# IWSA NEWSLETTER

The Official Publication of the Indian Women Scientists' Association

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Visit of IWSA Members to Chemical Industry in Thane on 10th May, 2019

IWSA Members participated in Mangrove cleaning drive at the Mini Sea Shore, Vashi on 25th May, 2019

International Yoga Day Celebrations on 22nd June, 2019 at IWSA HQ

Eco Friendly Ganesha Workshop on 31st August, 2019 at IWSA HQ

**BRANCHES**

**Roorkee 1979, Hyderabad 1979, Pune 1980, Nagpur 1982, Kolhapur 1982, Delhi 1987, Kalpakkam 1987, Baroda 1988, Amravati 2010, Bengaluru 2018, Nellore 2018.**

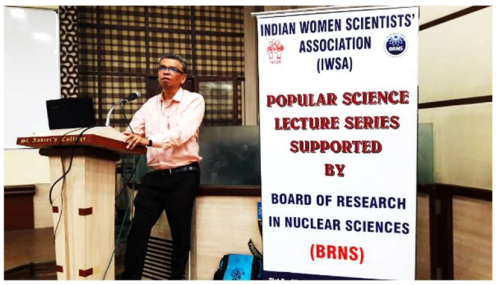

Mr. Jagdish Chaudhari delivering lecture on Affordable Agricuture at IWSA HQ, Vashi on 7th June, 2019

Dr. M.V. Kamath delivering lecture on Plasma Fractionation at KBP College, Vashi on 13th July, 2019


Dr. Radha Jayaram delivering lecture on Green Chemistry at Sophia College on 20th July, 2019

Mr. Mahesh Kshirsagar delivering lecture on Artificial Intelligence at VESIT on 27th July, 2019


Dr. Shobana Sharma delivering lecture on Man, Mosquito and Malarial Parasite at Jai Hind College on 3rd August, 2019




Dr. Manoj Mahimkar delivering lecture on Genomic Landscapes of Tumors at St. Xavier's College on 13th August, 2019

Ms. Shreeja Nambiar delivering lecture on e-Waste Management at Ruparel College on 28th August, 2019


Dr. Santoshi Prabhu delivering lecture on Gynaecological Disorders at Vivekananda College on 31st August, 2019

# From the Editor's Desk

**Dear IWSA Members,**

In this issue of the Newsletter, you will find reports on the eight BRNS Popular Science Lectures that were held between May to August 2019 in various colleges in Mumbai and Navi Mumbai. Besides these eight lectures organized at IWSA Headquarters, there was a lecture held at Cochin with the help of Dr. Susan Eapen, two lectures by Kalpakkam Branch and one by Nagpur Branch. It is heartening to note the active participation of the Branches in organising BRNS Popular Science Lectures. To celebrate National Technology Day, IWSA Members visted a Chemical Industry premises to learn about their technology. You will find reports on other Science Awareness activities such as workshop on STEM Education, Science Camps for school children etc. and several interesting activities of IWSA's Learning Garden. Two of our members have written about their field observation of Pancy Butterflies at IWSA Garden. International Yoga Day was celebrated at IWSA on 22nd June, 2019. Participation of IWSA members in cleaning mangrove forest at Vashi and Eco friendly Ganesha Workshop were other interesting activities. We have reported the details about these activities in this Newsletter. IWSA's Nursery kids, Hostel girls and other members celebrated Independence day. The highlight of the celebration was a musical program by Shri. Swaroop Kumar, emphasising the connection between music and good health.

This issue also brings the interesting activities held at IWSA Branches at Amravati, Baroda, Delhi, Kalpakkam, Kolhapur, Nagpur and Nellore. This year we are celebrating the birth centenary of Dr. Vikram Sarabhai. Dr. Susan Eapen has written an article about him in this issue. I have also included write ups about how women power steered Chandrayan 2 Mission, about women achievers in various fields and about some of our IWSA members receiving recognition. 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

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**Editorial Board**

# President's Message

**Dear Members of IWSA,**

I am extremely happy and honoured to be elected as the President of IWSA for the term 2019-2021. I thank all the members of IWSA who have elected me for this term and I have taken over this responsibility from 29th June, 2019. I welcome all the new EC members and the sub-committee members and on their behalf, express our desire to do our best. I will try my best to fulfill my duties as a President, keeping in view the mandates and objectives of IWSA.

I am indeed thankful to the immediate past President, Dr. Surekha Zingde, who worked tirelessly for last two years to take IWSA to greater heights, to stream line the administrative affairs, salaries of our employees, EPF and GST related matters in our administration. She has also worked in streamlining the branch affairs. This has made my job easier, so that my team and I can concentrate on newer horizons. I thank all the members of the Board of Trustees, who have always encouraged me in all my work. I also thank the members of EC (2017-2019) for all the support they have provided me whenever I approached them.

I have been actively associated with IWSA for the past five years, after my retirement from BARC. It has been extremely fulfilling to be associated with the various Science educational activities of IWSA. The Central Council meeting and Annual General body meeting of IWSA were held on 15th June,2019. Conveners of the Hyderabad, Nagpur and Amravati branches were present during the meeting. Delhi and Kolhapur branches now have new office bearers and we welcome them. Dr. Surekha Zingde (President 2017-2019) presented the Annual reports for IWSA and I presented branch reports. Branches have been requested to submit the financial reports and the annual activity reports by June of every year. We sincerely request the branches to keep us updated on member list too.

Members of IWSA express their heartfelt condolences on the sad demise of a founder member, Dr. Premlata Thomas. It has been heartening to see the large number of activities organized at Head Quarters as well as at the branches. The outreach numbers to school and students; faculty, public at large, through our activities has crossed 17,000 during the last financial year. IWSA expresses its heartfelt gratitude to the donors who have generously donated towards the various activities of IWSA.

Among the most important events of IWSA in this period, I would like to mention about the following- The Learning Garden of IWSA has come up very well. We have a large number of active members who are the 'Green soldiers' of the Learning garden with many new interesting concepts emerging from their active interaction. More than a hundred college students have visited the Learning garden in the last few months. A few students from Bharati Vidyapeeth College of Architecture, after their visit, have designed the landscapes for IWSA garden. It is indeed heartening that we are receiving several requests from college students to do short internship at IWSA. We have drawn some guide lines for these internships.

Science Nurture classes have started for this academic year with 13 students from VII and VIII Std from Sainath school. They would be taught Science, Maths, English and Computer basics.

IWSA would like to organize science camps at frequent intervals, for school students, to enhance the understanding of basic concepts of students. Two, half-day camps were organized on 5$^{th}$ July, 2019 ( In collaboration with HBCSE) and 26$^{th}$ August, 2019.

I would like to once again mention about the forth coming Triennial Conference 2019 at Hyderabad. The dates of the conference are-11$^{th}$ to 13$^{th}$ December, 2019. Conference theme is-"**Women Led Science, Technology and Innovation".** The venue is at ICMR-National Institute of Nutrition (NIN), Hyderabad. The sessions to be conducted include: Health, Pharma and Biotechnology; Food, Agriculture and Nutrition; Physical & Chemical Sciences and Space Sciences & Technology; Environment and Climate Change; Innovation and Entrepreneurship; panel Discussion on: Role of Women in Science & Technology for National Development. I request all members to register at the earliest.

Finally, I would like to draw your attention to the two "Women of substance" who have won the most prestigious Nobel Prize in the last one year. In 2018, Prof. Donna Strickland was the third woman to win the Nobel Prize in Physics, since the prize was started, for the path breaking technique of chirped Pulse Amplification which made it possible to operate lasers in the Petawatt ( $10^{18}$ Watt) range with focused intensity exceeding $10^{21}$Watts / cm$^2$. Esther Duflo has been awarded the 2019 Nobel Prize for Economics, with her colleagues Abhijit Banerjee and Michael Kremer "for their experimental approach to alleviating global poverty." This is a very important topic for global health and wellbeing. Duflo, 46, became the youngest ever recipient and only the second woman to be awarded the Nobel for Economics since it began in 1969.

In this issue we find the details of the work and responsibilities of the two Women, Vanitha M and Ritu Karidhal, who were behind mission Chandrayan 2 of ISRO. We expect many more interesting articles on women who have made significant contributions in various fields, in the forthcoming issues.

Best wishes,

**Dr. Lalitha Dhareshwar,**
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# Reports from Head Quarters

# Science Awareness Programs

## A. IWSA – BRNS Popular Science Lectures

**1. BRNS-Popular Science lecture at IWSA, Vashi, Navi Mumbai on 7th June 2019**

Mr. Jagdish Chaudhari, Lead Special Initiatives, Analytics and Insights Unit, Tata Consultancy Services,TCS Sahayadri Park, Pune, delivered a lecture on Affordable Agriculture, at IWSA.

In India agriculture as a profession lacks glamour and respect. Hence it faces a challenge of attracting talent which in turn leads to a fundamental constraint of lack of skills and

competency in the agriculture sector. This issue gets further compounded due to other issues such as small land holding, lack of irrigation facilities, limited education, non-use of scientific methods of farming and private funding at high interest rates. Despite putting in a lot of hard work, situation of farmers never improves, and they permanently remain in poverty. The situation deteriorates further in case a drought or if illness hits them. In such situations, they may land in a debt trap or even resort to self-harm. To address this challenge, IEEE Pune Section formed a Special Interest Group for Affordable Agriculture (SIG AA). The primary driver for this initiative is to enhance income levels and quality of life of small and marginal farmers.

SIG AA operates in two tracks. In the first track, SIG AA has partnered with six leading engineering colleges in Pune and set up Affordable Agriculture Labs in these colleges. In these labs, students are encouraged to take up frugal and interdisciplinary projects to help small farmers. Government Agriculture College and COEP's Bhau Institute are actively supporting this initiative.

The second track is to directly work with the farmers by forming farmer producer companies. SIG AA has partnered with two well-known NGOs namely Manavlok and Swapnabhumi for this purpose. The objective is to create conviction about collective and eco-friendly farming. Training programs and coaching for these farmers have been organized with a view to make them self-sufficient. The plan to accomplish this is by ensuring that all their farm produce is sold after some value addition. This approach is being demonstrated by setting up demo farms which will showcase various affordable technologies. The farmers are being encouraged to cultivate crops which fulfil their families' food requirement. This cultivation strategy will increase their profits, fulfil their domestic demand and improve overall quality of life. The talk included some real examples of the activities being done in both the tracks.

The lecture was attended by 70 people which included students and faculty from KBP College Vashi, members from Homi Bhabha Centre for Science Education, Mumbai and IWSA members. There was active discussion after the lecture. Tea and light refreshments were served to the participants.

**2. BRNS-Popular Science lecture at Karmaveer Bhaurao Patil College, Vashi, Navi Mumbai on 13th July 2019.**

Dr. M. V. Kamath, Vice President (Plasma Proteins): Reliance Life Sciences Pvt Ltd, Navi Mumbai delivered a lecture on "Overview of Plasma Fractionation". He informed the students and faculty attending the lecture that human plasma is the source of a wide range of about 20 therapeutic proteins. All aspects of the journey of plasma proteins- "from vein to vein" were then discussed in the presentation.

The most important biological medicines which can be prepared from Plasma are albumin, Immunoglobulin G, coagulation factor VIII, and coagulation factor IX. These are used in the treatment of severe bleeding, immunological or metabolic disorders, bacterial or viral infections, or blood losses associated with trauma.

