences during her tenure in IGCAR. She motivated young women by saying never to give up in life and take all responsibilities with pride. She brought out the importance of taking charge of one’s life and not letting go of any opportunities that present themselves by citing incidences from her career at IGCAR. Ms. N.S. Tanvi spoke on the subject “Cyber Crimes against women and Legal Provisions”. She made an interesting presentation with many examples for cyber crimes. Her talk brought to light how in the present times the already available legal provisions are used for handling crimes and how some of the cyber crimes are complex and crossing international borders and stressed the need for newer laws to tackle them.

Nagpur Branch

1. Annual General Body Meeting followed by Workshop on - Coconut and Personal Care Products

AGBM of Nagpur Branch was held on **29th July, 2017** where the Annual Report and Audit Statement of 2016-17 were presented. This was followed by one day workshop on 'Coconut and Personal Care Products' organised by Department of Cosmetic Technology, Nikalas Mahila Mahavidyalaya in association with IWSA. Third year students of this Department formulated different cosmetic products using different forms of coconut as active ingredient. The workshop unfolded multiple properties of coconut oil/ water/ milk, addressing issues of skin and hair. IWSA members enjoyed the interactive presentation and a demonstration of formulating cosmetic products and hands on beauty tips.. Small gift pouches containing coconut oil cosmetic were also gifted to the 45 members present.

2. Science and Art of Cooking

As a part of Food Day celebration, IWSA and Apang Mahila Bal Vikas Sanstha organised a program on 'Science and Art of Cooking' on **28th October, 2017** at Vidarbha Sanshodhan Mandal Premises, Civil Lines, Nagpur. Dr. Shakti Sharma, Lecturer, Department of Dietetics, Sadabai Rasoni Womens College was the main speaker of the day. She informed how cooking can be even more fun by learning how chemistry, physics, anatomy and even biology work to create the prepared food we eat. For example, heating changes the texture, colour and flavour of food depending on how you do it. The most interesting part of her talk was the molecular gastronomy, the physical and chemical transformation of ingredients that occur in cooking. Second speaker for the day was Dr. Rita Israni, Scientist, Agmark. She deliberated on food safety - farm to fork. This was followed by an interesting quiz on food conducted by quiz master Dr. Mrs. Chakrabarty, Senior IWSA Member. Exciting prizes were given to the quiz winners. Book named 'Multigrain A Road to Wellness' written by Dr. Pratima Shastry, Former Head, Department of Food Technology, LIT, Nagpur was released at the hands of Dr. Anuradha Gadkari, Founder Member, IWSA.

3. Power Point Presentations on Smart City Mission by School Children

IWSA in association with Somalwar High School, Nikalas Branch organised a competition on power point presentation on 'Smart City Mission - My Suggestion and Action Plan' for middle school and high school children on **30th November, 2017** at Multimedia Hall, Somalwar High School, Nikalas Branch. Twenty CBSE and State Board Schools participated in the competition. Students made thoughtful presentations on the above topic with reference to Nagpur city on sub-themes like Clean City, Safe City, Solar City, Smart City, Digital City etc. The power point presentations were judged by two eminent personalities. Dr. Hemant Pandey, Rtd. Head, Department of Chemistry, Hislop College, Nagpur and National Coordinator Vidnyan Bharati and Arch. Surashmi Kaalmegh, Associate Professor, LAD & SRP College of Women, Nagpur. It was a tough task for the judges to adjudge the winners. Gifts in the form of books on eminent personalities were given to the winners and participation certificates were given to all. On this occasion

Dr. Surekha Kalkar, Associate Professor, Head of Dept of Botany, Institute of Science, Nagpur and our life member was felicitated at the hands of Dr. Anuradha Gadkari for her success at the Academic Council election of Rashtrasant Tukadoji Maharaj Nagpur University. There were 70 participants at this event.

4. Science Quiz on Science Day Celebrations

Science day theme for the year 2018 was "Science and Technology for a Sustainable Future". Related to this theme a science quiz crossword and a science antakshari was organised for the 29 IWSA members present to challenge their scientific temperament on 3rd March, 2018 at Abhyankar Smarak Trust, Dhantoli, Nagpur. The winners were given cotton shopping bags with a message "Save Our Earth" block printed on it.

