



IWSA NEWSLETTER

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BRNS Sponsored talk, SIES College, Mumbai



Guest lecture, Hyderabad Branch



State level workshop on E Granthalaya, Mumbai



Mathematics Olympiad (VAMMO) Roorkee Branch



BRNS Sponsored talk for schools, Mumbai



BRNS sponsored talk for Colleges, Pune branch

BRANCHES

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





Popular Science Lecture
Organized by
Indian Women Scientists' Association
Vashi, Navi Mumbai

Supported by Board of Research in Nuclear Sciences (BRNS)

In association with
Department of Biotechnology
Amity Institute of Biotechnology,
Amity University Maharashtra Panvel

Lecture on
"Artificial Intelligence for Health Care"
by
Dr. Reena Pagare

IEEE Pune Section - Chair Engineering in Medicine & Biology Society,
Associate Professor, Dept of Computer Science & Engineering,
School of Engineering,
MIT Art, Design and Technology University
Loni Kalbhur, Pune

Saturday, 17 Sep. 2022, 2.00 pm
Venue: Seminar Hall, Ground floor A2 block.
Amity Institute of Biotechnology, Amity University, Panvel

ALL ARE CORDIALLY INVITED TO ATTEND



BRNS sponsored Popular Science lectures at colleges



Nature trail visit of children in IWSA's Learning Garden

From the Editor's Desk



Dear IWSA Members,

In this issue of Newsletter, you will find our regular features of reports regarding Popular Science Lectures, Science Awareness Activities, Activities regarding Early Childhood Education, Computer Centre, Library, Health Centre, Activities of various Branches etc. The activities reported in this issue were mostly conducted in offline mode barring a few which were conducted online. In our "Science and our Life" (SAOL) Lecture Series, four interesting lectures were conducted during the period of September to December 2022 (All online). Eleven popular Science lectures for college students (three - online and eight - offline) and seven offline lectures for school students were held during this period. All these lectures were supported by BRNS. Internship programs for college students, VIPNET Activities, Workshop on Fermented foods, VAMMO Maths Olympiad, Play and Learn Sessions for School Students, Reports from ECCED and Nursery Committee, Online webinars, courses on Computer Education, E-Granthalaya workshop by Library Committee, Health centre activities are some of our educative and community welfare programs reported in this Newsletter. At IWSA headquarters, we celebrated the 90th Birthday of our Founder Member Dr. Sudha Padhye on 13th September 2022. Visit of Red Dot Foundation Members along with young students working on "Engendering Climate Action for Water and Waste Management" was an enriching experience for IWSA members who interacted with them on 11th September 2022.

This issue also brings the interesting activities carried out at IWSA Branches at Hyderabad, Kalpakkam, Kolhapur, Nagpur, Pune and Roorkee. The article on Nobel Prizes 2022 describes in detail about the discoveries made by eminent scientists in the fields of Physics, Chemistry, Physiology and Medicine that led to their winning the Nobel Prizes for the year 2022. We have reported about four women achievers – Dr. Radha Rangarajan, Director, CDRI, who was selected for the "Champions of Change" initiative of Prime Minister Modi, recognizing India's emerging entrepreneurs, Ms. Manasi Joshi, Arjuna Awardee, a para-badminton player, who began her sports journey in 2015, four years after amputation of her leg due to an accident, Capt. Harpreet Chandi, the first woman of colour to complete a solo unsupported trek to the South Pole, and Dr. Maitreyee Wairagkar, the Scientific Achievement runner up of Inspiring Women in Science Awards 2022 by scientific journal 'Nature' in partnership with Estée Lauder. We have also highlighted the achievements of two IWSA members, Dr. Archana Sharma and Dr. Susan Eapen who are among 75 Indian Women in STEAM featured in the book "She Is" published by Red Dot Foundation to commemorate 75 years of Independent India. 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

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President's Message



The momentum for the year long celebration of IWSA's Golden Jubilee has caught up well amongst members at HQ as well as the eleven branches. Many varied activities are being planned in addition to the regular lecture series. For the first time the headquarters will conduct a Mathematics Olympiad for Atomic Energy Central Schools, Anushaktinagar. Popular science talks for Schools are drawing interest among many Navi Mumbai education institutes. We conducted a lecture in Hindi vernacular that was well accepted.

Students from management institutes are coming forward to work with associations like ours. This is creating a positive impact in their career path and expanding our outreach. The Library committee is on its way to digitization. We now have E Granthalaya facility, a tree library for the children of Nursery and Day Care Center. It is also the time for our annual scholarships and I once again request branches to consider their own by creating a corpus at the branches. These small steps go a long way in shaping a girl student's career in science. Lately, members are taking interest to publish books e.g. Wild Forgotten Foods, and booklets e.g. World of Fungi, as a mode of outreach.

Volunteers from the community are coming forward to give their time towards our activities. We have shared cuttings of medicinal plants for a garden at the KBP College, Vashi. The IWSA garden was chosen for celebrating an outdoor birthday and playfully engaging young minds in the importance of green space. So also was the success of the Play and Learn session on sciences conducted by the Science Awareness committee. Keep browsing the website for upcoming Triennial Conference announcements and enjoy reading the issues of Newsletter from the archives. Like the Nobel prize articles in this issue one can find so many interesting stories of women achievers of past and current years. As the annual festival season commences I wish all our readers and their families the best of times and good health.

Dr. Rita Mukhopadhyaya
rita45@gmail.com



Reports from Head Quarters

Science Awareness Programs

A. IWSA – BRNS Popular Science Lectures for Colleges

These lectures were conducted onsite or online at various Colleges on the topics of interest to the College. The speakers were identified by IWSA. Students from various classes-FY BSc-to-MSc, attended the lectures along with faculty. For each of the lectures the audience was informed about IWSA and the college. The lectures were followed by discussions with the speaker.

1. Lecture on 8th Sept., 2022 at Department of Botany, Ramnarain Ruia Autonomous College, Mumbai by Dr. Jayashree Sainis, Former Senior Scientist & Raja Ramanna Fellow, Bhabha Atomic Research Centre, Mumbai. Lecture was held onsite at Ruia College.

Topic: **Artificial Photosynthesis**

Abstract: Light drives life on this earth. Sunlight is like a shower of photons of different frequencies. Chlorophylls in photoautotrophs absorb some of these photons to initiate photosynthetic reactions. Chlorophylls have very high extinction coefficient. The excited chlorophyll molecule is unstable and loses energy by fluorescence in 10⁻⁸ seconds and the crux of Photosynthesis lies in utilizing the energy of excited electrons in chlorophyll molecules in less than 10⁻⁸ seconds. The reaction of abstraction of electron from excited chlorophyll molecule is one of the fastest chemical reactions. This is the reaction that uses the energy from excited chlorophyll molecule to do the photochemistry and feeds the entire world. Interestingly the energy of visible light lies in the visible spectrum 400- 800 nm where chlorophylls absorb the highest. Artificial photosynthesis attempts to mimic the natural photosynthesis for energy production. The increasing demand for energy by the modern society, dwindling natural oil and gas reserves and increasing emission of greenhouse gases resulting in global warming have necessitated the search for alternative energy sources. Among these, solar energy forms one of the best alternatives. Several research efforts have been devoted to understand the molecular mechanisms of photosynthesis, to decipher how light energy is converted to chemical energy. Earlier, these efforts were aimed at increasing the rate of photosynthesis by crop plants to increase food productivity. Photosynthesis Research is now poised to undergo renaissance. The mechanism of light harvesting and assimilation by natural photoautotrophs is being explored with new zeal and fervor to develop artificial photosynthetic systems.

Outreach: 163

2. Lecture on 15th Sept 2022, at Zoology Dept, Maharshi Dayanand College of Arts, Science and Commerce, Mumbai by Dr. Jacinta S. D'souza, Professor and Chairperson, School of Biological Sciences, UM-DAE Centre for excellence in Basic Sciences.

Lecture was held onsite at Maharshi Dayanand College

Topic: **Model Organisms: Unity in Diversity**

Abstract: The curious mind of humans has driven us towards gathering a humongous amount of information and synthesizing it in seemingly disparate ideas. This has not only helped us learn and grow, but has also stopped us from becoming obsolete. Biologists have trodden this very path of curiosity to drive themselves in understanding the seven tenets of life. Eventually, this knowledge would be useful for improving human health, treating human diseases, and increasing human life-span. If our eventual goal is towards betterment of Homo sapiens, then experimenting on humans seems the perfect way forward! However, except in the case of highly controlled and regulated clinical trials, geneticists and scientists do not use humans for their experimental investigations because of the obvious risk to life. Instead, they use various animal, fungal, bacterial and plant species such as *Mus musculus*, *Aspergillus niger*, *Escherichia coli*, *Saccharomyces cerevisiae*, *C. elegans*, *Chlamydomonas reinhardtii*, *Drosophila melanogaster*, *Arabidopsis thaliana* as well as several animal and plant-based cell lines as model organisms for their studies. The obvious questions that therefore arise are: (1) Can we apply the knowledge obtained from studying these model organisms to alleviate human misery? (2) Is this strategy accurate? The talk on 'Model organisms: Unity in diversity' is a peep into addressing these questions. Examples of how two model organisms, viz. *Escherichia coli* and *Chlamydomonas reinhardtii*, the former a prokaryote and the latter a eukaryote are being used towards addressing a ciliary disease will be discussed.

Outreach: 107

3. Lecture on 17th Sep 2022 at Postgraduate and Research Dept of Botany, Catholocate College, Pathanamthitta, Kerala by Dr. Annamma Anil Odaneth, Assoc. Prof, DBT-ICT Centre for Energy Sciences, Inst of Chemical Technology, Mumbai. Lecture was held online.

Topic: **Biomaterials from Algal sources**

Abstract: Algae-derived biomaterials such as alginate, ulvan, carrageenan and agarose have been used in a variety of applications. These algal extracts differ from products derived from terrestrial plants in that they feature varied functional groups and have been used as a major component in diverse applications. The quick adoption in a variety of industries is driven by its biocompatibility, biodegradability, ability to form ionic gels, abundance of hydroxyl, carboxylate and sulphate groups in its chemical structure, water solubility, and simplicity of algae-based product extraction. These biomaterials have several uses in the manufacturing of textiles, culinary products, medical equipment and cosmetics. Although there are many studies on the application of algae-based biomaterials, demonstration and pilot size systems are still lacking. Algal biomass valorization can be advanced using a biorefinery-based strategy. The use of these renewable bioresources in the energy, nutraceuticals, pharmaceutical, cosmetic, bioremediation of waste water, packaging and agricultural industries provide long term sustainable solutions for today's world.

Outreach:65

4. Lecture on 19th Sep.2022 at Dept of Biotechnology, SIES College of Arts, Science and Commerce (Autonomous), Sion (W) Mumbai by Dr. Prakriti Tayaliya, Associate Prof.

Dept of BioSciences and BioEngineering, IITB. Mumbai. Lecture was held onsite at SIES College, Mumbai.