Human plasma is an unique biological material that has a total protein content close to 60 mg/mL. Most abundant proteins are albumin (35-40 mg/mL), immunoglobulins (8-12 mg/mL), and fibrinogen (1.5-3 mg/mL). In addition, other therapeutically relevant proteins include coagulation factors, protease inhibitors, anti-coagulant proteins typically present at level of few milligrams to micrograms/mL.

Treatment of thousands of casualties from World War II was a trigger for the preparation of biological drugs such as albumin and immunoglobulin from human plasma. The process for separation of albumin and IgG was first commercially developed by Dr Edwin Cohn from Harvard University in 1945-46. Treatment of soldiers suffering from hypovolemic shock and burns, required a blood volume expander. Dr.Cohn's method of isolation of albumin contributed immensely towards offering a solution for alleviating the shock.

Most of the human plasma fractionation industries are based on Cohn's sequential cold ethanol precipitation method. In the 70's the industrial process evolved by the introduction of a cryoprecipitation step to recover Factor VIII. In the 80's major technological changes occurred in response to the need to improve product purity and recovery. This was achieved through wide implementation of various chromatographic steps based on the principles of ion exchange, affinity & size exclusion and technologies like ultrafiltration.

Dr. Kamath, described each of the steps of purification very lucidly and compared them to the different experiments undertaken in the laboratory. He showed pictures of the equipment used for the fractionation of large volumes of plasma in an industrial set up. He also explained that besides purity and recoveries, different quality control measures and safety issues need to be addressed and met to make products suitable for medical use.

The lecture was attended by 320 students and faculty. There was active discussion at the end of the lecture. Dr.C.D. Bhosale, Vice Principal, KBP College welcomed the audience and gave a brief about the College. Dr. Surekha Zingde, President, IWSA informed the audience about IWSA and its activities. The lecture was attended by IWSA members, Dr. Bakhtaver Mahajan, Dr. Suparna Kamath, Ms. Tripta Tewari. Light refreshments were served to the participants.

### 3. BRNS Popular Science Lecture at U.C. College, Aluva Cochin on 19th July, 2019

Mr. C. S. Pradeep Kumar, Biostarts Ventures, Kolkata and Sustainability Advisor and Indian Partner, BIOSFERA Foundation, The Netherlands delivered a popular science lecture at T. B. Ninan Hall, U. C. College, Aluva, Cochin on 19th July at 1430 hr on "Plant Biotechnology for Sustainable Environmental Management and Bioengineering Solutions".

He spoke on how innovative biotechnology and bioengineering solutions can be used for protection and restoration of water bodies, lakes, canals, water recovery systems, solid

waste dump site restoration, river embankment stabilization, sustainable green belt development etc. Live plants and natural materials can be used to rebuild the ecosystem and develop low carbon smart cities. Green technology interventions have led to restoration of lakes and river embankment stabilization. Studies at Kolkata showed that grey water and RO water can be reused. Detailed studies were conducted in various sites in Kolkata like CSIR-CGRI-SIRSA Housing complex, Floating market and several industrial sites . Various plants like Vetiver and natural fibres like coir and jute were used for embankment stabilisation in West Bengal. He suggested that Kerala can adopt the same technologies for damages caused due to floods. He further suggested that U. C. College should start one incubation centre where students with innovative ideas can incubate in the centre leading to start-ups.

Principal Dr. David Saj Mathew welcomed the speaker, Manager Rev. Thomas John spoke on the need for developing innovative minds in student community and Dr. Susan Eapen elaborated on the various activities of IWSA, which include both scientific and societal programs. Dr. M. I. Punnoose, Bursar of the college proposed vote of thanks. About 70 students and teachers participated in the program and there was an active discussion. Tea and light refreshments were served to the participants.

**4. BRNS-Popular Science lecture at Sophia College for Women, Mumbai on 20th July 2019.**

Dr. Radha Jayaram**,** Professor and Head Department of Chemistry , Institute of Chemical Technology, Mumbai, delivered a lecture on “Role of Catalysis in the ‘Green Revolution’ of Chemistry”. Dr. Jayaram explained that Chemistry has played a major role in the development of technology in terms of energy, medicines, crop protection, food products, and new materials. All the same, though chemistry has been accepted as a branch of science with the highest impact on society, the public image of the impact of practice of chemistry has drastically gone down. This is due to various catastrophes and accidents, water and air pollution and also improper and irresponsible utilization of natural resources.

This negative impact of chemistry led to the ‘Green Chemistry’ movement in the early 90’s. The Green Chemistry drive was incepted with the aim to design chemical products and processes which will reduce or eliminate the use and production of hazardous substances, produce minimum or no waste and avoid auxiliary reagents and non-benign solvents.

The key to waste minimization is to design synthetic protocols where every atom counts. Catalysis is the ultimate solution to this objective as practically any kind of selectivity towards the desired product can be obtained by the proper choice and tailoring of a catalyst system. Catalysis also offers other green chemistry benefits such as lower energy requirements, replacement of stoichiometric reagents with catalytic counter parts, decreased use of processing and separation agents, and allows for the use of less toxic materials.

Heterogeneous catalysis, in particular, addresses an additional goal of green chemistry as the separation of the products from the catalysts is simple and does not require additional unit processes. In addition, environmentally benign solid and reusable catalysts can be the choicest replacement for hazardous and non reusable reagents currently in use. The aim of this talk was to highlight the reach of heterogeneous catalysis in making chemical processes green and environmentally benign. This feature was discussed with reference to the application of metal oxides and mixed metal oxides as catalysts in organic reactions of industrial relevance.

Dr. Ignat Mendes, Head, Dept of Chemistry, Sophia College, welcomed the audience on behalf of the College. Dr. Niyati Bhattacharya, Chairperson, IWSA Board of Trustees, informed about IWSA and its activities. The lecture was attended by 140 students and faculty of the college. IWSA members, Ms Tripta Tewari and Dr. Paramjit Anthappan were also present.

**5. BRNS-Popular Science lecture at VES Institute of Technology, Mumbai on 27th July 2019.**

Mr. Mahesh Kshirsagar, CTO, Analytics and Insights, Tata Consultancy Services, delivered a lecture on Artificial Intelligence (AI)-What future holds for India?
Much has been spoken about Artificial Intelligence (AI), across various IT professionals, IT industry forums, analysts forums and consumers both corporate and retail. Like any other disruption witnessed in last few decades, where information technology, was playing the pivotal role, in case of AI too, there are number of hypothesis. Few of the hypothesis have right interpretation, few have incorrect interpretation, and few others are confusing as well. Thus, there is lack of clarity in terms of how much AI can do and where and whether it will benefit mankind, or would it act against mankind. In the lecture, Mr Kshirsagar gave an overview of AI. Since it is a vast topic, and also technically very deep, he restricted his talk at an overview level only, but at the same time, he left a thought with the audience, as to what future holds for India, when it comes to AI. He informed that AI is a Data driven intelligence which has to be appropriately modelled, visualized and finally its help taken in decision making. The data has to be ingested, stored, managed and utilized for knowledge generation. There are numerous applications of AI, which will benefit India. However, it is very important to draw the line in terms of where we should leverage AI and to what extent. Mr Kshirsagar explained that when we opt for any solution, be it technical or non-technical, we must ensure optimal balance, as excessiveness of anything is counterproductive. Same is the case going to be when it comes to deployment of AI.
Ms Sunita Sahu, faculty from VES Institute of Technology, welcomed the audience and Dr. Surekha Zingde, Trustee, IWSA, informed them about IWSA and its activities. IWSA members, Dr. Shyamala Bharadwaj, Ms. Tripta Tewari, Ms.Vijayalakshmi Tilak and Dr. Manjula Mathur attended the lecture. The lecture was attended by about 160 students and faculty. There were some interesting questions during and after the lecture.

**6. BRNS-Popular Science lecture at Jai Hind College, Churchgate, Mumbai on 3rd August, 2019.**

Dr. Shobana Sharma, INSA, Honorary Scientist, Institute of Chemical Technology, Mumbai, & Former, Chairperson, Division of Biological Sciences, TIFR, Mumbai,delivered a lecture on "Man, mosquito and malarial parasite: Who is ahead?". Dr. Sharma informed that Malaria is a tropical disease which continues to cause great levels of morbidity and mortality. The causal agents for the disease are parasites of the *Plasmodium* species, and these parasites are transmitted through the female *Anopheles* mosquitoes. Historically, man has been combating the disease through appropriate immune response and genetic resistance parameters. However, malarial parasites exhibit sophistication in the levels of immune-suppression and immune-evasion mechanisms. Naturally acquired immunity to malaria develops gradually, after many attacks and over many years in hyper endemic regions. The successful passive transfer of this immunity through immunoglobulins isolated from malaria immune adults to malaria patients has been well documented earlier. The exact mechanisms of action, as well as a comprehensive list of molecular specificities of such protective immunoglobulins (and their corresponding malarial targets), are yet to be established. The shortfall of such understanding is the reason for the non-existence of an effective malaria vaccine. Lately, mankind has controlled a) parasites through the use of antimalarial drugs and b) mosquitoes through the use of pesticidal agents. Although effective drugs for malaria exist, the emergence of rampant drug resistance is of concern. Mosquitoes have also acquired resistance to the pesticides. Thus, it remains an age old evolutionary struggle for survival amongst these host-vector-parasite species. Is anyone ahead in this race?

Dr. Sharma beautifully described the life cycle of the parasite, how it invades the liver cells and finally moves into the red blood cells through the endothelium. She explained that the mobility of the parasite was being attributed to a *Plasmodium falciparum* circumsporozoite protein (CSP), a major surface protein implicated in the structural strength, motility, and immune evasion properties of the infective sporozoites. This protein has multiple repeat domains. She described studies from her laboratory on deciphering the structure of these repeats. In the second part of her lecture she described efforts to encapsulate anti malarial drugs in nanostructured lipid carriers and their ability to kill red blood cells infected with the parasite. Dr. Sharma described challenges towards proper understanding of host-parasite-vector relationships. A causal analysis of host-parasite-vector interactions is necessary for future methods of control of malaria disease.

Dr. Shuchita Deepak, Associate Professor, Jai Hind College welcomed the audience, Dr. Ashok Wadia, Principal Jai Hind College, appreciated the efforts of IWSA in taking science to society. Dr. Surekha Zingde, Trustee, IWSA, informed students and faculty present about the Association and its activities. The lecture was attended by 120 students and faculty. Several of the students had very interesting questions on the lecture and Dr. Sharma was happy to answer the same. Light refreshments were given to the participants after the lecture.

**7. BRNS-Popular Science lecture at St. Xavier's College, Mumbai on 13th August, 2019.**

**Dr. Manoj Mahimkar**, Cancer Research Institute, ACTREC, Tata Memorial Centre, Kharghar, Navi Mumbai delivered a lecture on Genomic Landscapes of Tumors. He informed that conventional cytogenetic karyotype analysis is still the standard test in genetic diagnostics to identify numerical and structural chromosomal aberrations, which are the major cause of mental retardation, miscarriages, congenital anomalies, and also common findings in neoplasia. However, conventional cytogenetic analysis of solid tumors, is often difficult and had limited success due to inability to culture tumor cells due to slow growth kinetics, poor morphology of the metaphase chromosomes and complex karyotype. In addition, such analysis gives insufficient information because of simultaneously existing sub-populations of cells in tumor tissues. Development of fluorescence in situ hybridization (FISH) and PCR- based technology for studying molecular cytogenetics have offered powerful means to overcome the limitations imposed by conventional methods. However, both these techniques are targeted approach and fail to identify global alterations in tumor genome. Comparative genomic hybridization (CGH), is a direct method for comparing genetic imbalances in DNA from tumor cells. A single CGH analysis simultaneously provides an overview of the genome-wide changes in the DNA copy number [amplifications and deletions] of genetic material in a tumor specimen, which can be mapped directly on to the normal chromosomes. CGH offers unique advantages over conventional targeted FISH method, as it neither requires intact tumor cells nor metaphase preparations because tumor DNA itself serves as a probe. Array-based comparative genomic hybridization (array-CGH) is based on the same principle as conventional CGH except that DNA segments substitute metaphase chromosomes as the targets for the hybridization. More recently developed next-generation sequencing (NGS) has revolutionized the biological sciences. Today's complex genomic research questions demand a depth of information beyond the capacity of traditional DNA sequencing technologies. With its ultra-high throughput, scalability, and speed, NGS enables researchers to address a wide variety of biological queries at a level never before possible. Next-generation sequencing is now an everyday research tool. The lecture covered the technologies given above in the context of obtaining genomic signatures for tumors.