5. Women Entrepreneurship - Scientific and Social Concern

Women's Day and Annual Get-together of IWSA Members with their families and friends was organised at Kalakunj, Ramnagar, Nagpur on **7th April, 2018**. Theme for the same was 'Women Entrepreneurship-Scientific and Social Concern'. This event was to encourage women to take up small scale projects / income generating activity based on scientific principles helping to make life easy. The magical mega event was inaugurated at the hands of Mrs. Nanda Jichkar, Mayor, Nagpur. The notable stalls were cotton bags, biofertilizers and biopesticides, herbal cosmetics, bamboo decorators, artificial flowers, surgical steel cookware, multigrain utility food products, homemade culinary items from South India, eateries and games. Mrs. Nanda Jichkar interacted and encouraged the 100 members and participants who were present. The untiring efforts by the entire working IWSA team made this event a resounding success.

Pune Branch

1. Science Popularization Lectures

Two lectures were conducted at the Modern College, Ganeshkhind on **5th March 2018** under Science Popularization Program by IWSA, Pune branch in association with Prof. H. J. Arnika Trust. The first lecture was on "Impact of emission mitigation on ozone induced wheat and rice damage in India" by Dr. Dilip M. Chate, Scientist & Deputy Project Director (SAFAR-India), Indian Institute of Tropical Meteorology, Pune.

Dr. Chate discussed the ozone-induced damage to wheat and rice and its socio-economic impact on global economy with respect to export of Indian rice to Asian and African nations. He also cited the results of economical benefits of implementation of emission control of Ozone-precursors, which provides firsthand information to policy makers to propose more security on national food production.

The second lecture was on "Sensors for Smart Cities" by Dr. Parag V. Adhyapak, Centre for Materials for Electronics Technology (C-MET), Pune. Sensors play a crucial role in the foundation of a smart city. Different sensors like energy sensors, flow sensors, humidity sensors, gas sensors, weather prediction sensors, light sensors, temperature sensors etc will be an integral part of the smart city. For the development of these sensors,

the use of nanomaterials is inevitable, in view of expected miniaturization, fast response, high sensitivity, long durability, cost effectiveness etc. Semiconductor metal oxide gas sensors have been explored by many researchers all over the world and tremendous amount of research work is being already done on this subject. Along with semiconductor metal oxide nanomaterials, Dr. Adhyapak discussed about variety of other materials such as ceramics, carbon nanotubes, organic/conducting polymers and polymer/inorganic hybrid systems that have been extensively investigated and used as a sensing material. He gave an overview of the development of various sensors at CMET.

2. International Women's Day – Seminar on “Frontiers in Science and Technology”

Indian Women Scientists' Association, (IWSA) Pune branch in association with Chemistry Department, Savitriai Phule Pune University (SPPU) organized a one day seminar: “Frontiers in Science and Technology” on the occasion of “International Women's Day” on **8th March 2018** in Acharya P.C. Ray Hall of Department of Chemistry, SPPU, Pune. Prof. Gejji, Head, Department of Chemistry, SPPU, Pune, Prof. (Ms) S.A. Gangal, Convener, IWSA, Pune Branch and Prof. (Mrs) Nilima Rajurkar, Co-Convener, IWSA, Pune Branch, were on the dais. Prof. Gejji welcomed all the participants and spoke about the importance of Women's Day. Prof. Rajurkar informed the participants about IWSA and its activities and Prof. Gangal told about the theme of the Seminar and the lecture Program to be held during the day. IWSA, Pune Branch felicitated the women scientists Dr. (Mrs) Mohini Gupte (Modern College, Ganeshkhind), Dr. (Mrs) Vaishali Patil (VIIT College, Kondhava) and Prof. (Mrs)Anjali Athawale (Chemistry Department, SPPU) for their achievements during the year 2017-2018. Dr. Geeta Sharma and Dr. Neeta Zatakia compered the program. Prof. Rajurkar proposed vote of thanks.