Topic: **3D Printing Techniques for Biomedical Applications**

Abstract: Three-dimensional (3D) printing (also known as additive manufacturing technique) enables customized fabrication of 3D constructs with intricate design, high precision and resolution, which is not possible with other 2D lithography and printing processes. 3D printing technology, which used to be called rapid prototyping technology, is applied in various industries and is extensively used for patterning biomaterials in 2D as well as in 3D. Recent advancements have made it possible to fabricate complex structures comprising of biocompatible materials, cells and supporting components. Tissue engineering and regenerative medicine requires developing functional tissue-constructs that can mimic natural tissue for repair or replacement of damaged tissues or whole organs. 3D printing technology holds the potential to manufacture personalized tissue engineering scaffolds, repair tissue defects in situ with cells, and directly print tissue and organs using images obtained from computed tomography (CT) and magnetic resonance imaging (MRI) in order to perfectly match the patient's damaged tissue. Regenerative medicine is utilising 3D bioprinting to overcome the lack of transplantable tissues and organs. 3D laser lithography is another advanced technology, which enables modification of polymers at submicron level to engineer constructs with high complexity and precision for various biomedical applications such as cell biology studies, tissue engineering, regenerative medicine and pharmacology. In this talk, details of 3D bioprinting technology, its associated techniques, and a gist of different biomedical applications of 3D printing and laser lithography were discussed. Virtual tour of 3D laser lithography facility at IIT Bombay gave an overview of capability of the system.

Outreach:152

5. **Lecture on 19th Sep. 2022 at Science Association of SVKM's Mithibai College of Arts**, Chauhan Institute of Science & Amrutben Jivanlal College of Commerce and Economics, Mumbai by **Dr. Umasankari Kannan**, Head Reactor Physics Design Division, BARC, Mumbai.

Lecture was held onsite at Mithibai College, Mumbai.

Topic: **Renewable Energies for Sustainability-The Nuclear Option**

Abstract: Nature has endowed us with tremendous source of energy which can sustain all our energy needs. The science is how we tap it without disturbing its balance. Solar, wind, hydro, ocean and geothermal can be replenished and hence are practically potential sources for several thousands of years. Fossil fuels on the other hand are consumed rapidly and also take several millions of years to be produced. Global statistics of 2022 state that fossil fuels namely coal and oil together contribute to 61.3% of the energy production while the share of renewables is 35% with hydropower at 16% and nuclear at about 10%. India has an energy mix of 58.5% from fossil fuel and 41.5 % from renewables. Nuclear energy entails re-use or recycle of nuclear fuels thereby increasing its energy potential and renewables. Today the total electricity generation in India from nuclear stands at 6780 MW (e) and our uranium and

thorium reserves can increase this multifold. Nuclear has been proved to be the only mature non-carbon energy generation option to take on the challenges of the climate crisis.

This talk went through the world energy scenario, gave an overview of the benefits of renewable energy with a major focus on the nuclear option.

Outreach:142

6. Lecture on 19th Sep.2022 at IQAC and Science Depts, Sacred Heart College (Autonomous), Kochi by Prof. S, M Shivaprasad, Director, Karnatak State Higher Education Academy, Dharwad. Lecture was held onsite at Sacred Heart College, Kochi.

Topic: **Beauty of Science and Science of Beauty**

Abstract: The beauty and mystery of nature have always attracted the attention of thinkers and writers. The curiosity of scientists to understand the reasons for natural phenomena has prompted them to ask questions, make observations and imagine possibilities, in an attempt to open the doors to the secrets of nature. Be it the magnificence of the Universe, intricacies of the atomic structure or the origin and evolution of life, and even human social behavior have been exciting challenges. Scientists have been identifying common reasons and patterns, and it appears that we are moving towards realizing that 'Beauty and Truth' are synonymous.

Outreach: 100

7. Lecture on 24th Sep. 2022 at Department of Botany and Centre for Research, St.Teresa's College (Autonomous), Ernakulam, Kerala by Dr. Chitra Seetharam Mishra, Scientist, Applied Genomics Section, BARC, Mumbai. Lecture was held online.

Topic: **Gene Editing: The last ten years**

Abstract: Ten years back in 2012, Jennifer Doudna and Emmanuelle Charpentier published their finding that CRISPR-Cas9 could be programmed with RNA to edit genomic DNA. Genome/Gene editing is the precise modification of the DNA, in the form of deletions, insertions, or replacement in a living organism. Before discovery of the CRISPR technology, there were various technologies that had been developed to bring about genome editing in organisms, such as mega nucleases, zinc finger nucleases and transcription activator-like effector-based nucleases (TALEN), but none of these were as easy to use as the CRISPR-Cas technology. The CRISPR -Cas systems are easy to engineer and apply and therefore have taken the world by storm leading to several advancements in therapy and biotechnology. How far have we come in using the CRISPR technology to fulfil the dream of precise genome editing that can be a panacea for human health was clearly explained by Dr.Mishra.

Outreach:89

8. Lecture on 12th Nov.2022 at Dept of Microbiology, John Wilson Society's Wilson College (Autonomous), Mumbai by Dr. Rohan Khadiikar, Principal Investigator, CRI, ACTREC, Navi Mumbai.

Lecture was held onsite at Wilson College, Mumbai.

Topic: **Confocal Microscopy and its applications in Biology**

Abstract: Biology is complex and understanding biological phenomena has to be a concerted effort employing various advanced cutting-edge technologies. In order to study biological phenomena, understanding what happens at the cellular and molecular level becomes really important. One of the main technologies that has largely been used to study biology at the cellular level is microscopy. With the advent and use of fluorescence, light microscopy took center stage in order to look at biological problems with a different lens. The major problem that biologists started encountering with the use of conventional light microscopy was the out of focus light which would not give the needed resolution and details to look at ultrastructures inside the cell. Biology, as we understand today is very complex and studying biological processes at macromolecular and organelle level becomes necessary to understand the mechanistic underpinnings of various processes. Confocal microscopy is a technique that takes high-resolution fluorescent images of cells, tissues, and any other type of biological specimen by eliminating out-of-focus light. This is a scanning technique based on illumination of various points of a sample under investigation by using a pinhole. The excitation light beam in the confocal microscope is a laser source which produces fluorescence light. The seminar discussed the principles of confocal microscopy and its application in studying biological problems.

Outreach: 100

9. **Lecture on 21st Nov. 2022 at Dept of Microbiology, Jai Hind College, of Arts, Science and Commerce, Mumbai by Dr. Vainav Patel**, Scientist E, HOD, Viral Immunopathogenesis, ICMR-National Inst. of Research in Reproduction and Child Health, Mumbai.

Lecture was held onsite at Jai Hind College, Mumbai.

Topic: **Dynamics of Emerging and Re-emerging viral diseases**

Abstract: The lecture will address basic epidemiological principles such as prevalence, incidence and their relevance to surveillance of viral infections followed by reviews of important past, present, emerging and re-emerging viral infections relevant to child and maternal health. Specifically, technological tools, vaccination success stories, their limitations, challenges of chronic viral infections and lessons learnt from emerging and re-emerging epidemics were covered for viruses such as Herpes, HBV, HIV, Zika and CMV. A review of changing epidemiology spanning the last 100 years was also attempted highlighting both successes and failures in our ability to combat viral infections, both equilibrium (HSV, CMV, HPV) and non-equilibrium (HBV, HIV, Ebola) as well as lessons learnt from recent epidemics of Ebola, Zika & SARS-CoV-2. The current controversy regarding intentional non-vaccination and its implications for public health, as evidenced by re-emergence of measles and mumps was also discussed.

Outreach: 104

10. **Lecture on 24th Nov. 2022 at Dept of Botany, Telangana Univ, Dichpally, Nizamabad, Telangana by Dr. Siddhesh B. Ghag**, Asst. Prof., School of Biological Sciences UM-DAE Centre for Excellence in Biological Sciences, Mumbai.

Lecture was held online with Telangana Univ.

Topic: **Making a Transgenic Plant and its bountiful applications**

Abstract: The biggest question haunting the world is agricultural sustainability with the increasing population on one hand and changing climatic conditions on the other. It is estimated that the population will exceed 10 billion by 2050. This means we have to produce more food with the same amount of land and water that is available today. It is a daunting task to cater to this increasing food demand which results in extreme food insecurity. Everyday about 828 million people do not get safe and nutritious food. Conventional plant breeding techniques have been employed to generate new hybrid varieties but are limited by several factors pertaining to the reproduction potential of the plant and extent of the gene pool. Genetic engineering provides the advantage of transferring beneficial genes across kingdoms into crop plants for multiple ideal traits. To generate transgenic plants several parameters such as regeneration protocol, vector constructions, transformation methods, transgene integration, and inheritance of transgene need to be carefully deliberated. This talk ensued with some important technologies and major achievements in production and commercialization of transgenic crops in terms of stress tolerance, increased productivity, reduced post-harvest damages and production of molecules of therapeutic importance.

Outreach:375

11. **Lecture on 5th Dec. 2022 at Caius Research Laboratory, St. Xaviers College, Mumbai** by **Dr. Sorab Dalal**, Scientific Officer 'H' Principal Investigator, Cancer Research Inst. ACTREC, Navi Mumbai. Lecture was held onsite at St Xavier's College, Mumbai.

Topic: **The Role of Genetics in Modern Biology: Why Mendel still matters**

Abstract: This lecture celebrated the 200th anniversary of Gregor Mendel's birth. Mendel was an Augustinian monk who laid down the first laws of genetics that are still relevant today. The fact that he was able to come to these conclusions without any knowledge of the molecular basis of inheritance is a remarkable achievement and a testament to his observational skills. His observations are still relevant in the era of molecular genetics and during the course of this lecture Dr. Dalal discussed his initial observations, how they have been refined as we learnt more about the molecular basis of inheritance and how these principles were used in the study of basic biological problems and in the clinic. Initially Mendel's laws were covered and then exceptions to these rules of inheritance were described.

After that the discovery of DNA as the genetic material, Chargaff's rules and DNA structure and correlate these molecular and biochemical observations with Mendel's laws to demonstrate how DNA satisfies all the properties of the genetic material proposed by Mendel for the transfer of characters through generations using examples at each step. This was then be extended to genome sequencing and what that had added to our knowledge of genetic transmission. At the end of the talk, how models of human disease were generated in model organisms using Mendel's principles and how these promote the study of human diseases were discussed. Genetic testing that is available in clinics and how genetic counselors use pedigrees to advise patients on the probability that they or their progeny will develop a disease

was also presented. The gene environment interactions and how these could lead to disease development were also discussed.

Outreach:80

B. IWSA – BRNS Popular Science Lectures for Schools

These lectures were conducted onsite at various schools on the topics of interest as advised by the principal. The speakers were identified by IWSA. Students from classes-8th Std to 12th Std attended the lectures. The abstracts are given below.

1. Lecture on 28th Sept. 2022 at Radcliffe School Sector 8, Kharghar, Navi Mumbai, By Dr. K. V. Srinivasan, Scientist-in-charge, Low Temperature (Cryogenic) Facility at Tata Institute of Fundamental Research, Mumbai

Topic: **Significance of Cryogenics in Energy Storage & Industrial Applications**

Abstract: Cryogenics is an essential requirement in a variety of research areas. With the increasing demand for energy, environmental concerns and depleting fossil fuels, the focus is now on the new area called Cryogenic Energy Storage (CES) Systems. This talk will focus on environmentally safe way of storing energy using cryogenic fluids such as Liquid Air, Liquid Hydrogen and Liquefied Natural Gas (LNG). The talk will show a glimpse of various industrial applications of cryogenics in the areas of Engineering, Space, Medicine, etc.