Dr. Priya Sunderajan, Director, Caius Research Laboratory and Head of Dept of Biotechnology welcomed the audience. Dr. Surekha Zingde, Trustee, IWSA informed the participants about IWSA and its activities. Dr. Sudha Padhye, founder member IWSA, IWSA members Dr. Mahrookh Joshi and Dr. Paramjit Anthappan were also present. The lecture was attended by 65 students, two faculty from departments of –MSc Biotechnology, Microbiology, Lifesciences and Botany.

8. **BRNS-Popular Science lecture at Ruparel College, Mumbai on 28th August, 2019.**

**Ms. Shreeja Nambiar,** an Independent IT Consultant, Science Education Advisor, spoke on e-waste management. The use of electronic devices is increasing exponentially. Mobile phone is a classic example. Laptops, refrigerators and a host of other items of

personal and domestic use add up to the e-waste mounting to millions of tons! In 2016, 44.7 million metric tons of e-waste were generated. Experts estimate e-waste increasing to 52.2 million metric tons by 2021. That is the global scene.

Indian scene: 18 lakh MT 2017, 52 lakh MT 2020 at 30% CAGR. There are 5 lakh child workers who handle e-waste. Two out of three workers are coughing, choking and trembling. Only 1.5% waste is recycled; 95% is handled by scrap dealers. There is well oiled unorganized sector flourishing while the organized regulatory sector is absent. Extended producer responsibility is still far in the regulatory regime. Sixty-five cities in India generate more than 60% of the total e-waste generated in India. Ten states generate 70% of the total e-waste generated in India. Among top ten cities generating e-waste, Mumbai ranks first followed by Delhi, Bangalore, Chennai, Kolkata, Ahmedabad, Hyderabad, Pune, Surat and Nagpur.

In 2016, it was estimated that e-waste contained rich deposits of gold, silver, copper, platinum, palladium and other high-value, recoverable materials, with a total value estimated at $ 55 billion, a figure exceeding the GDP of most countries in the world. A strong case for a robust e-waste management strategy in a circular economy. The lecture provided information about e-waste management policy in India and the formal and informal sectors which accept and process waste. A few case studies were described to inform about the type of materials which are recovered from the e-waste and what they are being used for. Ms. Shreeja made an earnest request to the students to refrain from generating e waste by restricting their requirements for newer gadgets and dispensing the earlier models as a fashion statement.. She requested that each one of us is responsible in disposing e waste at centres which are equipped to recycle and /or reuse the components from the gadgets.

The lecture was attended by 126 students and several faculty. There was active discussion after the lecture. Dr. Surekha Zingde, Trustee, IWSA informed the audience about IWSA and its activities, Dr. Meenakshi Sundaram informed about Ruparel College, Dr.Paramjit Anthappan, IWSA member, summarized the lecture and faculty from Ruparel expressed a vote of thanks. Dr. Vijaylakshmi Tilak, member IWSA was also present at the lecture.

9. **BRNS-Popular Science lecture at VES College of Arts, Science and Commerce, Mumbai on 31st August, 2019.**

**Dr. Santoshi Prabhu**, MBBS, MD, DGO, FICOG,Senior Consultant Gynaecologist and Obstetrician, Bhabha Atomic Research Centre Hospital, Mumbai delivered a lecture on Awareness and Management of Gynaecological Disorders. These disorders include diseases of female genital organs including sexually transmitted diseases. Their diagnosis and treatment is an important aspect of the quality-of-life of women and their reproductive health because these diseases are public health related and social problems. These disorders are best dealt with primary and secondary prevention than curative procedures. Dr. Prabhu informed about some of the frequent gynaecological

disorders and their risk factors such as PCOS, irregular bleedings, vulvovaginitis, cervical cancer and breast cancer.

She first explained about onset of menstruation and ovulation which is a physiological process which occur throughout reproductive life. Each of these processes are regulated by different hormones. In PCOS, due to delayed or absent ovulation, menses become irregular and females may show associated obesity, acne, hirsutism (excessive hair growth on the face, chest), hair loss and infertility. Living a healthier lifestyle by avoiding fast food, adopting balanced diet, regular exercising and most importantly, weight reduction holds the key in management of PCOS.

Usually, by the age of 45 to 55 years, due to natural depletion of oocytes because of aging, the woman's menstruation stops completely. This is called as menopause. At menopausal transition, women experience physiological changes due to oestrogen deficiency, to which the body gets acclimatised gradually. These include: hot flushes, mood swings, trouble in sleeping, fatigue, hair loss, receding gums, dryness of skin, obesity, backache. Sometimes, they may present genitourinary symptoms like vaginal dryness, discomfort during sex, urine leak on coughing or sneezing or sometimes urinary urgency.

Cervical and breast cancer are the major cancers seen in women. Dr. Prabhu advised the audience the need to take care of their health and undertake regular check ups when they notice any change in their menstrual cycles and breasts. The Papanicolaou (Pap) smear test is performed for screening for cervical cancer and can be done by gynaecologists. Vaccines for prevention of cervical cancer are available but vaccination does not eliminate the need for regular screening in later life. For Breast cancer, Dr. Prabhu showed how each women can undertake breast self examination. If she notices any changes she should follow up with her doctor. Early intervention can ensure better management of cancer and quality of life. In summary Dr. Prabhu emphasized the need for each women to take good care of her health as she is also responsible for her family. She encouraged the audience to share the information she had given with members of their family so there was deeper understanding of the natural physiological changes that occur in women.

The lecture was attended by 170 students and faculty. There were many questions from the young girls, which Dr. Prabhu answered to their satisfaction. Dr. Anita Kanwar, Prinicpal of VES College, welcomed the audience, Dr. Surekha Zingde, Trustee IWSA informed about IWSA activities, Dr. Paramjit Anthappan and Ms. Vijaya Tilak, IWSA members shared their experiences with their daughters in understanding the physiological changes that occur in women. Dr. Santhini Nair, Vice Principal thanked IWSA, Dr. Prabhu and the audience for speaking and attending the lecture respectively. This lecture was organized in association with the Women's Development Cell by Dr. Radhika Mohan of VES college.

## B. Field Visit by IWSA Members on National Technology Day 10th May, 2019

As part of National Technology Day celebration, a field visit was arranged by Dr. Devaki Ramanathan, the past president of IWSA, to MEHK Chemicals, Thane, Maharashtra on the 10th May, 2019.

The objective of the visit was to know about the entrepreneurial journey of this absolutely Indian Company to attain self-sufficiency in the manufacture of certain high grade industrially needed chemicals. Since the inception in 1975, this company was scaling new heights gradually and is now almost sole supplier of certain perfumery intermediates to the whole world. The company started with distillation and purification of spent solvents from other pharmaceutical companies and is now engaged in supplying a number of industrial chemical intermediates, manufacture of solvents-specially Dibutyl ether, 1, 4-Dioxane, Phenyl Acetone, Quinolone, Diphenyl methane etc., besides Grignard reagents and specially Aroma ingredients used in perfumery industries.

A group of 18 senior IWSA life members were welcomed and gratefully acknowledged by the Founder Director, Dr. G. Kamath and over light refreshments in the conference room.Dr. Kamath narrated the historical beginning of MEHK, his dream child in 1975, the challenge faced by the company and its gradual growth to its current status which can now boast of an annual turnover of > 55 crores of rupees. It has a staff of over 100 employees who are a part of MEHK family, managing 3 reactors of ~ 10000 ton capacity running in shifts, 24 hours a day.

The current MD and CEO of the company Mr. Rohit Kamath, son of Dr. G. Kamath, explained the present working of the company with an audio-visual round. He vividly presented the prevalent activities of the company with reference to production, research and development, laboratory analysis, safety measures, accreditation, major products, major clients both national and international as well as certain future plans of propagation and administrative layout. Related pamphlets were distributed to members and CSR work and CST work and possible collaboration with IWSA were discussed during this interactive session.

Thereafter, the members were taken on a guided tour of the production units, testing laboratories etc., to acquaint them about the practical aspects of working and testing procedures which were explained by enthusiastic employees.

Another interactive session and discussion of future endeavours followed over a lavish lunch hosted by the company. Dr. G. Kamath considers all the employees of the company as part of his family and provides many facilities like subsidized canteen, medical assistance etc. In his grace he extended family status to IWSA members also.

This visit was really a fruitful experience for IWSA members on the occasion of National Technology Day celebration which was highlighted by interactive learning and sharing knowledge base.

## C. Inauguration of Science Nurture Program on 5th July, 2019

The Science Nurture program for the year 2019-20 was inaugurated on Friday, 5th July 2019 at IWSA's multipurpose hall. About 40 students of Std 7 and 8 from Sainath school attended the program. Dr. G.Nagarjuna and his team from HBCSE conducted a workshop on STEM education during the inauguration. Dr. Nagarjuna was the chief guest and Mrs. Lata Pillai was the guest of honour. Ms. Tripta Tewari introduced the chief guest whilst Ms.Madhu Pahwa elaborated on the science nurture programme.

The STEM (Science, Technology, Engineering, Mathematics) group demonstrated the making of anaemometer, microscope with 300X magnification, breeding of Moina and growing earthworms on tissue paper and studying their features.

IWSA's Science Nurture teachers also demonstrated two experiments. One experiment showed respiration in germinating seeds. The other experiment demonstrated the properties of ammonia gas using a "pink fountain'. Mrs. Priya Jacob gave the vote of thanks.

## D. Science Camp at IWSA on 26th August, 2019

IWSA has started organizing monthly Science Camps for the students of 7th to 9th Std. The objective of these camps is to- **Explore the wonders of Science, understand the Principles associated with the common phenomena observed in daily life and a close interaction with the teachers. This would prompt the students to ask questions to satisfy their natural curiosity.**

The first camp was held on 5th of July, 2019 during the inauguration of the Science Nurture Programme of IWSA. The second camp was held on 26th August, 2019 from 11 am to 2 pm. Fifty students of 7th and 8th Std from Modern School, Vashi, participated in this camp

The following experiments were demonstrated-

1. **Centripetal and Centrifugal forces**: How the centripetal and the centrifugal force are generated, the difference between the two and how it can be applied in various kinds of machines.
2. **Porosity:** Demonstration of porosity in materials. Flotation properties of different objects depend on their porosity. For example, it was shown how an orange covered with its rind is able to float on water whereas when the rind is removed, it sinks. This is because of the air filled micro-pores in the rind which increases the buoyancy.