The following seven lectures were organised during the Seminar:

1. Epidemiology : A translation tool between the laboratory and populations

Epidemiology is the science of measuring the distribution of disease, the determinants of disease and using this data to prevent disease, protect populations and anticipate and provide care. Prof. Anita Kar, Director, School of Health Sciences, SPPU, Pune talked about her research area, birth defects and developmental disabilities, to illustrate the trajectory of how scientific questions follow a reversible trajectory from the laboratory to the community and back. She explained the consequences of what happens when a baby is born disabled, or in need of life-long medical care. She then discussed about the magnitude of the problem and how to mobilize public health interventions for care. She used the Pune Urban Birth Outcome study to describe the data on magnitude of the problem in India. She specifically mentioned the impact of these conditions on women, who, as mothers are the primary care givers of disabled and sick children.

2. Dare to Dream Author

Prof. Vinaya Ket, Assistant Professor, Department of Environmental Science, SPPU, Pune, is a passionate EHS professional with around 5.5 years of industrial experience as a consultant, which was a woman led consultancy and 6 years teaching experience. She talked about a feat which does not correspond to her profession and can be described as

an adventure activity. Having travelled from North to South India solo by car in 98 hr 56 min, this feat has been recorded in Limca Book of Records and India Book of Records as the First Female in India for this achievement. The motive or theme for this expedition was to Lead by Example for women empowerment. Being an environment professional, she decided to convey the message of environment protection throughout the country. Doing such an expedition solo required will power, positive attitude and dream to win amidst difficulties. In India Book of Records, the record is as First Female to travel from Khardungla (highest motorable road @ 18380 ft) to Kanyakumari by four wheeler. Handling career and achieving accolades in it, the achievement is something different to inspire women to do something different, to dream beyond boundaries and set an example for whole women fraternity that nothing is impossible. Her presentation discussed about preparation for the expedition, pre-expedition challenges, challenges faced during the journey, and the experience during the journey. She also gave details of the requirements of Limca Book of records / India Book of records and evidences collected during the journey. The presentation covered pre expedition, during and post expedition experiences which can be inspirational for anyone who wants to achieve their dreams.

3. Functional Nanomaterials for Theranostics and Drug Delivery

Using nanoforms of inorganic metal oxides (and their complexes with polymeric and biomolecular systems) with fine conjugation strategies, one can explore extremely interesting and promising applications in the area of healthcare: especially for development of smart biosensors, imaging contrast agents, magnetic hyperthermia treatments, wound-healing patches, drug delivery agents, antimicrobial agents and in wide-range of pharmaceutical formulations. This can be achieved via careful material study to engineer them for establishment of their efficacy in such multiple applications.

In her presentation, Prof. Sangeeta Kale, Professor in Physics, Defence Institute of Advanced Technology, Pune, elaborated some of the works related to cancer hyperthermia, in which novel magnetic nanoparticles have been harnessed as efficient cancer-hyperthermia-cum-drug-delivery agents. In another effort, mesoporous nanoparticles have been used for sustained drug delivery to cater wound-healing applications. These are either inorganic materials or even sacrificial bio-polymers which work to enhance the medicinal value of the patch, enhancing the drug efficacy. In yet another study, similar polymers have been used for improving the drug-retention properties for ocular drug delivery. The fine conjugation chemistry involved, the drug loading strategies, stimuli-based-release mechanism, and the size-property relationships were discussed in detail.

4. Role of Women in Indian Defence Forces

The role of Indian Women in the Army began during British Raj in 1888 by introducing Indian Military Nursing Service. They even took active part in World War I & II. Capt Lakshmi Swaminathan/ Sehgal led Rani of Jhansi Regiment of INA in 1943. In 1992, the Indian Army began including women officers in non-medical roles. Today women are working & giving their contributions in all branches of Defence Forces viz. Army, Navy, Air force and even Para- Military forces. In recent years, India has been taking steps to crush