Number of attendees: 189

2. Lecture on 29th September 2022 at Sainath Hindi High School, Vashi, Mumbai

By **Dr. Krishna Kumar Mishra**, Associate Professor, Homi Bhabha Centre for Science Education, TIFR, Mumbai.

Abstract: इस सृष्टि की रचना जल से ही हुई है। पृथ्वी पर जीवन है क्योंकि यहां जल है। जहां तक हमें ज्ञात है, समूचे ब्रह्मांड में सिर्फ धरती पर ही जीवन है। यह एकमेव जीवंत ग्रह है। वह इसलिए क्योंकि धरती पर जल, द्रव रूप में मौजूद है। धरती का तापमान जीवन के अनुकूल है। पारलौकिक जीवन की खोज में वैज्ञानिक सर्वप्रथम वहां पर जल की मौजूदगी के निशान खोजते हैं। अगर किसी खगोलीय पिंड पर जल है तो जीवन की संभावना बनती है। निष्कर्ष यह है कि जल है, तो ही जीवन है। भारत की सनातन परंपरा में जीवन के संगठनात्मक मूल तत्व के रूप में जो पांच तत्व बताए जाते हैं, जल उनमें एक प्रमुख तत्व है। सांख्य दर्शन के प्रणेता कपिल मुनि ने इन्हें पंचमहाभूत कहा है। भारतीय संस्कृति में समादृत महाकाव्य, श्रीरामचरितमानस में संतशिरोमणि गोस्वामी तुलसीदास ने लिखा है- 'क्षिति जल पावक गगन समीरा, पंच रचित अति अधम सरीरा'। जल की महत्ता शास्त्रों में तो है ही, यह हमारे लोक में भी चिरंतन रूप से व्याप्त है। हमारे धरातल पर तथा धरती के अंदर विविध रूपों में जल मौजूद है। यह धरती के ऊपर जलवाष्प तथा बादलों के रूप में उपस्थित है। पृथ्वी की सतह का लगभग तीन चौथाई भाग (70.8%) जल से घिरा है। पृथ्वी पर मौजूद जल का करीब 97% से ज्यादा भाग सागरों एवं महासागरों के रूप में है। धरती पर मौजूद कुल जल का ढाई प्रतिशत हिस्सा सादा जल है, जो हमारे उपयोग का हो सकता है। इस सादे जल का दो तिहाई हिस्सा ध्रुवीय प्रदेशों में हिमनदियों के रूप में जमा है। धरती पर मौजूद कुल जल का करीब 0.6% भूमिगत जल है। नदियों, झीलों, तालाबों तथा अन्य सतही जल स्रोतों के रूप में मौजूद जल की मात्रा

महज 0.1 प्रतिशत है। प्रदूषण के चलते इन जलस्रोतों में उपलब्ध जल का करीब 20% भाग ही अब पीने योग्य बचा है। ऐसे में हमारा ध्यान जल स्रोतों को सहेजने तथा उनके संरक्षित करने पर होना चाहिए। आज समय की मांग है कि हम जल स्रोतों को प्रदूषित होने से बचाएँ, इस अमूल्य संपदा को संभाल कर रखें। देशभर में व्यापक जल-जागरण कार्यक्रम चलाए जाने की जरूरत है। यदि हम जल को लेकर दीर्घकालिक ठोस नीति बनायें तथा उसे अविलंब मजबूती से लागू कर पाएं, तो ही आने वाली पीढ़ियों के लिए शुद्ध पेयजल सुलभ रह पाएगा।

Number of attendees: 131

3. Lecture on 15th October 2022 at D.A.V. Public School, Airoli by Prof. Omprakash Mandge, Course Coordinator, MET Institute of Computer Science, Mumbai.

Topic: **Applications of Artificial Intelligence (A.I.)**

Abstract: Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. AI systems work by ingesting large amounts of training data, analyzing the data for correlations and patterns, and using these patterns to make predictions about future states. For example, a chatbot that is fed examples of text chats can learn to produce lifelike exchanges with people. AI is applied in many industries and sectors, such as healthcare, business finance, law, education, banking, manufacturing and security.

Number of attendees: 85

4. Lecture on 10th November 2021 at Smt. Radhikabai Meghe Vidyalaya, Airoli, by Dr. Vinita Grover Gupta, Scientific Officer(G), Chemistry Division, Bhabha Atomic Research Centre (BARC), Mumbai

Topic: **Periodic Table-The Scientific Wonder**

Abstract: Periodic table of elements was discovered in 1869 and is undoubtedly one of the most significant achievements in science. It organizes all the discovered chemical elements in rows and columns, also called periods and groups respectively, in the order of increasing atomic number. It is extremely useful as it provides a quick reference for information about any element, like atomic mass, chemical symbol and even the trends in various physical and chemical properties. It provides an important tool to scientists and technologists wherein the location of the elements in the periodic table can be used to predict its behaviour. Interestingly, many scientists worked on the problem of organizing the elements, but it is Dmitri Mendeleev who is credited as its inventor. Since then, the periodic table has evolved to reflect over 150 years of scientific development and understanding in chemistry and physics. The story of periodic table is an interesting tale in itself and to recognize its importance, the year 2019 was celebrated as the International Year of the Periodic Table. There is no denying the importance of elements in our day to day lives and the fact that periodic table deals with arrangement of elements makes it indispensable to science and scientists. According to UNESCO, Periodic table is a window on the universe, helping to expand our understanding of the world around us. The lecture will discuss the brief history of periodic table followed by its usage to understand trends in periodic properties of elements and chemical and physical properties of elements/compounds.

Number of attendees: 190

5. Lecture on 14th November, 2022 at Datta Meghe World Academy, Airoli, by Ms.

Shradha Bhoir, Scientific Officer, Food Technology Division, BARC, Mumbai.

Topic: **Radiation processing of food: an overview**

Abstract: Treatment of food, feed and agricultural produce by means of specific ionizing radiation to enhance food safety and security is one of the most thoroughly studied methods of food preservation. Although most of the research performed in laboratories is underutilized, the application potential of this technology is wide and commercial use is increasing rapidly. Applications of radiation processing range from inhibition of sprouting of tubers and bulbs, elimination of harmful and spoilage causing microbes, controlling insect infestation to production of commercially sterile food products for special applications. In year 2022, successful trials have been conducted by BARC to export 16 tonnes of irradiated Kesar mangoes to USA by sea route, thus reducing the cost of the transportation and hence promoting the export. Also, commercial trials have shown that irradiated onions (Agrifound red) and potatoes can be stored for 7-8 months, thus fulfilling the gap between demand and supply. Various studies and groups of experts from the IAEA, the WHO, the FAO and few others have concluded that irradiated food is safe and nutritionally adequate. Similar acceptance for radiation processed food is provided by the Food Safety and Security Authority of India (FSSAI) also and it has gazette notified the regulation as well as issued guidance notes for food business operators. Presently, 25 food irradiation plants are functional in India. FSSAI has also issued class-based approval for products and dose limits for radiation processing of food. The utilization of the process is adapted rapidly by many developed as well as developing countries. The future of this technology will depend largely on better understanding of the role of the process in enhancing the keeping quality of food. If used to its fullest potential, this technology can save millions of lives we lose due to hunger or consumption of unsafe food and add billions of dollars to the world economy.

Number of attendees: 131

6. Lecture on 10th December, 2022 at Modern School and Junior College, Vashi, by Dr. Shashikant G. Mahadik, Scientific Officer, Haematopathology Lab, Tata Memorial Hospital, Mumbai.

Topic: **Blood and Our Life**

Abstract: Haematopoiesis is the formation of blood cells which takes place in embryo, liver, spleen, and bone marrow; thereafter proliferation in peripheral blood. Erythropoiesis is the formation of erythrocytes. Stages involved are proerythroblast, early normoblasts, late erythroblasts, reticulocytes and mature erythrocytes. Multipotential hematopoietic stem cells (hemocytoblasts) divide into common myeloid and lymphoid progenitors which then develop into various lineages to form thrombocytes, neutrophils, eosinophils and monocytes. Lymphoid progenitor develops into natural killer cells, T lymphocytes, B lymphocytes and plasma cells. Each of these blood cells has a specific morphology and function to perform to keep us healthy and fit!

Number of attendees: 148

7. Lecture on 19th December, 2022 at Pragati Vidyalaya, Vashigaon, by Ms. Shalini Mittal, Freelance Java and UI trainer and developer.

Topic: **Can Machines Imitate Humans?**

Abstract: "Machine learning is common sense, except done by a computer." Till date computers were called dumb machines. They were good at obeying orders following step by step instructions. This was true until recently. Some very smart people found a way to teach computers to learn by themselves which is called "Machine Learning". Computers are shown many examples of questions and answers. Using the examples, the computer tries to figure out a way to guess the correct answer. It learns to make a correct guess even if it has not seen a particular question using the examples shown to it. So, instead of coding software with specific instructions, machine learning trains an algorithm so it can learn how to make decisions for itself.

Number of attendees: 65

C. IWSA – BRNS “Science and Our Life” Series of Webinars

The following webinars were conducted through Zoom platform during September to December 2022 under “Science and Our Life” Series.

1. Lecture on 10th September, 2022, at 5pm on Zoom online platform of IWSA, by Dr. Sushmita Adhikari, Department of Physics, IISER Pune

Topic: **The weight of darkness – dark matter halos and their role in cosmological evolution**

Abstract: We understand today that most of what is visible makes up only a fraction of all the matter in the universe. Most of the energy density in the universe that is in the form of matter appears to be dark and does not emit any light. Dark Matter, as far as we can tell, only interacts through its gravity. However, it profoundly affects the way the universe and all the galaxies within it evolve and grow through time. In this talk I will discuss how observations of the universe, from the smallest galaxies to the largest massive clusters and their distribution in the sky helps us understand the fundamental properties of dark matter.

Outreach: 34

2. Lecture on 8th October, 2022, at 5pm on Zoom online platform of IWSA, by **Dr. Suman Mundkur**, Visiting Faculty, Department of Fibres and Textile Processing, Institute of Chemical Technology, ICT, Mumbai

Topic: **Textiles to Sustain Our Future**

Abstract: Textiles used in our clothing and home furnishing have been an indispensable part of our lives. Clothing satisfies our basic need for protection and dignity. The choice of textiles to make our clothing has played a significant role on how we demand and consume. Over-consumption without plans of disposal has led to landfill problems and recently contributed to climate change. About 63% of the textiles are synthetic and 25% cotton, the rest wood-based

and other natural fibers. With general awareness of sustainable lifestyle, the forecast for the next decade is the demand for sustainable fibers. Natural dyes, herbal finishes, and green chemistry used in processing will contribute to wellness textiles.