3. **Optical Illusions:** Demonstration of various types of optical illusions which are created due to the eye and the brain working together. **Optical Illusions** can use color, light and patterns to **create** images that can be deceptive or misleading to our brains. The information gathered by the **eye** is processed by the brain, **creating** a perception that in reality, does not match the true image. The famous Stroop effect was demonstrated wherein the difference in capability of the brain and eye to read colours of words written and reading the words themselves.
4. **Osmosis and Diffusion:** The difference between diffusion and osmosis was made clear to the students. Osmosis was demonstrated using seeds, raisins, eggs and cellophane bag. The importance of osmosis in everyday life was taught.
5. **Parts of Microscope:** The various parts of a compound microscope and their functions were demonstrated. The difference between a magnifying hand lens and compound microscope was explained.
6. **Visualization of bacterial shapes [cocci and bacilli] using Compound Microscopes:**
   The size and shapes of bacteria [prokaryotes] and some major differences with respect to their properties were explained in comparison to eukaryotes to enable understanding of the concept as to why a microscope is required to visualize bacteria. Spherical and rod shaped bacterial permanent mounts were demonstrated under total magnifications of 100 X [cocci] as well as under 100 X and 450 X [bacilli].
7. **Maths:** Projects of the following models were shown-
   Model showing inequalities in a triangle
   Model showing a) corresponding angles b) alternate angles c) exterior alternate angles made by two parallel lines and its transversal.
   Besides, some quiz questions were asked.
8. **Components of water** were demonstrated by a simple set up showing the electrolysis of water.
9. **Natural Indicators** made from purple cabbage, turmeric and beet were demonstrated in acid and base solutions.

# E. IWSA's Learning Garden

### (i) Tie and Dye Workshop at IWSA on 14th May, 2019

On 14th March 2019, Workshop of Tie and Dye using Natural Dyes was conducted by Dr. Niyati Bhattacharya, Trustee, IWSA . Fourteen members of IWSA participated.

IThe workshop started with a prayer. Initially Dr. Niyati explained what is a dye, types of dyes, what are mordants, different types of mordants and their purpose, types of fabrics which can be used, how to select a colour, what is exactly meant by shade, hue and croma of a colour and how is chromatography useful. She also explained the pre-requisite of the fabric to be used, what should be the temperature, what is MLR, pH etc. This session was follwed by a practical.

The solutions of mordants (alum, harda) were prepared under her guidance. Then different dye baths were prepared. Marigold flowers, fresh Parijat flowers, onion peels, Pomegranate skin, Catechu and Indigo colour etc were used for the same. Dr. Niyati explained the methods of preparations for dyeing the fabric. Then everyone did the

folding and tying of the fabric as per their choice and immersed them into the dye bath of their choice and everyone got beautiful results. All members showed enthusiasm.

Workshop triggered creativity in each participant. So much was the enthusiasm that 5 of the participating members repeated the session on the following day i.e 15th March, with the remaining material. All the members thanked Dr. Niyati Bhattacharya for ably conducting the session and guiding the participants.

**(ii) Talk by Ms. Anita Dash on Horticulture Therapy at IWSA on 1st July, 2019**

Ms. Anita Dash delivered a talk on Horticulture Therapy at IWSA on 1st July, 2019. Horticulture therapy is defined as engagement of a person in gardening and plant-based activities facilitated by a trained therapist to achieve a specific therapeutic treatment. Direct contact with plants guides the individual to focus away from stress, thus enhancing the overall quality of life.

Particular benefits of an active interest in gardening include better physical health through exercise and strengthened muscles that improve mobility. Gardening also leads to improved mental health through a sense of purpose and achievement. The opportunity to connect with others combats loneliness in seniors and develops social skills with children.

Horticulture therapy is increasingly being used to help people such as hospital patients, mental disorders like depression and anxiety as well as learning and attention deficiency disorders.

Therapeutic gardens are specifically designed to meet the physical, psychological, social and spiritual needs of the people using it. Some of the types of therapeutic gardens are sensory gardens, community gardens etc.

A sensory garden is designed with the purpose of stimulating senses such as sight, smell, touch, taste and sound with the help of the plants. These gardens are helpful for autistic children, dementia and specially those who have sensory processing issues. A community garden is very helpful for senior citizens.

The therapeutic relationship between humans and nature has increased relevance in the modern world due to increasing rates of anxiety, depression and feeling of social isolation.

**(iii) Visit of IWSA Members to Ruia College on July 22, 2019 for hydroponic study**

A team of IWSA members visited Ruia College on July 22nd, 2019 to study the hydroponic system set up by the students of Botany Department under the guidance of Dr. Jessy Pius and faculty staff. The hydroponic system was installed on the terrace of the college. It was interesting to note that it can be run on low cost methods compared to the commercial methods of hydroponics that are prevalent. Hydroponics has gained popularity in the settings of urban farming due to sustainable farming and zero carbon food. Other advantages include less land requirement, water is recycled and saved and pesticide-free produce. Basic principle of hydroponics is soil being

replaced by water solution rich in nutrients. The requirements for running a hydroponic set-up is also minimal with an aerator and EC meter inside a tub/bucket. Medium used is clay balls and the nutrient pack for the water. Various methods were shown such as Ebb and Flow, Aquaponics, Aeroponics Bubbleponics, Deep Water Culture, Kratky or Dutch Bucket System, and NFT or Nutrient- Filled Technique of which Deep Water and Dutch Bucket as the most ideal for planting heavier produce such as potatoes. It also requires less monitoring and maintenance other than checking the electrical conductivity on a daily basis. Overall, the visit was very informative and it is apparent that the techniques used can help the agricultural and farming industry to the next level.

**(iv) Visit of Jai Hind College Students to IWSA Learning Garden on 16th August, 2019**

An educational visit of Jai Hind college, Biotechnology students on 16th August, 2019 was aimed at creating awareness of the green initiatives, imparting relevant knowledge and igniting enthusiasm, motivation and inspiration amongst students about IWSA's Green initiatives. Ms. Priya Jacob welcomed Prof. Nissy Sunil, Prof Monalisa Chakravarty, Ms Renee Vyas and the students. She also introduced the speakers.

Ms Tripta Tewari spoke about IWSA's various efforts for women empowerment as well as the green initiatives. Dr. Niyati Bhattacharya explained about the plant dyes and their sources. The students expressed a desire to do projects in natural textile dyes. Ms. Vijaya Chakravarty highlighted the key concepts of Biodiversity, Environmental degradation, Sustainability etc on which the garden has been designed.

The students were taken on a guided tour. In the Learning Garden, the plant sections highlight many scientific concepts and facts, important for the conservation of biodiversity. Ms. Sukhvinder Sandhu, Ms. Ambika Jayaraman and Ms. Malathi Rao lucidly explained about the Desert ecosystem, Primitive plants and stem / leaf modification respectively. This was followed by Ms. Snehalata Bhavsar pointing out the Traditional Conservation Practices like Ganesh Patri Puja and Biblical Herb Garden which have promoted biodiversity and sustainability. The students were intrigued to see the different Bioregions—Western Ghats, Deccan plateau, Rainforest, Coastal and Wetlands in one place. Ms Priya Jacob explained about the Indoor Air purifying plants and how they help to absorb and neutralise chemicals given off by household gadgets, paints, varnish etc.

Dr.Srirupa Mukherjee and Ms.TriptaTewari explained the role of flora in butterfly conservation, aromatic compounds found in plants and the role of biofuels in conserving natural resources. Ms. Manashi Chakraborty spoke about the important role a sensory stimulation plays in learning.

Ms. Vijaya Tilak and Dr. Paramjit Anthappan explained about solar energy. Students were curious about the biogas plant, composting pit, water harvesting etc. and happy about the opportunities for collaborative projects.

Ms. Renee Vyas from the Tree Appreciation walks of Mumbai had the students entertained with anecdotes about Plumerias and Ficus.

To sum up the session, Dr. Paramjit Anthappan spoke about the ways of writing a comprehensive report. Ms. Vijaya Chakravarty emphasised the need for creativity along with learning and Dr. Surekha Zingde said that in all learning, we first observe, then we think about our observations and follow this up with questioning to ensure that we understand. The biotechnology students were therefore encouraged to think about the observations in the Learning Garden and relate them to concepts they study in college.

**(v) Talk by Dr. Paramjit Anthappan on "Soil Microbes and Plant Growth" at IWSA on 19th August, 2019**

Dr. P. D. Anthappan, Former I/C Principal of Bhavan's College, Mumbai, and Retired Head, Associate Professor and Research Guide [Microbiology] delivered a lecture on 'Soil Microbes and Plant Growth' at IWSA on 19th August, 2019 at IWSA, Vashi. As a prelude she briefly shared the topic relevant research communications of her students presented at local, national and international platforms on applications of beneficial microbes for effective biocontrol foliar sprays, use of probiotic bokashi preparations for increasing soil sustainability and potential bacteria for siderophore production to enhance plant growth. She explained that a single gram of fertile soil could be viewed as a container of a biological universe including all domains [Bacteria, Archaea and Eukarya] and elements of life. The scope and significance of soil as a dynamic and important ecosystem for plant growth and harbouring a microbial community was overviewed. Besides the ecological, morphological, cultural and biochemical properties of soil inhabitants like bacteria, actinomycetes, fungi, algae and protozoa along with their roles played were discussed for cycling important elements and affecting plant growth. Some recent advances and trends for study of unculturable soil microbes including metagenomics and use of hydrophonic systems were also touched upon. The talk was concluded on a positive prospective finding of the prevalence of anti-depressant microbes in soil reported to stimulate serotonin production to enhance human happiness while nurturing learning gardens.

**(vi) Field Observations of the Pansy Butterflies at IWSA**

Pansy Butterflies belong to the family Nymphalidae or Brush Footed. They are also called Buckeyes or Inspectors due to the prominent 'Eye Spots' on both their wings. The Pansy can exist in two adult forms due to seasonal variations; wet and dry season forms.

1. **Common Name:** Peacock Pansy **Species:** alamania **Genus:** Junonia

**Family :**Nymphalidae **Status:** Common

**Butterfly Host Plants:** Ixora singaporensis, Lantana camara, Stachyterpheta indica etc

**Caterpillar Food Plants:** Barleria sp, Hygrophilia auriculate, Mimosa pudica [Touch me Not]

**Location observed:** Western Ghats Section, Learning Garden, IWSA, Vashi, Navi Mumbai, Maharashtra

**When it was spotted:** The Peacock Pansy was spotted at IWSA in October-November 2018. It is notable for its bright orange colour.

**Additional Information:** The butterfly is orange coloured on the upper side with prominent "peacock" eye spots. These 'Eye Spots' give this butterfly the appearance of an 'Orange-Faced Owl' and help frighten the predators. This is the wet season form. The underside of the wings are duller. The orange colour of the Peacock Pansy fades into a lighter shade of brown to resemble a dry leaf during the dry season.

**Observation**: Under sunny condition, they have a habit of opening their wings wide to sunbathe while resting on a perch.

**2. Common Name:** Grey Pansy **Species:** atlites **Genus:** Junonia

**Family:** Nymphalidae **Status:** Common

**Butterfly Host Plants:** Same as for Peacock Pansy

**Caterpillar Food Plants**: Same as for Peacock Pansy

**Location observed:** Butterfly Section, Learning Garden, IWSA, Vashi, Navi Mumbai, Maharashtra.

**When it was spotted:** It was spotted at IWSA during late monsoon in the month of September 2019.

**Additional Information:** There are a row of eyespots on both forewings and hindwings. The eyespots are partially orange and black and outlined in a white circle. The species has distinct wet and dry season forms where the markings on the wings are darker in the wet form and paler in the dry form.