gender barriers in its armed forces by enabling women to serve on board submarines, in ground combat positions and tank units. Ms Nirmala Sitharaman took over the Defence Ministry on 3rd Sept 2017. Very recently, FI Lt Avani Chaturvedi became the first Indian Woman Pilot to fly Fighter Jet MIG-21 Bison. Navika Sagar Parikrama expedition of 6 Naval Women Officers led by Lt Cdr Vartika Joshi are presently cruising through Pacific for their eight months expedition. Women with Engineering & Science background are recruited in Officer's cadre in Engineer Regiment, Signals, Electrical & Mechanical Engineering, Artillery and Armoured Corps. The day is not far, when women engineers would be inducted in the Infantry- which is considered as "Queen on the Battle". In his presentation, Dr. Chandrashekhkar Chitale, Chair Professor, Shantanurao Kirloskar Chair, SPPU, Pune, gave an overview of Incredibly Brave Women in Indian Armed Forces who broke the Glass Ceiling and the accomplishments of women as ISRO Scientists- the "Rocket Women of India".

5. Health Problems Faced by Women

In this lecture, Dr. Vijaya Rabade, Gynaecologist, Pune, discussed about the health problems of underprivileged and privileged women. Underprivileged women have higher chance of preterm delivery, anaemia, complications of pregnancy and maternal death. The babies born to these women have higher chance of anaemia, stunted growth, lower birth weight, infections, neonatal and infant deaths. Privileged women have higher chances of breast cancer, diabetes etc. and obesity is significant in these women. Importance of diet, exercise, pre-conceptional counselling, HPV vaccine etc were discussed in detail in this lecture.

6. Vedic Mathematics: Tricks, Tactics and Applications

Vedic Mathematics was introduced by His Holiness Jagadguru Shri Bharati Krishna Tirthaji Maharaj and is enriched with many marvellous and simple Sutras in Mathematics. These methods are put in the form of sixteen Sutras and corresponding sub Sutras. In his presentation, Prof Jayant Vinayak Khedkar, Former HOD, Electronic Science Department, Fergusson College, Pune introduced and illustrated some of the Sutras to the audience. These methods find applications in control systems, analysis of planetary motion, prediction of lunar and solar eclipses etc.

Vedic Mathematics - when seen in context of actual Vedas, Vaidic Ruchas and related Sanskrit literature - can reveal many interesting points which can serve the purpose of a new topic for researchers in Mathematics. Katapayadi sutra can be found to be used in deriving physical constants directly from the Vedic Ruchas. Some books -Asya Vamiy Sukta, Vedatil Vidnyan Deergh Tamas and Sum for example - give information about such attempts made by the researchers. However, while interpreting Vedic Ruchasa care must be taken to look at the contest in which the Ruchas are analysed.

7. Historical and Life style approaches to Biodiversity Conservation

Dr. Ankur Patwardhan, Head, Annasaheb Kulkarni Department of Biodiversity, MES Abasaheb Garware College, Pune, covered several aspects related to biodiversity distribution to protection by linking history with biodiversity. Different forms of nature

worship are found in many tropical countries like Africa, Ghana, Ethiopia. In India a large number of indigenous communities practice various forms of nature worship. One such significant tradition of nature worship is that of providing protection to patches of forests, streams dedicated to local deities and ancestral spirits. He discussed about the socio-cultural aspects and belief systems of local communities that are related to habitat protection in general to species protection in specific. He also described how the historical understandings of conservation are linked with current contexts of modern science.

Roorkee Branch

1. Prof. Vijaya memorial Maths Olympiad, VAMMO-2018

IWSA Roorkee Branch conducted the Prof. Vijaya Agarwala Memorial Mathematics Olympiad, VAMMO-2018 for the second time on **28th January 2018** successfully in the memory of founder member Prof (Dr) Vijaya Agarwala of Roorkee branch. The competition was organized for the children of classes 6th, 7th, 8th and 9th class to enhance the scientific temper in the society. Total 1100 students participated from 13 schools in the event. This year the number of participants increased from 650 (2016-17) to 1100 (2017-18) and the competition included 9th class in addition to previous years' 6th, 7th and 8th classes. A large number of volunteers from different organizations such as CSIR-CBRI, IIT-Roorkee, school teachers etc. extended their help for conducting the event. The competition was held in one of the best Schools of Roorkee, i.e., the Green Way School. The IWSA members worked with enthusiasm to make the event successful.