Outreach: 29

3. **Lecture on 19th November, 2022**, at 5pm on Zoom online platform of IWSA, by **Dr. B.N. Jagatap**, Chairman of the Research Council of the National Institute of Science Communication and Policy Research (New Delhi)

Topic: **Academic Framework of Higher Education under National Education Policy 2020**

Abstract: National Education Policy (NEP) 2020 contemplates disruptive transformation of the country's higher education sector. These disruptions include both institutional and academic restructuring to facilitate multidisciplinary education with emphasis on skill development, vocationalization, flexibility, Indian values and relevant research. The academic framework suggested in the policy has now been consolidated by the UGC and it includes 3-4 years degree programmes with multiple exit and entry options, broad multidisciplinary exposure, imaginative and flexible curriculum, engaging and effective pedagogy, field-based learning, community engagement, research-based specialization, and Indian knowledge system. It is now time for the academic institutes to implement the policy proposals in letter and spirit to realize a higher education system that is at par with the best in the world. In this presentation, we shall discuss the major components of the policy and the way forward.

Outreach: 25

4. **Lecture on 10th December, 2022**, at 5pm on Zoom online platform of IWSA, by **Prof. Archana Pai**, Professor, Dept. of Physics, IIT Bombay, Mumbai

Topic: **The New Era of Gravitational-Wave Astronomy**

Abstract: After the landmark discovery of the gravitational waves by the two LIGO detectors from merging black holes in a distant Universe, the field of gravitational wave astronomy has rapidly grown with an observation of ~90 compact binary mergers. Though most are binary black holes, the detectors also observed mergers of neutron stars and hybrid neutron star black hole mergers. These detections have unravelled puzzles in astronomy and posed new questions. This talk will provide an overview of gravitational-wave astronomy, with main highlights from the LIGO-Virgo observational runs and some future projections.

Outreach-15

D. IWSA – Student Internship Program

1. ITM BUSINESS SCHOOL internship 5th-17th December

Thirty six interns from ITM, Kharghar did internship program in IWSA from 5th to 17th of December. The students got familiarised with the concept and working of all the IWSA based on-campus projects and contributed towards Learning Garden Living Museum initiatives, Tree Library set up, E- Granthalaya conference planning, ECCE initiatives, collating information for triennial, etc under the guidance of IWSA subcommittees. They prepared QR codes, collages, videos, e-herbarium and participated in Citizen science program.

E. Activities in Collaboration with Vigyan Prasar

VIPNET Science Club

Following are the activities of the VIPNET Science Club (VP-MH 0248) during the period August to December 2021 and all these programs were for the benefit of VIPNET members from Maharashtra (Students and Teachers) and IWSA Members:

a) Fun with Science and Maths- Hands-on activities

12th Activity of IWSA- VIPNET Science Club (VP MH 0248) was held on zoom virtual platform on 13th September at 3.30 pm. Ashok Rupner, Senior Technical Officer and Ankish Tirpude, Technical Assistant, from Smt. Indrani Balan Science Activity Centre (SAC), IISER, Pune showed several simple activities that children can do with everyday objects to understand Electricity, Magnetism, Laws of inertia in physics and laws of areas in Maths.

Total number of participants: 30

b) Try your hand at Design Thinking

On 30th September 2022 at 4:00 pm, the thirteenth activity titled "Try your hand at Design Thinking" was held on the zoom virtual platform. The session started off with Ms. Disha Dbritto and Ms. Megha Chougule introducing some problems and encouraging the students and other club members to solve them in their own innovative ways. The session was quite interesting and made each and every participant try to find different ways of solving the many problems put forth by the duo from Homi Bhabha Centre for Science Education.

Total No. of Participants: 30

c) Coastal Guards: Mangroves

The fourteenth activity was held on 18th November 2022 at 4:00 pm, on zoom virtual platform. Prof. Niranjana Chavan, Retired Professor from Department of Botany, Shivaji University, Kolhapur explained the importance of Mangroves, their role during tsunamis and their different types especially in Kolhapur. It was an exhaustive and detailed coverage of the mangroves by an expert.

Total No. of Participants: 20

F. Garden-Based Learning (GBL) Activities

1. Workshop on Fermented Foods

A workshop on Fermented Foods was organised on November 4, 2022, at IWSA HQ. Dr Srirupa Mukherjee and Dr Maitrayee Paul presented three main fermented preserves, namely Sauerkraut, Kombucha tea, and Kimchi.

The workshop began with an emphasis on the importance of age-old practices of fermentation. The fermented food helps the survival of beneficial bacteria essential for gastrointestinal tract and gut health. Modern practices of antibiotic use, sanitation, and minimal use of live cultures in our diet may lead to poor functioning of the intestinal microbiome. This can result in gas, bloating, constipation and irritable bowel syndrome. Fermented foods such as Sauerkraut, Kombucha and Kimchi are healthy probiotics. They are live microorganisms crucial to healthy digestion.

Dr Maitrayee demonstrated the preparation of Sauerkraut made from cabbage and shared a few tips for achieving a delicious ferment. Dr Srirupa presented Kombucha Tea followed by the preparation of Kimchi. The demo sessions focused on fermentation and flavouring techniques. A biofilm or SCOBY to brew Kombucha tea was shown to the participants. For Kimchi, seasonal vegetables such as cabbage, radish, and carrot were used. A sample of kimchi paste was offered to the participants. Meanwhile, Ms Sadhana Syal, an entrepreneur involved in the preparation of fermented food Kefir talked about its benefits and therapeutic potential. Live active Kefir grains were shown to the participants and the methodology of preparing Kefir was explained.

Participants received printouts on the recipes, taste samples, methodology to safely make the fermented foods at home and also a variety of probiotic snacks.

Number of Participants: 45

2. Christmas Celebration, Masti Ka Pitara

A unique celebration of Christmas, "*Masti Ka Pitara*", was organised on 10th December 2022 in the botanical garden. Science concepts and practical knowledge were imparted to the kids with Fun and Enjoyment. IWSA volunteers as well as ITM interns were involved in organizing the event.

Concept of upcycling and saving trees was explained with the help of stories using puppets followed by practically showing uses of plants for example: edible flowers are broccoli and cauliflower, edible roots are radish, turmeric and so on. Radish plant, ladyfinger plant, bitter gourd creeper, Touch Me Not plant etc. were shown to the kids and they enjoyed touching and feeling the texture of the vegetables, which they otherwise only consume. The importance of trees and the need to take care of them and thank them was very well conveyed to the kids. In the Thank you activity, kids decorated an actual Christmas tree and mentioned "Thank you to trees". This was followed by a Christmas party. A guided tour was planned for the moms also.

Outreach: 38 (adults and children)

3. Outdoor nature trail for children in IWSA Garden - A unique birthday celebration

A thoughtful mother's search for an "off-beat" birthday celebration led to a pleasant evening of birthday joys at IWSA's Learning Garden. It was the seeds of 'nature love' that was sown, way back during the visit to IWSA in 2019, when the therapeutic benefits of bringing children close to nature was explained, which led 11-year-old Rhea Dharamsi and her mother Khyati Dharamsi to this nature-themed, sustainable birthday celebration on 13th December 2022. The children were taken on a journey to touch and feel plants; hear the sounds of leaves; sniff the different leaves to know their unique fragrance; all those pleasure and knowledge that were often ignored amidst the chaos. An insightful indoor demonstration showed the children how the colourful and attractive flowers could also be edible and help us make beverages with health benefits. The children were thrilled and fascinated by a session of moulding dried leaves and flowers into creative crafts on paper and also the floral patterns, peacocks and giant trees as well as words crafted with the pulses and mustard seeds on display. The children took back home not just the handmade memorable cards, but also selected plants, a very different type of return gifts. This unique celebration, with less clutter of toys and wrapping paper, induces less damage to the environment. Instead, children will be motivated to take a Nature pledge to ensure a greener and better future.

Outreach: 25 children aged 11- 14 years

4. Visits and other activities

Visit of Chris Hegde from ICMR, who went on to volunteer in the garden and Dr Vidya Shetty, professor, Somaiya Medical college who later brought a group of medical students as volunteers.

An online interactive workshop was conducted on 3rd September by Global Tipping Point Summit 2022 with Ms. Vijaya Chakravarty and Dr. Sweedle Cerejo-Shivkar, authors of IWSA's book "Wild Forgotten Foods".

IWSA's courtyard garden refurbished in December

IWSA members made the most use of the bountiful starfruit tree and the ripe and juicy fruits were served to the visitors.

G. Vijaya Agarwala Memorial Maths Olympiad (VAMMO)

Vijaya Agarwala Memorial Maths Olympiad (VAMMO) was held in Mumbai in association with IWSA, Roorkee on 27th November, 2022. Four hundred and seventy students of Class 6 to 9 from Atomic Energy Central Schools 1 to 6 registered and 24 students were awarded I, II, III and consolation prizes at the National level. Prizes were in cash, certificates and medals. The felicitation and prize distribution ceremony of VAMMO-5 to be held on 1st January 2023

H. Play and Learn Sessions

The Indian Women Scientists' Association in collaboration with Sciencedidi and Asan Vigyan conducted a four-session program (2 hours each) called Play and Learn on 20th September 2022. IWSA, with the mandate of taking science to the masses and inculcating a scientific temper in the budding citizens of tomorrow, has been running a Science Nurture (SN) program for school children in the 7th and 8th grade from the nearby English medium high school. The children are from a lower economic stratum. Sciencedidi, a women-led start-up has a similar motto of inclusion of the marginalized in science. They believe in accessible science education through approachable methods. Asan Vigyan has a collaborative Non-Zero-Sum Game approach towards Holistic Education. Thus, like-minded people from all three organizations got together to initiate a program called Play and Learn for 40 students of std 7 from Sainath English High School. The sessions were held on 20th, 21st, 27th and 28th September.

It began with an introduction to the concept of measurement at both metres to light years and from centimetres to nanometres level. The students could appreciate the distance between atoms and subatomic particles. Having understood the various subatomic particles like protons and electrons the students were introduced to various elements of the periodic table using a pack of cards in session 1. These cards were however different from the normal playing cards they had seen. Each card had an element from the periodic table of elements with its different properties printed on it. The children learnt atomic numbers, names and symbols of elements in the periodic table from these cards. They children played different games with these sets of cards and slowly got familiar with the different elements and their properties merely by seeing and reading them several times during the course of their play. The children learnt about cations and anions in the next two sessions. The game called Neutralizer helped to identify the right ratio of cations and anions in about 200 common ionic substances and also demonstrated the chemical reactions.

Each session included a pre and post session quiz to track the progress of each and every participant. Children found this program very exciting and captivating and it definitely helped to strengthen the young minds in science.

Community Programs

A. Indirabai Padhye Nursery School and Education Committee

Teachers Day was celebrated on 5th September 2022 where teachers were felicitated with a memento, pencils made of newspaper, and i50, IWSA's fragrance.

A puppet making workshop was organized on 14th and 15th Sep where the trainees were taught 10 types of puppets along with understanding on how to deliver a puppet show. They put up a puppet show at WOW mela on 16th Oct @ Lohana Bhavan in Koparkhairane. The performance was based on "Beauty is Missing", a story from Pratham's One Day Story Challenge.

Trainees attended workshops conducted at the Eduthon- khel khel mein session on 27th November and also presented unique teaching aids for early years in Science, Maths and language. They won 3 prizes, one in each category of Teaching Aids.