**Observation:** They adopt a flap-and-glide flight pattern. It has a habit of returning to the same spot and then open its wings flat to sunbathe.

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**By Ms. Priya Jacob, Ms. Vijaya Chakravarty**
**Pictures Courtesy: Ms.Madhu Pahwa and Ms.Tripta Tewari (Pictures on Page 45).**

# 1. Other Activities

### 1. Mangrove Forest Cleanup Drive at Vashi

IWSA joined hands with local citizens and NMMC staff for 3 weeks for the mangrove forest cleanup drive on Saturday mornings **(Starting from 25th May, 2019 and ending on 15th June, 2019)** to remove the debri like plastic, thermocol products and other trash stuck in the mangroves. Vashi has a mangrove lining of 800 metres long, along the mini sea shore from Sector 8 to Sector 10. On the third Saturday in the month of June, three truck loads of garbage containing mainly plastic, thermocol, rubber, glass and many other items like bags and cartons were removed. By participating in this drive we realized the magnitude of the devastation caused by the citizens and and the slow death of mangroves if we do not act soon. We appealed to the citizens through NMTV that whatever we throw into the ocean comes back to us, and mangroves are the first line of defense from tsunami and they are the breeding ground for animals and form a complete ecosystem.

A strong message was sent to all to shun the use of plastic bags and thermocol, be aware of non degradable products, and not to throw these including pooja items into the sea and to make continued efforts to care for the environment. The take home message was to protect our mangroves and allow it to breathe so that in return they give us oxygen for life.

### 2. Mentoring of Mr. Ajayraj Jadhav by IWSA members.

Mr. Ajayraj Jadhav, a young XI Std student from Karmaveer Bhaurao Patil School, Aitwade, Budrak, Sangli participated in the Rayat Vidnyan Parishad at the KBP College, Vashi in December 2018. His innovative project and interest in science was noted by IWSA members, Dr. Lalitha Dhareshwar and Dr. V. Sudha Rao. They wanted to encourage him and give him an opportunity to enhance his scientific interest. Dr. Lalitha Dhareshwar and Dr. Sudha Rao arranged a one month internship for Ajayraj at the Homi Bhabha Centre for Science Education, TIFR, Mumbai with the help of Dr. H. Pradhan of the centre. Ajayraj spent an interesting summer vacation at HBCSE under the guidance of Dr. G. Nagarjuna and his team and learnt better techniques to enhance the working of his agriculture based project which involved controlling water supply to the fields. In June, 2019, IWSA member, Dr. Surekha Zingde introduced Ajayraj to Mr. Jagdish Chaudhari of Tata Consultancy Services who was engaged in promoting a special Interest Group for Affordable Agriculture under IEEE, Pune with the students of Pune engineering colleges. Ajayraj is now being mentored by Mr. Chaudhari for improving his innovative skills. IWSA is happy to have a role to play in ensuring Ajayraj does well in working on his scientific interests which are of importance to farmers.

### 3. International Yoga Day at IWSA

International Yoga Day was celebrated at IWSA on 22nd June, 2019. Ms. Tanuja Bendre conducted a yoga session at the IWSA Multipurpose Hall, IWSA campus,

Vashi. There were approximately 40 participants during the session. Ms. Unnati Pahwa demonstrated the various yogasanas whilst Ms. Bendre explained the correct method of executing each asan. Ms. Tripta Tewari gave the welcome address and elaborated on the science of yoga.

# Nursery School and Education Committee

## 1. Eco- Friendly Workshop at IWSA on 31st August. 2019

Eco- friendly Ganesh Workshop was held at Indian Women Scientists' Association (IWSA), Vashi on Saturday, 31st August, 2019. The workshop was conducted by Rupali Madan, renowned sculptor and founder of 'ERA'.

The aim was to promote the concept of "Eco-friendly Ganesh" where the idols are made with seeds of vegetable and fruits. More than 70 participants including senior citizens, school children and college students, slum children from NGO Aarambh learnt to make the Eco-friendly Ganesh. The idols were made of Natural clay, Shadu clay and painted with natural colours.

The participants were educated about the harmful effects of plastics and artificial materials which are used in the decoration. They were advised to immerse the idols in their garden to grow plants and trees out of the seeds used in the idols.

## 2. Other Activities

(i) Music and Movement was organised on 12th July, 2019 by Ms. Honey Thakkar.

(ii) Puppet workshop was organised by Shri Katta Babu on 3rd August, 2019. All ECCE students participated.

(iii) Dr. Lalitha Dhareshwar (President, IWSA) delivered lecture-cum-workshop on 'Heterogeneous Learners' on 6th August, 2019. It was well appreciated by students as well as faculties.

(iv) Edible Rakhi (Healthy rakhi ) competition was held for IWSA Indirabai Padhye Nursery School on 9th August, 2019 wherein mother and child together made edible rakhi.

(v) Independence Day was celebrated by Nursery children & teachers in the ICICI Multipurpose Hall on 14th August, 2019.

# IWSA's Murli Laj Chugani Health Care Centre

The regular doctors, a dentist and physiotherapist, continue with their routine work.

On 15th August, a special musical programme by Shri Swaroop Kumar was organised in the IWSA complex. The connections between music and wellness / good health are well established and Swaroopji graciously consented to give a short performance. He is traditionally a classical musician who has dedicated his life in propagating Indian

classical music. He has learnt from his grandfather guru Pandit T. L. Raju and thereafter from Pandit Dinkar Kainini and Pandit Narayanrao Bodas. He is currently working with Fr Agnels school and runs his own gurukul and trust under the name of Swar Sudha Trust.

The musical program was attended by IWSA members and hostel inmates. First, Mrs Swaroop rendered a few patriotic songs, and then she was also joined by her young daughter. In the end, Swaroopji sang two beautiful bhajans which held the audience in great raptures. Music therapy is well documented and is known to reduce stress and conflict. It boosts concentration and enhances linguistic functions, social skills and personality development. Plato, the ancient philosopher, said that "...rhythm and harmony find their way into the innermost places of the soul" . The 15th August Wellness program combined with a musical show of Shri Swaroop, was music for the soul, indeed!

## IWSA's Working Women's Hostel and Day Care Centre

Hostel residents, Committee members and several IWSA members celebrated Independence Day on 15th August, 2019, with flag hoisting and singing the National Anthem. Ms. Sana Awasthi, one of the hostellites mesmerized the audience with her poem on "Women Power" and Ms Rose Mary led the girls in the singing of patriotic songs. The program ended with distribution of sweets to all participants.

In the Day Care Centre, August has been a busy month. On 15th August, 2019 the children made Rakhis with coloured paper and tied them around each other's wrist on the occasion of Raksha Bandhan. The children celebrated Independence day on 19th August, 2019 wherein they made their own flags, coloured them and then danced and sang. Dahi Handi was celebrated on 23rd August, 2019. The little boys and girls dressed up us as Krishna and Radha in traditional attire and enacted the breaking of a dahi handi. The young children enjoyed the event immensely.

# Reports from Branches

## Amravati Branch

### 1. Kitchen Garden Workshop

A kitchen Garden Workshop was organised by Indian Women Scientist's Association, Amravati Branch in collaboration with Department of Zoology, Bharatiya Mahavidyalaya, Amravati and Marathi Science Council, Amravati at Bharatiya Mahavidyalaya, Amravati. The programme was open for all. The workshop was held at the Conference Hall, Bharatiya Mahavidyalaya, Amravati, on **August 22, 2019.** Chief guest Dr. Archana Kakade, Associate Scientist, Krushi Vidhnyan Kendra (KVK), Durgapur, key speaker Mr. Pravin Gulhane, President Marathi Science Council, Mr. Sushildatta Bagade, Secretary, Marathi Science Council and Dr. Deeplaxmi Kulkarni, Convener, IWSA, Amravati Branch were present on the dais.

In the introductory speech, Dr. Deeplaxmi Kulkarni stated that benefits of kitchen garden are many fold for eg., we get pesticide free nutritious vegetables and fruits for the family, management of kitchen waste at home, clean and green environment and this hobby gives real happiness. Therefore, for proper guidance of development and maintenance of one's own Kitchen Garden successfully the workshop was arranged.

Mr. Pravin Gulhane described the requirements and steps of setting up a kitchen garden in the backyard, gallery or terrace. In his descriptive power point presentation, he explained selection of pots and seeds, way of sowing the seeds, management of water, light and nutrients for healthy growth of plants. He also gave a demo of using waste plastic bucket, pots for growing fruits and vegetables and the use of a Waste Eating Basket to convert the vegetable waste into organic fertilizer.

Speaking on the occasion, Chief Guest, Dr. Archana Kakade emphasised on the use of wild vegetables. She explained importance of nutrition garden for rural areas and the various schemes run by KVK.

Over 70 participants from Amravati, Akola, Karanja (Lad), Achalpur along with staff and students of Bharatiya Mahavidyalaya and IWSA members actively participated in this workshop. Organic fertilizers, seeds, pots and plants were made available to the participants by "Herbage World" and "Gayatri Nursery". On this occasion, free sample packs of organic fertilizer were given by Mr. Abhuday Somwanshi to the participants. Ms. Mayuri Jadaho conducted the programme while Dr. Amrapali Wasnik presented vote of thanks. IWSA, Amravati Branch members, students and staff of B.M.V. worked hard for the successful organisation of the workshop.

# Baroda Branch

### 1. One day Workshop on Introduction to Herbal Therapeutics

One day workshop on herbal therapeutics was conducted at Shree Ramakrishna Institute, Surat, to understand the principles of herbal and ayurvedic medicines and to gain insight about concepts and phenomena of ayurvedic science on 29th July, 2019.

About 40 students of M.Sc. Biotechnology participated in this workshop. Dr. Nehal Shah gave an introduction about the program and also activities of IWSA (Baroda Branch) to the participants.

An elaborative lecture was given by Mr. Rayomand Parabia, Health Consultant, Parabia Remedies, Surat on what is ayurveda, misconceptions related to ayurveda, present status of ayurveda and herbal medicines, principles and concepts of ayurveda like vaat, pita cough, five different basic processes of preparing ayurvedic medicines, research in the field of ayurveda etc.

Later students were divided into 4 groups and taken to the laboratory where they were provided material and given instructions on how to prepare 4 different herbal products as part of hands on training during the workshop. Students were taught different recipes. Under the supervision of Mr. Parabia, they prepared four different useable

products. They were also briefed about the utility and medicinal significance of these products.

During the lab work, Mr. Parabia shared many easy, yet useful product making recipes and gave many tips related to health of human body. Students and staff members enjoyed the herbal tea prepared by students during the workshop. The products were gifted to non-teaching staff members of college for use.

The workshop ended with a very fruitful learning day for all the participants which was not only informative, performing but above all joyous and left a lifelong memory.

Students learnt the basic concepts of Ayurveda. They practically learnt how to prepare cough syrup, derma cream, gulkand and herbal tea along with the medicinal importance of each ingredient. Misconceptions related to ayurvedic medicines were clarified and personal health problems of participants were discussed and resolved too. Many research problems related to the same were discussed for the future work of students.

# Delhi Branch

### 1. One-Day Workshop on "Research Writing" on 20th August 2019

Indian Women Scientists' Association (IWSA), Delhi Branch, in collaboration with Delhi Technological University (DTU) organized 2019 Veena Roonwal Memorial, a one-day workshop on "Research Writing" on 20th August 2019, at Pragyan Hall, Admin Block, DTU Delhi.