2. VAMMO-2018 Prize Distribution

Prize distribution function of the event VAMMO-2018 Mathematics Olympiad, was organized on **24th February 2018** in the auditorium of the Department of Biotechnology in IIT Roorkee. Cash prizes are given to the children - 1st prize Rs 3000/-, 2nd prize Rs.2000/- and 3rd prize Rs 1000/ with Mementos and certificates. Two consolation prizes of Rs 500/ each with certificates for all four classes were also given. It has been decided by the committee that Prizes will be given in each class to all students in different categories.

Dr. Tripti Chopra Principal Mountford School from Dehradun was the Chief guest of the Award function. Prof R.C. Agarwala (Retd.) from IIT Roorkee was the Guest of Honour for the function. Prof. Indu Mehrotra, President IWSA Roorkee welcomed the guests and Dr. Neeta Mittal, Secretary presented the IWSA objectives to the gathering. Dr. Rama Mehta, Scientist, NIH (Retd), the event co-ordinator explained about the competition and Dr Maya Nair, Prof. IITR co-ordinated the prize distribution and stage arrangement. Mrs Kiran Handa introduced the Chief Guest. In the end, Dr. Rashmi Gaur, Prof. IITR gave the vote of thanks. The event was very successful and very much appreciated. It is also decided to explore the future expansion of the Maths Olympiad to other nearby places and for sponsors of the event.

ARTICLES

IWSA Partners with CUBE for Good Understanding of Biology

Bhaktaver S Mahajan

Secretary, Board of Trustees, Indian Women Scientists' Association

Vashi, Navi Mumbai

Email: bs_mahajan@yahoo.com

In early 2017, IWSA started its exciting journey with CUBE--Collaborative Undergraduate Biology Education. This is a program under the Knowledge Lab of Homi Bhabha Centre for Science Education, TIFR, steered by Professors G. N. Nagarjun of HBCSE and M C Arunan, previously with Sophia College, Mumbai. The program was initiated essentially to link up thousands of biology teachers in our schools and colleges and involve them with activities, experiments, field work, meetings, presentations, online discussions, etc, to inculcate science as a culture, an ongoing close to life practice.

As one enters the modest CUBE lab at HBCSE, you are greeted with the slogan, "Weak, Meek and Geek, all are welcome". And you see hundreds of plugged conical flasks, plastic bottles, a student cleaning a biggish fish tank with the fish eyeing him suspiciously, etc. Four school students of class VII casually walk in and busy themselves with some observations in the flasks; and the atmosphere gets charged with excitement as more stream in discussing a scientific problem in an animated manner...

The above exciting experience prompted IWSA, especially its teachers of science nurture program, to chip in with their inputs and interpretations, with the hope that this approach of observation, data collection, experimentation, analysis and seeking answers, are communicated to working teachers and students of Navi Mumbai. Let me take an example of how CUBE operates. First, we are guided to take pictures with our mobiles of mango trees our vicinity and observe flowering, fruiting on a monthly basis. The response of IWSA members was good, with pictures of flowering mango trees from Mumbai, Pune, Navi Mumbai, Tamil Nadu, Sholapur, etc. The next posting was of observation of snails, worms, etc, and the plants frequented/eaten by these creatures. Discussions, analysis, et al follow on the net, and misconcepts, such as, "plants adapt to the environment", or "this plant is a major medicinal species" (loose statement) are corrected. As clarified by Nagarjuna in one of his postings, "Winter flowering of some trees of mango is common. But working with a lot of data, and following the same tree for a few years will give us better clues as to what is happening. What makes them flower, or how to induce flowering, I don't think is known. CUBE citizen science can solve it. Or at least, lead the study with the rest of the biologists joining us". Well said, Nagarjuna. Scientific answers do not come easily and the so-called simple observations of the life around us is complex and to get answers one needs to follow the scientific method.

In another instance of current study, butterflies are known to hover over certain plants and take the nectar of these plants only. Do we have an answer to this observation? In another question, students are urged to microscopically examine small stagnant puddles of water, as on the covers of our sewers. The variety of organisms therein is mindboggling and a few creatures are also examined to be used as model systems, for further research. This puddle project is termed as Pagalapos (from Darwin's Galapagos) in the CUBE set up.