Religious, social and national festivals including Teachers Days, Childrens Day, Diwali, Ganesh Chaturthi etc were celebrated together with day care centre and Hostel. LIC visited on 15th November and a syllabus was drafted for ECCE course in hybrid model, to be sent to the university for approval.

B. IWSA's Day Care and JMM Working Women's Hostel

Celebrations

90th Birthday of Dr Sudha Padhye, founding member of IWSA, was celebrated on 24th September 2022. Hostel mates along with Daycare children celebrated religious, social and national festivals, mainly Teachers Days, Childrens Day, Diwali, Ganesh Chaturthi etc. A special Rangoli was made on 20th October with the theme of rainy day.

C. IWSA's Satish Haware Computer Education Centre

1. Computer Courses

Online MSCIT course and an advanced computer course (15 days) were conducted in September and October 2022 respectively. The advanced course began with the introduction of IWSA, its activities, branches and then moved to CEC. All the Google tools, MS Office tools, Resume and Cover letter, Office application softwares, Video Editing, Canva, Zipfile and many other topics were covered in the course.

Science Nurture students from Sainath School took computer training in December, where they were taught basic MS-Office.

2. Online Webinar and Talks

A webinar, Bioinformatics - Molecular dynamics Simulations, covering protein biology was organized in association with Lake Water Bioinformatics on 6th November 2022 and 36 students from SIES college attended this webinar. Two BRNS lectures, "Artificial Intelligence" and "Can Machines imitate humans" were organized through CEC in two schools.

D. IWSA's Piroshja Godrej Foundation Library

Tree Library: The IWSA tree library was set up for nursery and day care children from 10th Dec to 15th December. The purpose was promotion of reading handheld books in open spaces (garden) to encourage and motivate all age groups from kindergarten to senior citizens.

State level Workshop on E-Granthalaya 4.0 Software: A Digital Agenda for Library Automation and Networking was held at IWSA on 22nd December, 2022, in collaboration with Higher and Technical Education Department, Directorate of Libraries, and Office of the District Library Officer, Thane. Ms. Shalini Ingole, Asst. Director of Libraries, Mumbai Division was the chief guest. About 25 women librarians and interested participants attended the workshop.

E. IWSA's Murli Laj Chugani Health Care Centre

Medical and dental checkups were conducted for hostel girls and daycare kids by Dr. Varsha Verma and Dr. Raichel Thomas on 10th December, 2022. The dental checkup facilities were upgraded. Preparations were initiated to start paediatric physiotherapy service for autism, cerebral palsy, Learning Disability, ADHD and other related challenges from 1st January 2023 by Dr. Revati Nalawade. Total footfall of patients during this period was 104.

A standee was designed and created to promote nutritional awareness of wild foods based on the IWSA book Wild Forgotten Foods.

Other Activities at IWSA Head Quarters

Visit of Red Dot Foundation

Red Dot Foundation is an eight years old NGO, established by former corporate employee, ElsaMarie D'Silva, with the aim to make public spaces safer and accessible to all, especially women, girls, children and other marginalized, using data and technology. About 30 students, participating in "Youth Innovation Challenge 2022" program organized by Red Dot (Ten teams with ten project proposals) visited IWSA on 11th September for a field survey. These teams consisting of youth in the age group 17 - 25 years were from three states, Madhya Pradesh, Goa and interior Maharashtra. They were from multidisciplinary backgrounds in science and environment. Ms. Elsa D'Silva along with two more Red Dot Foundation members, Ms. Vaibhavi Maske and Ms. Rhea Sethi visited IWSA. The purpose of this visit was to present their ideas and incorporate IWSA's inputs or feedback into their business models. The students worked on the theme "Engendering Climate Action for Water and Waste Management."

The program commenced with a welcome address and briefing about IWSA activities, (focusing on the green initiatives, waste management, and LGLM) by Dr. Rita Mukhopadhyay. This was followed by Ms Elsa's address and introduction of the Innovation program and the students of the teams. She remarked on the active participation of students from distant smaller towns. She observed that IWSA activities' vision, intentionality and strategies have resulted in sustainability of the organisation and stressed the need to adopt these aspects into their models to carry forward for many years. On behalf of Red Dot Foundation, the group facilitators, Ms. Rhea and Ms. Vaibhavi presented a book to Dr. Rita and Dr. Shyamala as a mark of celebration and recognition to women scientists of India who have faced many challenges in their journey. This is the first book put together by Red Dot for the series "She is". Ms. Elsa announced the launch of their next book on Women in STEAM and a copy to be shared with IWSA.

After a tea break, the students in two groups visited 1) the green initiatives of IWSA, biogas, waste management and solar panels and 2) sections of the learning garden, with the most updated information relating to climate change, soil conservation and water management.

After lunch, the students presented ideas on the 8 different models. They were given 2 minutes each to present the summary which included an introduction, problem, problem solution and

call-to-action. After this session, IWSA members interacted with each group to understand their objectives and mode of implementation. Members requested the students to present an online session where a larger presence of IWSA members can be entailed. This would help them connect to experts from specific fields related to their projects. The program came to an end after brief interaction and discussion with students. Ms. Elsa thanked all members and apprised students on identifying the need, value proposition and the right customer. In her vote of thanks, Dr. Shyamala observed that such project interaction with students brings excitement and keeps retired scientists young.

Overall, the visit could gain insight into long-standing problems within a community and find an alternate path and potential solution to alleviate these issues.

Reports from Branches

Hyderabad Branch

1. Guest Lecture on 6th September 2022

Department of Microbiology in Collaboration with Telangana State Yogadhyana Parishad and Indian Women Scientists' Association, Hyderabad organized a guest lecture on "Promoting Health Through Drug Less Therapy - Naturopathy". The Resource person for the day was Dr. A. Malathi Syamala, Director, Yogi Vemana Research Institute and also an IWSA-Hyderabad member.

Dr. Syamala discussed principal concerns for treatment with traditional methods, natural therapies to modern medicine. She also focused on the body's capacity to heal itself, preventing health problems and personal responsibility to optimize health. One hundred and fifty one students and a total of 162 participants attended the guest lecture. The session was interactive and highly informative.

Outreach: 162

Kalpakkam Branch

1. Technical Talk on 10.11.2022

One Technical Talk was organized by IWSA, Kalpakkam branch on World Science Day, 10th November, 2022 at an auditorium, NDE Division, MMG, IGCAR. The Speaker Mrs. Revathy, SO/E, PPED, IGCAR gave an excellent lecture on the topic "*Engineering Developmental Activities and Achievements on metal fuel reprocessing at Pyroprocess R&D facility (PPRDF)*". Dr. B. Sasi, NDED, MMG, Secretary, IWSA(K) welcomed the audience. Dr. M. Manohari, HISD, HSEG introduced the speaker.

The speaker discussed the development of the facility for pyro reprocessing, necessity of the facility and challenges faced during the process. The facility successfully demonstrated its capability to process 10 kg of fuel within 2 days. The lecture was followed by an active interactive session. Senior members of IWSA Dr. S. Vijayalakshmi (RCD) and Mrs. S. Padmapriya, INRPK, BARCF appreciated the speaker and honored with gift and memento.

Mrs. J. Sangeetha, CSTD, MMG, EC Member thanked the speaker and the audience. Dr. Padma S Kumar, WSCD, BARCF Co-convener, IWSA(K) anchored the programme.

Outreach: 60

2. Technical Talk and Farewell function on 07.12.2022

IWSA, Kalpakkam arranged one technical talk on "**Changing trends in Childhood Illnesses and psychosocial problems**" by **Dr. P. Vineetha**, Head, Paediatrics, DAE Hospital, Kalpakkam on the occasion of her superannuation. The talk was held at the Conference Hall, HASD, SQRMG, IGCAR on 7th December, 2022. Mrs. Jemimah Ebenezer, Convener, IWSA(K) welcomed the gathering and Dr. B. Sasi, Secretary, briefed about IWSA objectives and activities. Dr. Padma, Co-convener introduced the speaker and shared her experiences with Dr. Vineetha during IWSA charity activities and medical camps in villages. The lecture dealt with childhood illnesses and psychosocial problems. The speaker discussed the present status of physical health and mental wellness of children and listed out the remedial measures. There were a lot of discussions in the interactive session that followed the lecture, and she cleared many doubts and queries posed by members and colleagues. After the talk, IWSA gave a warm felicitation to Dr. Vineetha, who is superannuating in the month of December, 2022. Many members of IWSA remembered and cherished the moments and memories with her during IWSA activities. Members wished her a peaceful retired life and presented a gift and a memento as a token of love and affection. Mrs. K. Shivakamy, Treasurer compered the felicitation program and Mrs. N. Geetha, Joint Treasurer gave the vote of thanks. About 140 members and colleagues participated in the programme.

Kolhapur Branch

1. Online lecture and demonstration as a part of flower festival series on 29th September 2022

An online talk and demonstration on Floral Dyes & Banana Leaf Molding Art & Techniques was conducted by Karishma Mohite and Shamrao Kerkar.

Outreach: 52

2. Prize Distribution at Annual Flower Show on 18th December 2022

IWSA Kolhapur branch sponsored the prizes for the drawing competition held for youngsters at Garden Club, Kolhapur, annual flower show.

Outreach: 65

3. Felicitation of Woman Achiever on 4th November 2022

New member of IWSA, Kolhapur, Dr. Manjiri More, Chairman, GKG College, Kolhapur was felicitated for her achievement of receiving Green college Award in New York and for selection as an academic council member at the Shivaji University, Kolhapur.

Nagpur Branch

1. World Food & Teachers Day on 16th October: On the occasion of World Teacher's Day (October 5th), Teacher members were felicitated and New Education Policy discussed. There was a Talk on Detoxification. Nutri-snacks prepared by members were distributed.

2. BRNS Sponsored Lecture on 17th Sep.2022 at Seth Kesarimal Porwal College of Arts, Science and Commerce, Kamptee by Dr. Archana Moon, Professor, PGTD Biochemistry, RTM Nagpur University, Nagpur. Lecture was held onsite at SKP College Kamptee

Topic: **Combating Multidrug resistance in Urinary Tract Infection**

Abstract: Bacteria are responsible for a wide range of infections, resulting in mild to life-threatening illnesses. Urinary Tract Infection (UTI), is also known as bladder infection or acute cystitis. The current antibacterial therapies cover a wide array of targets viz., the broad spectrum, the narrow spectrum and the bactericidal antibiotics. The β -lactam antibiotics target peptidoglycan biosynthesis, aminoglycosides target ribosomes, and fluoroquinolones target topoisomerase. In addition to this, the bactericidal antibiotics induce the formation of reactive oxygen species. An antibiotic to be effective must have a susceptible target, must reach the target, and it should not be inactivated or modified. The antibiotics control the bacterial infection by inhibiting any of the following mechanisms: cell wall synthesis, protein synthesis, membrane function, folate pathway and/or nucleic acid synthesis. The major disadvantage of the use of antibiotics is the development of resistance by bacteria which makes them unsusceptible to the action of those particular antibiotics. Indiscriminate, inappropriate, prolonged and uncontrolled use of antibiotics has made bacteria drug resistant. Using In silico docking which involves the use of sampling algorithm and a scoring function to evaluate the proper orientation and poses of ligand molecule in relation to the binding energy. The correct identification of this binding poses one or more related ligands that is important in establishing a structure-activity relationship in lead optimization. Studies on bacterial enzymes viz., beta lactamases, penicillin binding proteins, Dihydrofolate reductase (DHFR) and Dihydropteroate synthase (DHPS) have been extensively done in Dr. Archana Moon's laboratory during the last 8 years using Schrodinger's Suite and Autodock versions.