The purpose of the workshop was to make students aware about research writing, as it is an integral process of research and generation of scientific knowledge. The scholars usually need the ability to prepare research reports and dissertations systematically and publish research papers in reputed journals. Many times adequate training in the academic writing skills is required to improve the quality to a desirable level. The workshop was attended by 87 participants consisting of Faculty Members, Research Scholars, and UG/PG Students from DTU Delhi and other distinguished institutes and colleges in Delhi/NCR.

The workshop began with the National Anthem followed by Saraswati Vandana and lighting of the lamp by the dignitaries.

IRD DTU welcomed the Chief Guest, Hon'ble Vice-Chancellor, Prof. Yogesh Singh , Dr. Rina Sharma , Convener, IWSA Delhi and Senior Principal Scientist, CSIR-NPL, Prof A. Trivedi, Dean IRD, Dr.Ruchika Malhotra, Associate Dean IRD and Dr. Anjali Sharma Executive committee member IWSA Delhi, Principal Scientist, CSIR-NPL by presenting plant saplings.

Prof A. Trivedi welcomed the chief guest, dignitaries, and participants and presented his welcome address. He highlighted the importance of language in the research. Dr

Rina Sharma informed the audience about “Indian Women Scientists Association” including its status, activities carried out by Head Quarters and various Branches, memberships etc. She delivered a talk on development of Scientific Temperament in the Society - Role of women. While talking on the topic she emphasised that as per Constitution of India development of scientific temper is a fundamental duty of every citizen and urged students to commit themselves to this duty.

The program was inaugurated by Hon’ble Vice-Chancellor, Prof. Yogesh Singh. He spoke about the importance of research in India and how it has evolved over time. He stressed upon the need for good research writing, which enables the work to be published in high-level journals. He also discussed about ‘research excellence awards’, an initiative of DTU Delhi. Vote of thanks was given by Dr. Ruchika Malhotra on behalf of IRD DTU.

After the tea break, Technical Session-I started with the presentation by Prof. A.Trivedi. He spoke about Research thinking which includes selecting the research area and doing the initial study.

Dr. Ruchika Malhotra gave a systematic idea about writing a research paper which included key points such as selection of the research area, performing a systematic literature review, writing research questions, hypothesis formation and many more. She also described various research terminologies such as survey, systematic review, whitepaper and impact factor, etc. She provided brief information about various journals and conferences.

Technical session-II started at 2 pm after the lunch break. In this, Dr. Anjali Sharma discussed about ethics in research. She stressed the topic of plagiarism and its consequences through various national and international examples.

The hands-on session was initiated by Dr. Ruchika Malhotra and Dr. Anjali Sharma. Students were provided a copy of a research paper and were asked to present the summary of the paper in 400-500 words. The students presented the summary in front of the audience and had interactive discussion about reference citation, summarising a research paper and plagiarism rules, etc. At the end, Dr Anjali Sharma presented vote of thanks to DTU and all the participants.

The workshop received very good feed back from students.

# Kalpakkam Branch

### 1. BRNS Popular Science lectures at two Government Schools at Nerumbur and Pandur on 21st June 2019.

Dr. P. Vineetha, Head, Paedeatrics, DAE Hospitals, Kalpakkam delivered lectures on Developmental changes during adolescence to girl students from IX Std from two schools namely Govternment Adi Dravida Welfare High School at Nerumbur and

Government Higher Secondary School at Pandur which were about 10 km away from Kalpakkam. Dr. Vineetha, addressed 50 students from Nerumbur and 80 students from Pandur. Her talk commenced with the physical changes and psychological changes that happen on girls during their adolescence and dwelt on the role of hormones. She further elaborated on the myths and medical facts about menstruation, the importance of hygiene-personal and surrounding. The talk also included aspects of menopause which the mother's of the students must be going through and the kind of sensitivity as daughters they should have towards their mother. It was heartening to observe the interaction between the speaker and the girl students. Dr. Vineetha patiently clarified all their doubts and elaborated further on the role of food and nutrition in avoiding anaemia and facing the challenges. A booklet in Tamil, covering the aspects of growing up to adolescence was distributed to all the students.

At the Nerumbur school, Smt. Sasirekha, Senior teacher (Physics), welcomed the audience and at Pandur, senior Social studies teacher, Smt. Indira, welcomed the students and members present. Dr. Kalavathi, Convener, IWSA Kalpakkam branch gave an introduction to IWSA activities at each of the schools before Dr. Vineetha's lecture. Dr. Padma, Treasurer of IWSA (K) gave a vote of thanks at the end of the program at both the schools. Dr. Padma thanked the sensitivity of the school authorities in enabling an interaction between the girl students and the paediatrician.

## 2. Technical Talk by Vanaja Nagaraju and AGBM, IWSA(K) on 25th June, 2019

Annual General Body Meeting of IWSA (Kalpakkam branch) was organized on **25th June, 2019** at MDL Seminar Room, IGCAR, Kalpakkam. AGBM was preceded by a technical talk by Smt. Vanaja Nagaraju, Head, P&CS, ESG, GSO, Kalpakkam. Her talk on "GSO's 'Go Green' Initiatives: A Glimpse" was both interesting and enlightening. She showed the importance of General Service Organisation (GSO) through various activities like rain water harvesting program, waste management program etc. She also highlighted the importance of cleanliness of our townships. She elaborated about the way household waste is collected with the help of supporting staff of GSO and the various methods by which this waste is made into useful biogas. The talk was followed by an active interaction of the audience with the speaker.

The AGBM started with a welcome note by Dr. S. Kalavathi, Convener, IWSA (K) and followed by reading of secretary's report by Dr. Anita Toppo. Secretary's report was proposed by Smt. K. Shivakamy and seconded by Dr. S. Vijayalakshmi. Treasurer's report was presented by Dr. S. Padma and was proposed by Smt. T. Jayanthi and seconded by Smt Padmapriya Selvakumar. AGBM was attended by more than 85 members of IWSA Kalpakkam branch. Dr. Kalavathi, convener, IWSA (K) elaborated about the activities of IWSA. She urged the members of IWSA to get associated with one or more activities of IWSA and welcomed their feedback and suggestions. The members expressed their satisfaction on the overall functioning of IWSA. Dr. Kalavathi encouraged IWSA members to motivate their younger colleagues to become members of IWSA.

### 3. BRNS-Popular Science lecture at Rajeswari Vedachalam Government Arts College, Chengalpattu on Monday, 26th August, 2019.

**Dr. K. Prabakar,** Scientific Officer (F) & Asst. Prof. in Physics (HBNI,Mumbai), Surface and Nanoscience Division, Materials Science Group (MSG), IGCAR,Kalpakkam, delivered a lecture on "How to weigh a virus" . He informed the audience that microcantilevers are the simplest micromechanical systems anchored at one end and free to move at the other end. Typical dimensions of microcantilever are in the order of 100 µm x 10 µm x 1 µm and are fabricated using either Si or polymer based materials.

Microcantilevers can be regarded as mechanical oscillators and can be visualized as miniature diving boards. They are extensively used for ultra sensitive mass detection. This is achieved by measuring the shift in its resonance frequency due to the added mass. Mass sensitivities in the range of atto grams, which is suitable for single virus detection, are also reported. Various aspects of operation, fabrication techniques (lithography & etching in class100 clean micro fabrication room), functionalisation methods (i.e to detect specific molecules, coating with specific detector molecules), characterization methods and resonance frequency measurement were presented. Specific examples of ultrasensitive mass sensing using these devices viz. single smallpox virus weight measurement (resonant frequency change merely 60 KHz), cantilever array to measure different parameters in blood like antigen, transcription factor, gene, DNA hybridisation etc were also given. Polymer nano composite microcantilevers help in explosive detection in ppm levels in few seconds of response time in ambient condition.

Nearly 100 students from Physics & Chemistry Department and 10 teaching staff attended the program. The welcome address was given by Dr. K. Rajarajan, HOD, Physics. At this lecture Principal Dr. S.Chidambara Vinayagam, inaugurated the Physics Association of the college and introduced its office bearers. Introduction of IWSA was given by Dr. S. Kalavathi, Convener IWSA (K) & Head,High Pressure Physics Section, Condensed Matter Physics Division, IGCAR, Kalpakkam and Dr. Shanmuga Sundar of the College proposed a vote of thanks.

## Kolhapur Branch

### 1. Celebration of International Mangrove Day by IWSA, Kolhapur Branch, 26th July, 2019.

The activity was organized for gardening course students of Gardens Club of Kolhapur at Rajarampuri 8th Lane, Kolhapur. A lecture on importance of mangrove ecosystem was delivered by Prof. (Dr.) Niranjana Chavan, Department of Botany, Shivaji University, Kolhapur, to inform the participants about mangrove diversity, coastal plants and habitat. There were 40 participants consisting of Gardens Club members and students.

### 2. Tree Plantation Program at Shirbavi, Taluka Sangola, District Solapur

During monsoon season, tree plantation program was organized by IWSA, Kolhapur branch at Shirbavi village, Sangola in collaboration with NSS unit of Vidnyan Mahavidyalaya, Sangola and Forest Department. It was a 3 day's Programme **(6th to-8th August , 2019)** and about 4000 trees were planted. Tree seedlings were made available by forest department.

Dr. Seema Gaikwad, co-convener, IWSA Kolhapur Branch, Dr. K.B. Ghadage, NSS Programme Officer and Members, Vidnyan Mahavidyalaya, Sangola, Devkarsaheb and their staff from forest department participated in this program. In all there were 134 participants.

## Nagpur Branch

### 1. Panchang, planetary configuration and impact of their movements on environment and human life

A talk by Jyothish Ratna, Smt. Vidhya Rajandekar, who is the first and probably till date the only woman who publishes Panchang was organised on **6th July, 2019** at Abhyankar Smarak Hall, Dhantoli, Nagpur. She has received Government of Maharashtra Award for her work on Panchang. The topic was "Panchang, planetary configuration and impact of their movements on environment and human life". She explained in detail about Panchang, calculations and Hindu calendar. She deliberated upon how auspicious day and timings are decided for marriage and other good events. How rains, eclipses are predicted, how sunrise and sunset timings are decided, rahu, ketu and their influences on our lives was a part of interactive discussion that followed. Audiences got deeply involved in the discussion. About 35 participants attended the talk.

### 2. Environment Management and Conservation

IWSA, Nagpur Branch, in association with alumni of Neil City High School (Presently D.D. Nagar School, Mahal, Nagpur) organized a scientific talk by Dr. Mrs. Gadkari entitled, 'Environment Management and Conservation', for the students registered at Upay Foundation's (NGO) centre running at the parking place of Persistent Software Technology Company, Nagpur on **27th July, 2019**. The talk included sources of pollution and how pollution occurs in air, water and soil. She explained to the little children about surroundings and how they must be maintained clean. She further deliberated on children's role in preventing pollution and how they can bring awareness amongst family members neighbours and friends. The talk was well received by the students. About 35 participants attended the talk.

### 3. BRNS-Popular Science lecture at Jawaharlal Nehru college of Science, Commerce and Arts Wadi, Nagpur

Indian Women Scientist Association Nagpur Branch organized a talk "Developing Scientific temper busting Superstitions" by Dr. Ronini Karandikar, HBCSE, TIFR at Jawaharlal Nehru college of Science, Commerce and Arts Wadi, Nagpur, for undergraduate students on 13th August, 2019.

Dr. Rohini Karandikar informed that Article 51A (h) of the Constitution requires us to develop the scientific temper, humanism and the spirit of inquiry and reform. Many a times there are false claims and misleading information. Beliefs about science are spread without any scientific basis. Many people are blindly accepting such beliefs just because the explanations to these claims contain some scientific terms. This clearly shows the loss of reasoning and critical thinking in the society.