The life on our Earth is beautiful and full of curiosities. CUBE provides a dynamic platform to pose questions and seek answers from students, teachers and professional biologists by "...adopting the technique of 3RRRs-- Record, report and research", as said by Arunan. This way, teachers from all over the country, in fact, from across the world, are woven together in a participatory manner, forming numerous CUBE hubs. Meetings are held at different venues twice a year, which helps in further streamlining the project. "Make, share, seek feedback and collaborate is the core design principle of CUBE."

This exposure reminds me of active participation of citizens in solving different scientific and social problems in the West, even in the 19th century. The instance of tracing the migration patterns of a butterfly, Monarch, with the help of citizens from Canada, USA, and several countries of South America is a well documented successful experiment, with the scientists from the University of Kansas at the helm of the project. CUBE is designed in the same spirit and one hopes that many more such citizen participatory and collaborative programs come up in the country to solve our many problems, both scientific and social in nature.



Dr. B.S. Mahajan was President of IWSA (2007-2009). She recently retired from Homi Bhabha Centre for Science Education (HBCSE), Tata Institute of Fundamental Research, Mumbai. With a PhD in Biochemical Genetics from BARC (Bombay University), for the first ten years of her scientific career, she worked as an Assistant Editor with Science Today, a Times of India publication. In 1990, she joined HBCSE and worked in the areas of biology, health and environment education. Besides research publications, booklets and posters in these areas, she has authored three (two with co-authors) books: Microbes and Disease (Oxford University Press--OUP), New Biology and Genetic Diseases (OUP) and Health Matters (HBCSE publication). She also initiated and led the Indian Biology Olympiad movement for the first three years, wherein Indian students won laurels for the country. In 2004, she conceptualized and led a major health and environment education programme, Health and Environment: Action-based Learning (HEAL). She had been elected as Fellow, Maharashtra Academy of Sciences (2002), received the Rayat Shikshan Sanstha's award in the memory of Savitribai Phule (2003), and is on the editorial board of International J. of Biology Education. She is the first recipient of the Homi Bhabha Award for Science Education - 2006, instituted by the TIFR Endowment Committee. She was an independent elected municipal councillor from Anushaktinagar, Mumbai, 1976-1982.

Lithium-Ion Battery Inventor Introduces New Technology for Fast-Charging, Noncombustible Batteries

(Abridged from <https://news.utexas.edu>, February, 28, 2017)



Dr. John B. Goodenough



Dr. Maria Helena Braga

AUSTIN, Texas — A team of engineers led by 94-year-old John Goodenough, professor in the Cockrell School of Engineering at The University of Texas at Austin and co-inventor of the lithium-ion battery, has developed the first all-solid-state battery cells that could lead to safer, faster-charging, longer-lasting rechargeable batteries for handheld mobile devices, electric cars and stationary energy storage.

Goodenough's latest breakthrough, completed with Cockrell School senior research fellow Maria Helena Braga, is a low-cost all-solid-state battery that is noncombustible and has a long cycle life (battery life) with a high volumetric energy density and fast rates of charge and discharge. The engineers describe their new technology in a recent paper published in the journal [Energy & Environmental Science](#). "Cost, safety, energy density, rates of charge and discharge and cycle life are critical for battery-driven cars to be more widely adopted. We believe our discovery solves many of the problems that are inherent in today's batteries," Goodenough said.

The researchers demonstrated that their new battery cells have at least three times as much energy density as today's lithium-ion batteries. A battery cell's energy density gives an electric vehicle its driving range, so a higher energy density means that a car can drive more miles between charges. The UT Austin battery formulation also allows for a greater number of charging and discharging cycles, which equates to longer-lasting batteries, as well as a faster rate of recharge (minutes rather than hours).

Today's lithium-ion batteries use liquid electrolytes to transport the lithium ions between the anode (the negative side of the battery) and the cathode (the positive side of the battery). If a battery cell is charged too quickly, it can cause dendrites or "metal whiskers" to form and cross through the liquid electrolytes, causing a short circuit that can lead to explosions and fires. Instead of liquid electrolytes, the researchers rely on glass electrolytes that enable the use of an alkali-metal anode without the formation of dendrites.