Outreach: 170

Pune Branch

1. BRNS Sponsored Lecture on 14th Oct.2022 at Dept of Biotechnology, Amity Inst of Biotechnology, Amity University Maharashtra, Panvel by Dr. Reena Pagare, Associate Professor, Dept. of Computer Science and Engineering, MIT Art, Design and Technology University, Loni Kalbhor, Pune. Lecture was held online.

Topic: **Artificial Intelligence for Health Care**

Abstract: The talk addressed the following points:- What is Artificial Intelligence (AI)? Why Artificial Intelligence? Applications of AI. AI in different sectors of healthcare. Challenges of using AI for healthcare. Opportunities in AI domain. Market trends.

Outreach:168

2. BRNS Sponsored Lecture on 4th Nov.2022 at Dept of Chemistry, Modern College of Arts, Science and Commerce, Ganeshkhind, Pune by Dr. Neelima Bulakh, Principal Technical Officer, Polymer Science and Engineering Division, CSIR-National Chemical Laboratory, Pune.

Lecture was held onsite at Modern College Pune.

Topic: **Thermal Methods of Analysis**

Abstract: Thermal Analysis techniques are used in a wide range of disciplines, from pharmacy and foods to polymer science, materials and glasses. The wide range of measurements possible provide fundamental information on the material properties of the system under test, so thermal analysis has found increasing use both in basic characterization of materials and in a wide range of applications in research, development and quality control in industry and academia. The talk is designed with strong focus on practical aspects of thermal analysis techniques as getting correct data and interpreting it correctly is very important. It aims to prepare people for R&D/ QC/QA functions in such industries.

Outreach:132

3. BRNS Sponsored Lecture on 16th Nov.2022 at Sir Parashurambhau College (Autonomous), Tilak Road, Pune by Dr. D. G. Naik, Project Coordinator, Maharashtra Education Society, Pune.

Lecture was held onsite at SP College, Pune.

Topic: **Chromatographic Techniques**

Abstract: Separation and purification of mixtures are challenging problems for the practicing chemists. Chromatographic techniques are used to separate, identify, and quantify each component in a mixture. It relies on separation of mixtures by using a stationary phase and a mobile phase. The mixture enters the stream of the mobile phase and is eluted by the mobile phase. Each component in the sample interacts slightly differently with the adsorbent material, causing different flow rates for the different components and leading to the separation of the components as they flow out of the stationary phase. The velocity of each component depends on its chemical nature, on the nature of the stationary phase (column) and on the composition of the mobile phase. The time at which a specific component elutes is called its retention time. When the stationary phase is a thin layer of adsorbent material like silica gel and the mobile phase is any liquid, the technique is 'Thin layer Chromatography'. If a column of the stationary phase is used as a stationary phase in the same way, it becomes 'Column Chromatography. High Performance Liquid Chromatography (HPLC) is distinguished from traditional column chromatography because operational pressures are significantly higher, while ordinary liquid chromatography typically relies on the force of gravity to pass the mobile phase through the column. Also, HPLC columns are made with smaller adsorbent particles (2–50 μm in average particle size). This gives HPLC superior resolving power (the ability to distinguish between compounds) when separating mixtures. Besides it generates permanent records and results are reproducible which makes it a popular chromatographic technique. Similarly of a stationary phase is liquid and the mobile phase is gas the technique becomes 'Gas Chromatography. All these methods have wider applications in most of the branches of chemistry. The principles involved, instrumentation and applications with special reference to semio-chemicals and standardization of herbal drugs were discussed.

Outreach: 158

Roorkee Branch

Vijaya Agarwala Memorial Mathematics Olympiad (VAMMO)

Vijaya Agarwala Memorial Mathematics Olympiad (VAMMO) was conducted in the memory of founder member, Vijaya Agarwala. Olympiad was conducted for four classes, class 6th to class 9th. This national exam was conducted on 27th November at the same time at all centres and 42 schools from Roorkee, Haridwar and Mumbai registered. Total 2200 students participated. Exam went successfully and the result was prepared by Roorkee branch members. Awardees from Mumbai HQ were informed in time and the Roorkee and Mumbai HQ felicitated all awardees at their centres. An Award function was organized in Roorkee on Dec. 25, 2022 in the memory of Prof. Vijaya Agarwala, the founder member of Indian Women Scientists' Association Roorkee Branch. Total 6 prizes at National level and 36 prizes by Roorkee branch have been given to the students from Roorkee and Haridwar. All prizes were in terms of Cash money, Certificate and Medals within class VI to IX. A graphical analysis of marks for all students at National level and School level have been given in each school. All schools appreciated the efforts by IWSA members.

Women Achievers

1. Dr. Radha Rangarajan, Director, CDRI

Dr Radha Rangarajan assumed charge as **new director of Lucknow's Central Drug Research Institute (CDRI)** on September 5th. She is the second woman director after Dr



Madhu Dixit, who was the CDRI-director between 2015-2017. Dr Rangarajan has been active in the field of public health for the past 20 years, with her work focusing on product development and translational research. Working closely at the interface between academia, start-ups and industry, her experiences span the drug discovery,

diagnostics and medical devices sectors.

An alumna of Stanford University, University of Michigan, and Rockefeller University, Dr Rangarajan has been a postdoctoral fellow at Harvard School of Public Health. She also worked in the drug discovery division of Hyderabad's Dr Reddy's Laboratories between 2003-2009. In 2020, the CDRI director was chosen as the chief technology officer of HealthCubed, a medical equipment company. Herein, she handled the product development, manufacturing, clinical validation and more. She served in multiple roles, successfully developing early-stage

molecules for various therapeutic areas such as anti-infectives, diabetes and cardiovascular disease.

Thereafter, she co-founded Vitas Pharma, a drug discovery and development company focused on novel therapies to treat highly resistant infections. She leveraged public-private partnerships to build a highly efficient innovation platform delivering multiple lead optimized candidates, granted patents and companion diagnostics. In 2020, she took on the role of Chief Technology Officer at HealthCubed, a medical devices company focused on affordable diagnostics, where she was responsible for product development, clinical validation, manufacturing and regulatory affairs.

Dr Rangarajan received the Federation of Indian Chambers of Commerce and Industries (FICCI) Award of Excellence-Women in R&D in 2019. She was selected for the "Champions of Change" initiative of Prime Minister Modi, recognizing India's emerging entrepreneurs in 2017. She led the Vitas Pharma team that received the Discovery Award of the Longitude Prize Committee, UK in 2016 and was a finalist in the Economic Times startup Awards (Woman Ahead Category) in 2016. She led the Vitas Pharma team that won the Discovery Award of the Longitude Prize Committee in 2016 in the UK.

https://cdri.res.in/CDRI_Director.aspx

2. Manasi Joshi - Arjuna Awardee

Manasi Joshi, Indian para-badminton player, was conferred Arjuna award on 30th November 2022.

She is a former world champion in the women's singles SL3 (standing/ lower limb impairment/ severe) category. She started her professional sporting journey in 2015, 4 years after amputating her leg due to an accident, and in 2020, she was ranked world no. 2 in women's singles in the SL3 category.



As on 8th of March 2022 she was ranked world no. 1 in women's singles in the SL3 category.

Manasi was listed as the Next Generation Leader 2020 by TIME magazine in October 2020 and she appeared on their Asia cover, making her the first para-athlete in the world and the first Indian athlete to be

featured on the magazine's cover, for being an advocate of rights for people with disabilities. On the occasion of the International Day of Girl Child (11 October 2020), Barbie celebrated Manasi and her achievements by modelling a one-of-a-kind Barbie doll to her likeness to inspire young girls. She has also been recognized by BBC as one of the 100 most inspirational and powerful women across the world in 2020 and was nominated for the BBC Indian

Sportswoman of the Year Award of 2020 alongside other well-known Indian sports women, P. V. Sindhu, Mary Kom etc. She had met with an accident while travelling for work in 2011, and had to amputate her leg. She took aid of an artificial leg and started walking after five months of that unfortunate incident. She then took support of badminton to regain her fitness and mental confidence. This award is a story of her hard work and determination and also a motivation and encouragement to all, not to despair, but to push boundaries and reach newer heights.

<https://www.aninews.in/news/sports/others/national-sports-award-is-proud-moment-for-an-athlete-manasi-joshi-on-receiving-arjuna-award20221130143517/>
<https://m.rediff.com/sports/report>

3. Capt. Harpreet Chandi

Captain Harpreet Chandi, an Indian-origin British Sikh Army officer and physiotherapist, created history by becoming **the first woman of colour to complete a solo unsupported trek to the South Pole.**

Chandi set out on her solo expedition on 7 November 2021, departing from Antarctica's Hercules Inlet. The journey to the South Pole involved travelling a distance of 700 miles (1,100 km), pulling a sled weighing 200 pounds (90 kg), carrying 48 daysworth



of food and supplies. She completed a solo expedition across Antarctica to the South Pole, finishing on 3 January 2022. She started her second solo south pole expedition in In November 2022, with the aim of becoming the first woman to cross Antarctica solo and unsupported, hoping to reach Reedy Glacier within 75 days after traveling 868 miles (1,397 km) up to that point. In November 2022, Chandi won *Woman of the Year* and also the *Inspirational Award* at the Women in Defence Awards 2022.

Read more at:

<https://organiser.org/2023/01/01/103108/bharat/first-indian-women-achievers-of-2022-heres-the-list/>,
https://en.wikipedia.org/wiki/Preet_Chandi

4. Maitreyee Wairagkar - Scientific Achievement Runner up of Inspiring Women in Science Awards 2022 by scientific journal 'Nature' in partnership with Estée Lauder.



Maitreyee Wairagkar is a biomedical scientist developing advance neurotechnology using artificial intelligence. She builds brain-computer interfaces (BCI) to enable people with severe motor and speech impairments to communicate directly via their brain signals. These devices break down barriers between humans and technology to allow intuitive interactions. Her research is focused on healthcare applications

of neurotechnology in rehabilitation and assistive devices for people with different neurological conditions, for example, enabling a person with ALS to fluently speak through a computer, neurorehabilitation for stroke recovery and at-home robotic care for dementia. She is committed to translating her research to real-world applications through collaborating closely with patients, medical practitioners and industrial partners. Her previous neurotech research has been successfully commercialised. She is currently a postdoctoral scholar at University of California, Davis.

Previously, she was postdoctoral researcher at Imperial College London. She has obtained her PhD and MEng in Cybernetics and AI from University of Reading.