The aim of the present talk on scientific temper was to sow the seeds of critical thinking among students. Students were shown a video film showing how people fall prey to wrong beliefs without understanding root causes. They were explained the scientific method and how to analyze certain claims and seek evidence. Towards the end of the talk, students were presented with claims around eating during lunar eclipse, and about the Indian traditional belief on women to stay away from long preserved foods such as pickles during menstruation. Students were engaged in animated discussions and came up with scientifically sound arguments to debunk these myths. A quiz was conducted based on the talk and prizes and certificates were distributed to the winners. The 160 students who attended the talk were very receptive to the topic and participated actively in discussion.

The function was inaugurated at the hands of Principal Dr.Vijay Dontulwar and IWSA founder member Dr. Anuradha Gadkari. Principal Dr. Dontulawar in his introductory remarks congratulated IWSA for its efforts. He cautioned students about wrong and unscientific claims prevailing in our society. Dr. Anuradha Gadkari highlighted the importance of scientific temper and scientific thinking for betterment of our society and further cited that many people become victim of false claims. The program was conducted by Dr. Manisha Bhatkulkar, Asst professor of Zoology. Executive members of IWSA Nagpur were present on the occasion.

## Nellore Branch

### 1. Science of Memory and Nutrition

A lecture on “Science of Memory and Nutrition” was given by Dr. Bindu Menon, Convenor, IWSA, Nellore Branch at Tataya Municipal High School Vengal Rao Nagar, Nellore, on **20th July, 2019.** About 75 students of Standard 8th to 10th attended this program.

In this era of fast technology, more and more people are depending on the Internet for their information. Children of this age should realize that the importance of forming new memories rather than being dependent on technology. Even a simple act of

remembering a name needs to have connections between neurons. It was emphasized that the 100 billion nerve cells can have 10,000 connections, which further proves that one needs to keep learning. However whatever memory is formed will be lost if one does not keep memorizing or getting exposed to the event; in the students case their books and chapters need to be memorized else the synapses get weaker gradually. Many examples were enumerated and memory games were played and interaction was encouraged. An overview of nutrition and brain health was given and there was a good interaction with students.

### 2. Memory processing, storing and retrieval

IWSA Nellore Branch organized an interactive session with students at Vowel Junior College, Nellore on **31st August 2019**. It was a wonderful interactive session with children as to how they read, make notes, and prepare for exams and how memory functions.

There is a blur between the interface of the physical world and the digital world. It has been known that the interaction between modern technology and human society can have temporary psychological effects. At this present time, students are facing 'information overload' problem. This is creating problem in retrieving and selectively deleting or forgetting these data. There is a bombardment of new information everyday. Hence much information never gets stored. There are some science-backed ways to improve ones' memory. These aspects were discussed with the children. About 300 children participated in this event.

## IWSA MEMBERS RECEIVE RECOGNITON

### 1. Backstage Secrets from Fabrication Lab – Saakshi Dhanekar

Research scientist Saakshi Dhanekar writes an article about how a woman scientist is juggling in the 'male dominated society' for doing research and accomplishing her goals. The complete article can be found here: Backstage secrets from the fabrication lab by Saakshi - The Life of Science

Dr. Saakshi Dhanekar is currently an Assistant Professor, Department of Electrical Engineering at IIT, Delhi. She has shared her story of the fun and challenges of working in a Fabrication lab. She is also an IWSA Member.

### 2. Prof. Bindu Menon receives "Sakshi Excellence Award in Health Care"

Prof Bindu Menon Neurologist Apollo speciality Hospitals and Convener, IWSA Nellore Branch, received the "SAKSHI EXCELLENCE AWARD in HELATH CARE" on **10th August, 2019,** at Hyderabad. Chief Guest of the function was Governor of Telangana His excellency Shree E. S. L. Narasimhan. The award was handed over by Director General of Andhra Pradesh Police, Shree Gautam Sawang and Padmashree awardee Prof. Shantha Sinha. Prof Menon received this award for the activities related to prevention and awareness of stroke and epilepsy. Her rural initiative "Neurology On Wheels " which is first of its kind in the country where she travels with her team to the rural community with the motto "We reach, We Teach, We treat" was considered highly innovative.

## 3. TEDx Talk by Prof. Bindu Menon

Eminent neurologist and Convener of IWSA Nellore Branch, Dr. Bindu Menon shared her inspiring life story in which she followed her heart's true calling. This was on a difficult yet satisfying path to social commitment, which culminated in her pet projects 'Neurology on wheels' and 'Dr. Bindu Menon foundation', both of which are a great boon for the underprivileged people lacking access to proper healthcare facilities. It will surely inspire budding doctors to give back something to society. She is one of the most prominent names among Indian neurologists, a strong hearted woman with social commitment, a warrior for a noble cause, and creativity at its peak to revolutionize medical outreach to the masses. Having completed MBBS from Gandhi Medical College, MD medicine from Jiwaji University and DM neurology from Mumbai, she took further Neurology training at University College, London. She has 21 years of experience in the field. This talk was given at a TEDx event at Bhubaneswar on **17th August 2019** using the TED conference format but independently organized by a local community. The link can be accessed at
https://www.youtube.com/watch?v=hf5049qxiyE

## 4. We are proud of the Achievements of Prof. M.A. Vijayalakshmi, an IWSA Member

Prof. M.A. Vijayalakshmi with her basic training in chemistry, from All India Institute of Chemistry, Calcutta in 1966, obtained a PhD from University de Bourgogne, Dijon, France in 1974 and then her D.Sc. from University de Technologie de Compiegne, France in 1980 combined with UNIVERSITY OF UPPSALA, SWEDEN. She worked as a Research Engineer at CNRS, National Research Council Group, UTC, France from 1979 to 1990. She became a Full Professor in UTC in 1990, and in 2001 she became a Distinguished Professor in UTC (called Professor "Class Exceptional" in French) which is the highest level in the academic career in France.

The Center for Bioseparation Technology (CBST) was created at VIT University by Prof. M.A. Vijayalakshmi under the "High priority Research Area" funded by Department of Science and Technology (DST), Government of India. The Centre is projected by the DST as a 'National Facility' for R&D and training and it caters to postgraduate, doctoral and post-doctoral researchers.

In 2005, she was awarded “CHEVALLIER de PALMES ACADEMIQUES” by President of France

For more details read: http://www.info.vit.ac.in/cbst/vijayalakshmi_profile.asp

# ARTICLES

## Dr. Vikram Sarabhai - “Father of Indian Space Programme”

*Dr. Susan Eapen, Former Senior Scientist, BARC and Former Trustee, IWSA*
*Email:eapenhome@yahoo.com*

Dr. Vikhram Sarabhai, the great Indian scientist and innovator is known as “Father of India’s Space Programme”, since his vision and hard work led to the development of Indian Space Research Centre, which launched several satellites and set up Chandrayan and Mangalayan missions in later years. Dr Vikram Sarabhai was born on 12th August 1919 at Ahmedabad, to affluent parents - Ambalal Sarabhai (Industrialist) and Sarala Sarabhai. His wife - Mrinalini Sarabhai was a world famous dancer and his daughter - Mallika Sarabhai is an activist and Indian classical dancer and actress. His son - Karthikeya Sarabhai is one of the world's leading environmental educators and a dedicated community builder. As this year marks the birth centenary of Dr. Vikram Sarabhai, we bring this article about this great son of India as our humble tribute to him.

**Early Education.**

Dr. Vikram Sarabhai did his schooling and early education in an experimental school in Ahmedabad set up by his parents, which had a workshop attached to it to encourage and nurture scientific temper among students. At the age of 18, he went to St John’s college, Cambridge and secured a degree in Natural and physical sciences. After coming back to India, he joined Indian Institute of Science, Bangalore and started his research on cosmic rays under the leadership of Nobel laurate Dr. C.V Raman. He had the company of Dr. Homi Bhabha, who introduced Sarabhai to Mrinalini Swaminathan, who was Bhabha’s tennis partner. Mrinalini was a classical dancer and soon they fell in love and got married in 1942. In 1945, Sarabhai went to Cambridge University and secured his PhD on cosmic rays.

He returned to an independent India and realised the need for research institutions in India to carry out scientific research. He borrowed money from his relatives and friends and founded the Physical Research Laboratory (PRL) in Ahmedabad, which was inaugurated on 11th November 1947. Together with Dr. K. R. Ramanathan, who became the first director of PRL, they initiated studies on cosmic rays and transformed PRL into one of the well-known institutes of space research.

**Setting up of institutes on Space Research.**

Dr. Sarabhai was an institution builder. With the support from Dr. Homi Bhabha, widely known as "Father of India's Nuclear Science Programme", Dr. Sarabhai set up the first rocket launching station in India. The centre was established at Thumpa in Thiruvananathapuram, on the coast of Arabian sea, primarily because of its proximity to Equator. After putting in a lot of efforts for setting up the infrastructure, personnel, communication link and launch pads, the inaugural flight was launched on November 21, 1963 with a sodium vapour payload. Dr. Sarabhai initiated a project on fabrication and launch of Indian satellites. However, only after his sudden demise in December 1971 at Kovalam, Thiruvananthapuram his dream came true, when in 1975 the first Indian satellite Aryabhatta was put into orbit from a Russian Cosmodrome.

Today Vikram Sarabhai Space Centre (VSSC) at Thiruvananthapuram, which is named after Dr. Sarabhai after his demise, is the main centre of ISRO, where design and development activities of satellite launching vehicles and rockets are being carried out. India's second satellite Bhaskara was launched from Russia in 1979. Rohini was next launched on July 18, 1980 from Indian soil from Sriharikotta. The Indian National Satellite System (INSAT) was used for news exchange, broadcast, climate prediction etc. from 1983 onwards. Today ISRO has several units working under it. On 8th April 2008, ISRO launched 10 satellites and on February 15, 2017, 104 satellites were launched together.

**Establishment of Institutes.**

Dr. Sarabhai established several institutes which led to scientific research and the progress of independent India. They are.

1. Physical Research Laboratory (PRL) , Ahmedabad.
2. Indian Institute of Management (IIM), Ahmedabad.
3. Community Science Centre, Ahmedabad.
4. Indian Space Research Organization (ISRO).
5. Space application Centre, Ahmedabad (6 centres by Sarabhai were merged to make this centre).
6. Fast Breeder Test Reactor (FBTR), Kalpakkam.
7. Variable Energy Cyclotron (VEC), Kolkata.
8. Electronic Corporation of India Ltd. (ECIL), Hyderabad.
9. Uranium Corporation of India Ltd. (UCIL), Jaduguda.
10. National Institute of Design, Ahmedabad.
11. Darpan Academy of Performing Arts, Ahmedabad. (Along with Mrinalini Sarabhai).

Dr. Sarabhai also ran several businesses and was a Professor at MIT, USA. After the unexpected demise of Dr. Homi Bhabha, Dr. Sarabhai became the chairman of Atomic Energy Commission.

Dr. Sarabhai received Shanti Swaroop Bhatnagar Award in 1962 and was conferred Padma Bhushan in 1966. Padma Vibhushan was conferred to him posthumously in 1972.

The lander of Chandrayan 2 is named ‘’Vikram” as a part of centenary celebration. Dr. Sarabhai had deep faith in India and its people, and wanted the nation to be self-reliant and not dependent on other nations. He did not want the country to be vulnerable to international pressures for progress in Science and Technology. It was unfortunate that Vikram lander of Chandrayan2 could not achieve the soft landing on moon on 7th September, 2019 as planned. But we, the 1.3 billion strong people of India, are proud of the 98 % success achieved by Chandrayan 2 and we salute the vision of Dr. Sarabhai, the Father of Indian Space Programme.