The use of an alkali-metal anode (lithium, sodium or potassium) — which isn't possible with conventional batteries — increases the energy density of a cathode and delivers a long cyclelife. In experiments, the researcher's cells have demonstrated more than 1,200 cycles with low cell resistance. Additionally, because the solid-glass electrolytes can operate, or have high conductivity, at -20 degrees Celsius, this type of battery in a car could perform well in sub zero degree weather. This is the first all-solid-state battery cell that can operate under 60 degree Celsius.

Braga began developing solid-glass electrolytes with colleagues while she was at the University of Porto in Portugal. About two years ago, she began collaborating with Goodenough and researcher Andrew J. Murchison at UT Austin. Braga said that Goodenough brought an understanding of the composition and properties of the solid-glass electrolytes that resulted in a new version of the electrolytes that is now patented through the UT Austin Office of Technology Commercialization. The engineers' glass electrolytes allow them to plate and strip alkali metals on both the cathode and the anode side without dendrites, which simplifies battery cell fabrication. Another advantage is that the battery cells can be made from earth-friendly materials.

"The glass electrolytes allow for the substitution of low-cost sodium for lithium. Sodium is extracted from seawater that is widely available," Braga said.

Goodenough and Braga are continuing to advance their battery-related research and are working on several patents. In the short term, they hope to work with battery makers to develop and test their new materials in electric vehicles and energy storage devices.

At the age of 57, John B. Goodenough invented the lithium battery which powers all our smart phones, tablets and laptops - as well as electric cars.

37 years later at the age of 94, John has unveiled a new, ultra-efficient, low cost battery which uses a sodium or lithium coated glass electrolyte. It will dwarf his original invention and make it redundant.

The new glass battery will allow electric cars to go three times the distance, and recharge in minutes instead of hours. It's also far safer as it won't explode and can operate in sub-zero temperatures.

The new glass battery will power our future solar powered and electric vehicles, homes and industries.

But John isn't finished yet. He still works every day as a Professor at the University of Texas.

John believes humanity has a 30 year window to come up with an even more powerful "super battery" to take us entirely off fossil fuels, before the environmental damage we are creating becomes irreversible, and says, "I want to solve this problem before my chips are in I still have time to go."

So if you ever think it's too late to be successful, just remember John B. Goodenough.



**Hepatitis B Awareness Program
Amravati Branch, 8th February, 2018**



**International Women's Day Amravati
Branch, 8th March, 2018**



**National Workshop on "Current Facets of
Botany", Baroda Branch, 24th-30th July, 2017**



**National Seminar on "Impact of Climate
Change on Biodiversity – III" Baroda Branch,
29th November, 2017**



**Winners of the Science Day Event,
Kalpakkam Branch, 24th February, 2018**



**Dr. Uma Sheshadri at the Women's Day,
Event Kalpakkam Branch, 24th March, 2018**



**Pune Branch Activities: Left: Science popularization Lectures 5th March, 2018
Right: Women's Day Program 8th March, 2018**



**VAMMO-2018 Participants, Roorkee
Branch, 28th January, 2018**



**VAMMO-2018 Prize Winners Roorkee
Branch, 24th February, 2018**



**Presentation by School Students on Children's
Day, Nagpur Branch, 30th November, 2017**



**International Women's Day,
Nagpur Branch, 7th April, 2018**

To

From

IWSA Head Office

Plot No.20, Sector 10A
Dr. Mar Theophilus Road, Vashi
Navi Mumbai: 400703
Tel: 27661806,
Email: iwsahq@gmail.com
Website: www.iwsa.net

Published by Dr. Surekha Zingde, President, IWSA, Plot No.20, Sector 10A,Vashi, Navi Mumbai 400703.
Editor Dr. Shyamala Bharadwaj.

Printed by: Prudent Arts & Fab Pvt. Ltd., A-221, TTC Industrial Area, M.I.D.C., Mahape, Navi Mumbai 400701.Tel.: 61119001/02