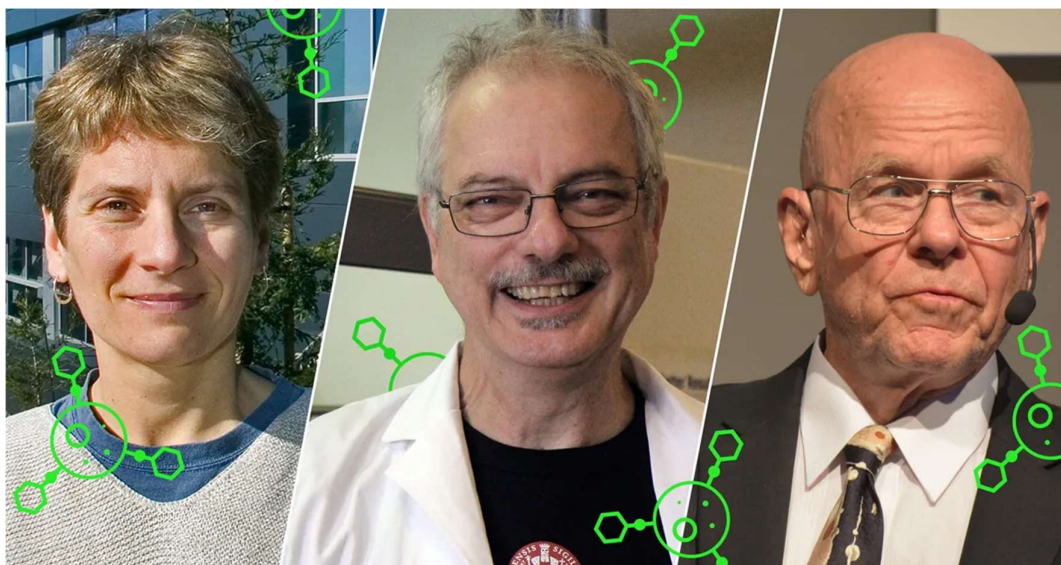
Originally from Pune, Maharashtra she grew up in a family with strong scientific background, her father being a doctor and scientist working in global health and mother, a science educator with double postgraduate in sciences. Working of the human brain always fascinated Maitreyee. After completing her 12th standard from Pune, she was keen on studying cutting edge technologies like BCIs and zeroed in on the University of Reading in the UK. It offered a unique integrated undergraduate and master's degree course in Artificial Intelligence and cybernetics. Since starting her undergraduate studies at the University of Reading in 2010, Maitreyee has built different neurotechnologies that help in rehabilitation after brain injury or stroke and even assist them in day to-day-life.

<https://www.nature.com/immersive/inspiringwomeninscience/index.html#section-Winners-tQjz7THcZs>
<https://www.globalindian.com/story/global-indian-exclusive/maitreyee-wairagkar-using-neurotechnology-to-transform-lives/>

Nobel Prize 2022

Chemistry

Carolyn R. Bertozzi from Stanford University, CA, USA, **Morten Meldal** from University of Copenhagen, Denmark and **K. Barry Sharpless** from Scripps Research, La Jolla, CA, USA share Nobel Prize for Chemistry in 2022, "for the development of click chemistry and bioorthogonal chemistry"



Barry Sharpless and Morten Meldal are awarded the Nobel Prize because they brought chemistry into the era of functionalism and laid the foundations of click chemistry. Carolyn Bertozzi took click chemistry to a new dimension and began using it to map cells. Her bioorthogonal reactions are now contributing to more targeted cancer treatments, among many other applications. It can be said that the Nobel Prize in Chemistry 2022 is about finding new chemical ideals and letting simplicity and functionality take precedence.

Prof. Sharpless, born in 1941 in Philadelphia, USA, is a second time recipient of the Nobel Prize in Chemistry. The first one was in the year 2001 jointly with two others for his work in the 1980s on chirally catalysed oxidation reactions, which created new possibilities for building new complex molecules in the pharmaceutical industry. Prof. Meldal was born in 1954 in Denmark. He completed PhD in 1986 from Technical University of Denmark. Prof. Bertozzi, born 1966 in USA, completed PhD in 1993 from UC Berkeley, CA, USA.

In the last many decades chemists have put in enormous efforts and have devised highly innovative and creative methods to synthesize or build molecules of different types with extremely complex structures. However, the number of steps, the complexity of the conditions and heavy losses at each step etc. are serious drawbacks of many of these methods. Early in this century Sharpless proposed a more “streamlined” process, where each compound could be made using a limited set of very general, very robust, and high yielding reactions instead of using a variety of methods. The idea was that all the necessary components, like ‘building blocks’, will be assembled together efficiently by a set of reactions that are easy to carry out reliably by the users and these reactions were named as “click reactions”. In a publication in 2001 Sharpless and coworkers gave specifications for these reactions, and identified some reactions such as cycloaddition as suitable candidates for the click chemistry concept.

Very soon while working on the identification methods to introduce the 1,2,3-triazole pharmacophore in peptides, Morten Meldal and Christian W. Tornøe discovered that cuprous ion (Cu^{I}) substantially catalyzed the cycloaddition reaction between azides and terminal alkynes and it was found to be very efficient, simple and yielding specific product independent of substitution. Independent of, and in parallel with the above work, Sharpless and coworkers

also identified Cu^I as a catalyst for the 1,3-cycloaddition of azide and alkyne reaction in slightly different conditions. Their work improved the reaction with respect to cost and catalyst purity. This reaction, which is independent of substituent and which proceeds under ambient conditions in water and other mild solvents with high yield, enjoys dramatic popularity in chemical synthesis as well as in other fields, and also has led to the development of other suitable click reactions.

Meanwhile Prof. Bertozzi was trying to map glycans in the cell, which are important in viral attack of the cell and immunity activation. She had brought the idea of attaching a handle to the cell through a suitable reaction, which further can be connected to a probing fluorescent molecule to make the glycans visible. The handle must not react with any other substance in the cell and should be insensitive to absolutely everything apart from the molecules that were going to be linked to the handle. She established a new term for this, the reaction between the handle and the fluorescent molecule had to be “bioorthogonal”. Bertozzi wanted to use the click reaction, the Cu^I catalysed azide alkyne reaction, for this purpose, but it was difficult because copper is toxic to living cell. However, based on an old report of 1961, she forced alkyne into a ring-shaped chemical structure and the strain created so much energy that the reaction occurred smoothly, even in the absence of copper catalyst. This strain-promoted alkyne-azide cycloaddition worked very well in the cell and could be used to track glycans.

This great achievement paved the way to further progress, where these methods are refined and used to explore interaction of biomolecules in cells and to study disease processes such as tumors and to develop suitable pharmaceuticals. Many researchers have also started to develop clickable antibodies that target a range of tumors. Once the antibodies attach to the tumor, a second molecule that clicks to the antibody is injected. For example, this could be a radioisotope that can be used to track tumors using a PET scanner or that can aim a lethal dose of radiation at the cancer cells.

This year's Nobel prize for click chemistry demonstrates how brilliantly the discoveries and concepts originated at different times and different places click together, leading science and humanity to new pathways of progress.

Ref: <https://www.nobelprize.org>.

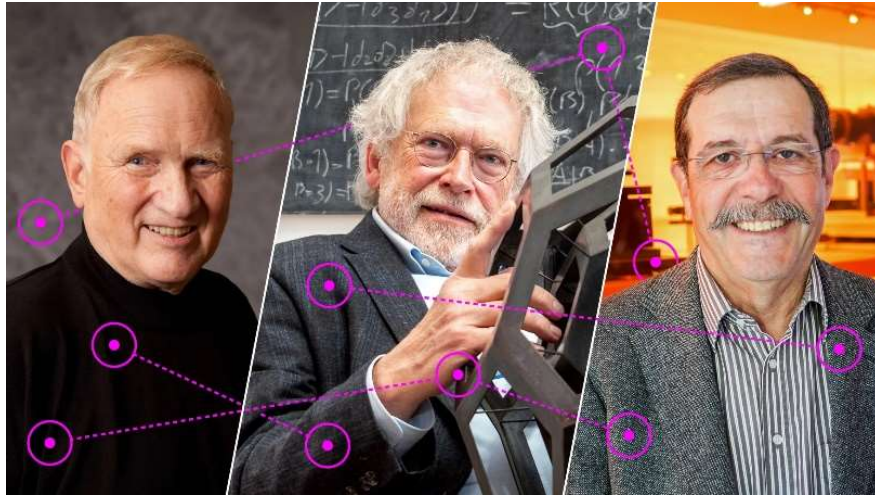
<https://www.quantamagazine.org/molecule-building-innovators-win-2022-chemistry-nobel-prize-20221005/>

(Dr. Dhanya Suresh)

Physics

The Nobel Prize in Physics 2022 was awarded to **Alain Aspect, John F. Clauser, Anton Zeilinger**. Each one of them has conducted groundbreaking experiments using entangled quantum states, where two particles behave like a single unit even when they are separated. Their results have cleared the way for new technology based upon quantum information. Alain Aspect, born 1947 in Agen, France, completed PhD 1983 from Paris-Sud University, and at present he is Professor at Institut d'Optique Graduate School – Université Paris-Saclay and École Polytechnique, Palaiseau, France. John F. Clauser, born 1942 in Pasadena, CA, USA

obtained his PhD in 1969 from Columbia University. He is a Research Physicist at J.F. Clauser & Assoc., CA. Anton Zeilinger, born 1945 in Ried im Innkreis, Austria did PhD in 1971 from University of Vienna, Austria. He is a Professor at the University of Vienna.



Quantum mechanics allow two or more particles to exist in a shared state, regardless of how far apart they are. This is called **quantum entanglement**, and has been one of the most debated elements of quantum mechanics ever since the theory was formulated. **Quantum entanglement** occurs when a group of particles are generated, interact, or share spatial proximity in a way such that the quantum states of each particle of the group cannot be described independently of the state of the others, including when the particles are separated by a large distance. The fact that this occurs instantly bothered Einstein, who dismissed this element of quantum entanglement—called non-locality—as "spooky action at a distance" in 1935. He instead believed that "hidden variables" must somehow be behind what was happening. But Erwin Schrödinger said it was quantum mechanics' most important trait. When two particles are in entangled quantum states, someone who measures a property of one particle can immediately determine the result of an equivalent measurement on the other particle, without needing to check. For a long time, the question was whether the correlation was because the particles in an entangled pair contained hidden variables, instructions that tell them which result they should give in an experiment. In the 1960s, John Stewart Bell developed the mathematical inequality that is named after him. This states that if there are hidden variables, the correlation between the results of a large number of measurements will never exceed a certain value. However, quantum mechanics predicts that a certain type of experiment will violate Bell's inequality, thus resulting in a stronger correlation than would otherwise be possible.

John Clauser developed John Bell's ideas, leading to a practical experiment of generating entangled particles, namely photons, which travelled in different directions and then measuring their polarization, by allowing them to pass through suitable filters. When he took the measurements, they supported quantum mechanics by clearly violating a Bell inequality. This means that quantum mechanics cannot be replaced by a theory that uses hidden variables. However, these experiments had limitations. One of these limitations was that the experiment was generally inefficient, both when it came to producing and capturing particles. The measurement was also pre-set, with the filters at fixed angles. There were therefore

loopholes, where an observer could question the results: what if the experimental setup in some way selected the particles that happened to have a strong correlation, and did not detect the others? If so, the particles could still be carrying hidden information.