# How Women Power Steered Chandrayan 2 Launch

Chandrayaan-2, India's second lunar exploration mission, was headed by two women making it a first for the country's lunar mission. M Vanitha and Ritu Karidhal were the Project Director and Mission Director respectively. They steered the deep sea mission team of which about 30 per cent were women. M Vanitha, the Project Director, is the first woman to hold such a vital position and was responsible to oversee the development of hardware and other aspects of the project essential for the completion of the mission. Vanitha, a design engineer by training, had received the award for the 'Best Woman Scientist' in 2006 by the Astronomical Society of India. Mission Director, Ritu Karidhal was previously part of the Mars Orbiter Mission as the Deputy Operations Director. For Chandrayaan-2. Karidhal developed the mission objectives, reviewed its progress and coordinated with other agencies and strived hard to reach the goal.
Referred to as the 'Rocket Woman of India', she is an aerospace engineer, graduated from the University of Lucknow after which she joined ISRO. Ritu also received the prestigious ISRO Young Scientist Award in 2007 from APJ Abdul Kalam in 2007.

"We only looked at the fittest person for the job, and it so happened that it was women here. It didn't make a difference for us," said ISRO Chairman K. Sivan.

Breaking gender stereotypes, women in the last decade have taken up leadership roles in the STEM (science, technology, engineering and math) fields. Rocket science, for one, has traditionally been a male stronghold. Women, who contributed to the space progamme of India, were hardly seen or heard. History was, however, scripted in the early 2000s when the success of India's space mission put the role of women scientists in spotlight.

ISRO stated that women constituted 20 per cent of the total workforce. In the scientists and technical category, women constitute an even lower 12 per cent. With women scientists yet to receive their due recognition, we wait for the day when a woman goes on to head India's premier space agency.

https://m.dailyhunt.in/news/india/english/news24online-epaper-newsonline/women+power+powers+chandrayaan+2-newsid-125104828

# We Salute these Women Achievers

## 1. Chandrima Shaha, First Woman to Head Science Academy

As a young scientist, Chandrima Shaha often "felt invisible" when she sat among her male colleagues. Only a few acknowledged her presence. But little did it deter this feisty woman from fighting her way through gender biases and achieve heights that only some dare to reach. From being a vice-captain of West Bengal's first women's cricket team to becoming the first woman cricket commentator for All India Radio, Shaha has added another first to her illustrious career. The president-elect of the Indian National Science Academy (INSA) will be the first woman to hold the post. Her appointment was announced in the second week of August 2019.

"Women have to first believe in themselves in order to take over leadership positions. I have been elected by a council consisting of mostly male members," Shaha tells The Print. With a scientific career spanning more than three decades, Shaha, 66, now looks forward to becoming the face of Indian science. Along with the newly-elected council of 30 other members, Shaha will assume her new office from 1 January, 2020. During her stint at the INSA, she wants to encourage collaborations between scientists of different fields so that problems can be solved using a multi-disciplinary approach. To get people more interested in science, Shaha wants to increase the outreach of scientific communities. She pointed out how various government initiatives have given a push towards innovations but the learning system is not designed to encourage research.

For more details: https://theprint.in/science/chandrima-shaha-first-woman-set-to-head-science-academy-was-also-a-cricketer-commentator/273673/

## 2. Minty Agarwal, IAF Officer receives Yudh Seva Medal

Among the 132 awardees of the gallantry awards to Armed Forces personnel and members of paramilitary forces as approved by President Shri. Ram Nath Kovind, is Squadron Leader Minty Agarwal. She has been awarded the Yudh Seva medal, for distinguished service during wartime. Just like the Indian government has done, it is time for the citizens of this country to recognise this brave woman who played a key role as fight controller during the aerial combat between India and Pakistan on February 27, 2019 and displayed distinguished service during the conflict. After five of India's IAF Mirage-2000 aircrafts bombed a JeM terrorist training camp in Balakot on February 26, 2019, Pakistan Air Force had attempted a retaliation soon after. Those attempts were, however, foiled, thanks to Squadron Leader Minty Agarwal's quick reflexes and clear decision-making during the time of emergency conflict. According to reports, Minty, who was part of the team of seven fighter controllers on duty that morning on February 27,

2019, became wary of the Pakistan Air Force attack and controlled the interception package launched to stop Pakistan's fighter jets, successfully preventing an Indian Air Force loss. Her skill was recognised by the Armed Forces, thus awarded accordingly with one of India's most distinguished wartime awards — the Yudh Seva medal.

For more details: https://www.dnaindia.com/india/report-who-is-minty-agarwal-iaf-officer-honoured-with-yudh-seva-medal-2782014

### 3. Manasi Joshi, Indian Para-Badminton Athlete

While PV Sindhu made all of India proud by winning Gold in Badminton at the World Championships, let us have a look at Manasi Joshi, another shuttler who won gold at the same court in Para-Badminton.Manasi Joshi is an Indian Para-Badminton athlete who is currently World No. 2 in SL3 Singles. She was six when she started playing badminton with her father, a retired scientist from Bhabha Atomic Research Centre. An engineer by qualification, she completed her graduation in Electronics Engineering from K. J. Somaiya College of Engineering, University of Mumbai in 2010. In 2011, she met with a road accident and lost her left leg. Despite the handicap, she enrolled at P. Gopichand badminton academy at Hyderabad for training in 2018. In September 2015, she won a Silver Medal in mixed doubles at the Para-Badminton World Championship held in Stoke Mandeville, England.. In October 2018, Manasi won a Bronze medal for India at the Asian Para Games 2018, held in Jakarta, Indonesia. She won a Gold medal for India at the Para-badminton World Championship 2019 held in Basel, Switzerland.

Abridged from: https://en.wikipedia.org/wiki/Manasi_Girishchandra_Joshi

### 4. Aarti Dogra, the short IAS Officer doing exceptional work

Aarti Dogra is a 2006 batch IAS officer of Rajasthan cadre. She is widely regarded as one of the most honest officers of Rajasthan in the contemporary time. In a career spanning little over a decade, she has compelled everyone to take notice of her work and achievement. In fact, Aarti is a big inspiration for all of us. Just three years after birth, the pediatrician had told her parents that she is disabled and may need special school. Her father, an Indian Army officer, decided to send Aarti in a general school, not a special school. He fought for her. He became a guide to her,and, most importantly, he decided to not have any other baby. The short height of Aarti couldn't become a hindrance to her indomitable spirit. Her work as Collector of Bikaner and DM of Jodhpur has been exceptional. As the DM of Ajmer, she had become a favorite officer of Vasundhara Raje Scindia. Ashok Gahlot, in the first administrative reshuffle of his new government, appointed Aarti Dogra along with Rajan Vishal as Joint Secretaries to the CM. This is a big responsibility and obviously Ashok Gahlot has high expectation from her.

Reference: indicivil.blogspot.com/2018/05/aarti-dogra-ias-profile-wiki-height.html

## 5. Women in Vellore are bringing back water to arid lands

In the past four years, nearly 50% of Vellore's agricultural labour has left behind the farmlands for the city, according to the farmers' organization Tamizhnadu Vivasayigal Sangam. In March, Vellore was declared one of the 24 drought-hit districts in the state by the government. As a result, the few who made a living tilling farmland had to look for work as contract labourers in cities.

A group of women from Salamanatham village in Kaniyambadi block refused to resign to this fate and stayed back to turn things around. Assisted by The Art of Living Foundation's (AOL) volunteers, the women registered as Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) workers, have helped revive what was once the primary source of water for the district — the Naganadhi River — which had been lifeless for nearly 15 years until 2018.

"A river flows above the surface only after the groundwater has been replenished and the lakes are full. Therefore, reviving a river isn't just about its flow, but allowing enough water to seep into the ground. In other words, letting the rainwater infiltrate the soil by slowing it down," says Chandrasekaran Kuppan, director of the Naganadhi Rejuvenation Project, which was launched in 2014.

Following this technique, 50 women built 36 recharge wells and 25 boulder checks (using pebbles to slow the rainwater flow), in the past four years. Nathiya, 32, is among the first batch of women roped in for the project. She's part of the team behind two recharge wells in her village. She could harvest the water-intensive paddy thrice a year on her 40-cent plot – something she couldn't have imagined three summers ago. "With no rain, we had to leave our land barren. But being a part of this project, I earned ₹224 a day for almost 25 days, and brought water into my land," she says.

For more details about this project:
https://timesofindia.indiatimes.com/city/chennai/women-in-vellore-are-bringing-back-water-to-arid-lands/articleshow/69781295.cms

**Chandrima Shaha, First Woman. President (elect) of Indian National Science Academy**

**Squadron Leader Minty Agarwal: recipient of the Yudh Seva Medal**


**Manasi Joshi Para Badminton Champion**

**Aarti Dogra – IAS Officer who overcame Physical Disability**

**The two Super Women of Chandrayan 2 Mission : Dr. Vanitha Muthayya, Project Director (Left) and Dr. Ritu Karidhal, Mission Director (Right)**

**Vellore Women Reviving Naganadhi River**

Dr. Saakshi Dhanekar

Prof. M.A. Vijayalakshmi

Dr. Bindu Menon, Convener, Nellore Branch receives "Sakshi Excellence Award for Health Care on 10th August, 2019

Inauguration of Science Nurture Program 5th July, 2019

Science Camp at IWSA on 26th August ,2019

Tie and Dye Workshop conducted by Dr. Niyati Bhattacharyya at IWSA on 14th May, 2019

Visit of Students from Jai Hind College, Mumbai to IWSA Garden on 16th August, 2019

**Pancy Butterflies at IWSA**

**Peacock Pansy (Left)**

**Grey Pansy (Right)**

**Independece Day celebrations by Nursery Children (Left)**

**Musical programme by Shri Swaroop Kumar (Right) 15th August, 2019**

**At IWSA Headquarters**

**Workshop on Kitchen Garden conducted by Amravati Branch on 22nd August, 2019**

**Workshop on Herbal Therapeutics organised by Baroda Branch, 29th July, 2019**


**Workshop on "Research Writing" organised by Delhi Branch on 20th August 2019**

**Dr. P. Vineetha with audience for the BRNS Popular Science lecture Organised by Kalpakkam Branch on 21st June 2019**

Technical Talk by Vanaja Nagaraju Organised by Kalpakkam Branch on 25th June, 2019

BRNS Popular Science lecture Organised by Kalpakkam Branch on 26th August 2019


IWSA Nagpur branch members after the talk on Planetary Positions at Nagpur on 6th July, 2019

Lecture on Environment Management , Nagpur on 27th July, 2019

Celebration of International Mangrove Day on 26th July, 2019 (L) and Tree Plantation Drive (August 6-8, 2019) (R) by Kolhapur Branch

Dr. Rohini Karandikar delivering BRNS Popular Science Lecture and the audience, Nagpur Branch on 13th August, 2019

Dr. Bindu Menon delivering Lecture on Science of Memory and Nutrition,Nellore Branch on 20th July, 2019

# BOOK POST

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**Dr. Bindu Menon conducts an interactive Session on Memory Processing with Junior College students at Nellore, on 31st August, 2019**

**BRNS Popular Science Lecture by Mr. C.S. Pradeep Kumar at U.C. College, Aluva Cochin on 19th July, 2019 organised by Dr. Susan Eapen (Former Trustee of IWSA)**

**TO**

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