Eliminating this particular loophole was difficult, because entwined quantum states are so fragile and difficult to manage; it is necessary to deal with individual photons. **Alain Aspect** built a new version of the setup that he refined over several iterations. In his experiment, he could register the photons that passed through the filter and those that did not. This meant more photons were detected and the measurements were better. In the final variant of his tests, he was able to further refine the experimental set up, completely closing an important loophole of the experiment investigating Bell's inequality and providing a very clear result: quantum mechanics is correct and there are no hidden variables.

Entangled quantum states hold the potential for new ways of storing, transferring and processing information. Interesting things happen if the particles in an entangled pair travel in opposite directions and one of them then meets a third particle in such a manner that they become entangled. They then enter a new shared state. The third particle loses its identity, but its original properties have now been transferred to the solo particle from the original pair. This way of transferring an unknown quantum state from one particle to another is called quantum teleportation. This type of experiment was first conducted in 1997 by **Anton Zeilinger** and his colleagues. Once this had been shown experimentally, the next step was to use two pairs of entangled particles. If one particle from each pair are brought together in a particular way, the other undisturbed particles in each pair can become entangled despite never having been in contact with each other. This entanglement swapping was first demonstrated in 1998 by Anton Zeilinger's research group. This means it is possible to send the original state further, thereby transferring it over longer distances than had otherwise been possible. It is to be noted that this teleportation is that of quantum state or information, not of matter as shown in science fiction movies.

The ineffable effects of quantum mechanics are starting to find applications. Entangled quantum states have now been demonstrated between photons that have been sent through tens of kilometres of optical fibre, and between a satellite and a station on the ground. In a short time, researchers around the world have found many new ways to utilize the most powerful property of quantum mechanics. There is now a large field of research that includes quantum computers, quantum networks and secure quantum encrypted communication. Superdense coding and quantum teleportation are two of the most well-known applications of entanglement. Superdense coding is the process of transporting two classical bits of information using a single entangled qubit. We could use entangled qubits to achieve instantaneous information agreement over very long distances. Quantum cryptography, which uses entangled photons, has already been accomplished with an unbreakable quantum key distribution (QKD). QKD, sends information about the key using randomly polarized photons. The recipient uses polarized filters to decipher the key with a chosen algorithm used to encrypt the message. The secret data still gets sent over normal communication channels but can only decode the message with the exact quantum key. Security is enhanced because "reading" the polarized photons changes their states, and any eavesdropping will alert the communicators of the breach. QKD technology is currently limited by fiber optic cable, which can send a photon about 100km before becoming too dim to receive. The first entangled QKD

bank transfer was made in Austria in 2004. Ensuring transfer of unbreakable and tamper-proof communications that is provably secure based on the laws of physics has obvious use in finance, banking, military, medical, and other services. Several companies are using entangled QKD now.

Quantum Entanglement is applied in microscopy also. A team of Japanese researchers at Hokkaido University developed the world's first entanglement-enhanced microscope in 2013, where entangled photons are used instead of classical light sources. They report a better signal-to-noise ratio, which for a given light intensity is limited by the standard quantum limit when unentangled particles are used. These can lead to advances in telescopes, and increased sensitivity of other instruments leading to biological, astronomical, and material applications as well. Quantum entanglement and teleportation also makes quantum computing easier and more practical. In short, quantum entanglement's amazing potential may revolutionise our future.

Ref: <https://www.nobelprize.org>,

<https://www.quantamagazine.org/>

<https://www.deltecbank.com/2021/07/06/quantum-entanglement-and-its-applications>.

- (Dr. Dhanya Suresh)

Physiology and Medicine 2022

Nobel Prize in Physiology and Medicine 2022 was awarded to the Swedish geneticist Svante Pääbo for his pioneering work on genomes of extinct hominins and human evolution. He established that gene flow occurred from now extinct hominins and Denisovans to *Homo sapiens*, resulting in the present-day humans. The ancient gene flow has implications in human immune system and how it reacts to infections and also other characteristics.



Svante Pääbo was born in 1955 in Stockholm, Sweden. He defended his PhD thesis in 1986 at Uppsala University. He became Professor at the University of Munich, Germany in 1990. In 1999 he founded the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany where he is still active. He also holds a position as adjunct Professor at Okinawa Institute of Science and Technology, Japan.

Humanity has been intrigued by its origins – like from where humans come from and what makes *Homo sapiens* different from other hominins. Earlier research based on paleontology and archeology had provided evidence that the anatomically modern human, *Homo sapiens*, first appeared in Africa approximately 300,000 years ago, while our closest known relatives, Neanderthals, developed outside Africa and populated Europe and

Western Asia from around 400,000 years until 30,000 years ago, at which point they went extinct. About 70,000 years ago, groups of *Homo sapiens* migrated from Africa to the Middle East and, from there they spread to the rest of the world. *Homo sapiens* and Neanderthals thus coexisted in large parts of Eurasia for tens of thousands of years. But we did not know about the relationship between present day humans and the extinct Neanderthals. Such studies would require the sequencing of genomic DNA recovered from archaic specimens.

Early in his career, Svante Pääbo became fascinated by the possibility of utilizing modern genetic methods to study the DNA of Neanderthals. However, there were extreme technical challenges, because with time DNA becomes chemically modified and degrades into short fragments. After thousands of years, only trace amounts of DNA are left, and what remains is massively contaminated with DNA from bacteria and contemporary humans. As a postdoctoral student with Allan Wilson, a pioneer in the field of evolutionary biology, Pääbo started to develop methods to study DNA from Neanderthals, an endeavour that lasted several decades. In 1990, Pääbo joined University of Munich, where he started analyzing DNA from Neanderthal mitochondria – organelles in cells that contain their own DNA. The mitochondrial genome is small and contains only a fraction of the genetic information in the cell, but it is present in thousands of copies, increasing the chance of success. With his refined methods, Pääbo managed to sequence a region of mitochondrial DNA from a 40,000-year-old piece of bone. Thus, for the first time, we had access to a sequence from an extinct relative of *Homo sapiens*. As analyses of the small mitochondrial genome gave only limited information, Pääbo took on the enormous challenge of sequencing the Neanderthal nuclear genome. At this time, he was offered the chance to establish a Max Planck Institute in Leipzig, Germany. At the new Institute, Pääbo and his team steadily improved the methods to isolate and analyze DNA from archaic bone remains. With the help of new technical developments and several critical collaborations with experts on population genetics and advanced sequence analyses, Pääbo was successful and could publish the first Neanderthal genome sequence in 2010. Comparisons with contemporary humans and chimpanzees demonstrated that Neanderthals were genetically distinct and also demonstrated that the most recent common ancestor of Neanderthals and *Homo sapiens* lived around 800,000 years ago. The analyses also showed that Neanderthals and *Homo sapiens* interbred during their millennia of coexistence. He showed that in modern day humans of European and Asian origin, approximately 1 - 4% of genome originated from Neanderthals.

He also made a sensational discovery of a previously unknown hominin- Denisovan from samples obtained from caves of Siberia. Comparisons with sequences from contemporary humans from different parts of the world showed that gene flow had also occurred between Denisova and *Homo sapiens*. This relationship was first seen in populations in Melanesia and other parts of South East Asia, where individuals carry up to 6% Denisova DNA.

Pääbo's discoveries have generated new understanding of our evolutionary history. At the time when *Homo sapiens* migrated out of Africa, at least two extinct hominin populations inhabited Eurasia. Neanderthals lived in western Eurasia, whereas Denisovans populated the eastern parts of the continent. During the expansion of *Homo sapiens* outside Africa and their migration east, they not only encountered and interbred with Neanderthals, but also with Denisovans

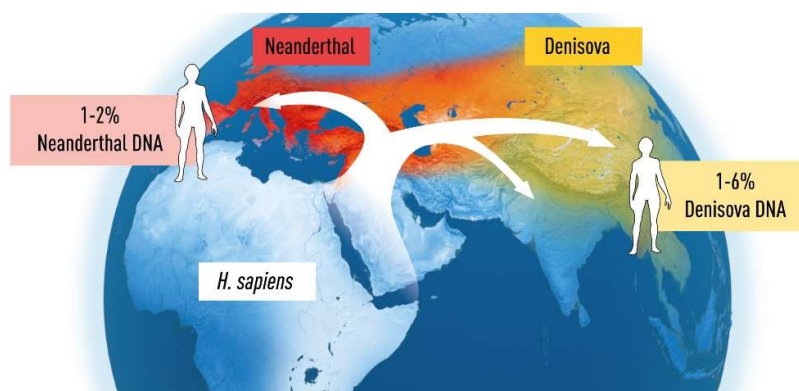
Following these initial discoveries, his group has completed analyses of several additional genome sequences from extinct hominins. Pääbo's discoveries have established a unique resource, which is utilized extensively by the scientific community to better understand human evolution and migration. New powerful methods for sequence analysis indicate that archaic hominins may also have mixed with *Homo sapiens* in Africa. However, no genomes from extinct hominins in Africa have yet been sequenced due to accelerated degradation of archaic DNA in tropical climates.

Through his groundbreaking research, Svante Pääbo established an entirely new scientific discipline, *paleogenomics*. His work showed that gene sequences from extinct human relatives influenced the physiology of present-day *Homo sapiens*. *Eg*: Denisovan version of the gene EPAS1 confers an advantage for survival at high altitude and is common among present-day Tibetans. Other examples are Neanderthal genes that affect our immune response to different types of infections. By revealing genetic differences that distinguish all living humans from their extinct hominin ancestors, Pääbo's discoveries provide the basis for exploring what makes us uniquely human.

References:

- 1) The Nobel Prize in Physiology or Medicine 2022. NobelPrize.org. Nobel Prize Outreach AB 2023. <https://www.nobelprize.org/prizes/medicine/2022/summary/>
- 2) <https://www.nobelprizemedicine.org/>

- (Dr. Susan Eapen and Dr. Sheela Donde)



Pääbo's discoveries have provided important information on how the world was populated at the time when *Homo sapiens* migrated out of Africa and spread to the rest of the world. Neanderthals lived in the west and Denisovans in the east on the Eurasian continent. Interbreeding occurred when *Homo sapiens* spread across the continent, leaving traces that remain in our DNA. (<https://www.nobelprize.org/prizes/medicine/2022/press-release/>)

A Nobel Laureate's Noble Gesture for his Teacher

Year 1979/80 or thereabouts. The Indian Prime Minister's office, with its new incumbent, received a request from a Pakistani man by the name Mohammad Abdus Salam to do some

detective work for him. Mrs. Gandhi, helped him on his request. Mohammad Abdus Salam was a physicist, who received the Nobel Prize for Physics, shared with Steven Weinberg and Sheldon Glashow in 1979 “for their contribution to the theory of the unified weak and electromagnetic interaction between elementary particles, including the prediction of the weak neutral current”.



The request that Prof. Salam had made to the Indian government was to help him find a certain Anilendra Ganguli, who had taught him Mathematics back at the Sanatan Dharma College in pre-independence Lahore. Eventually it was discovered that Ganguli, by then a feeble, ailing octogenarian, had retired to a quiet life in a silent neighbourhood in South Calcutta. Salam, a

good 2 years after his first pursuits, finally made it to Calcutta in 1981. Removing the Nobel Prize medal from his pocket, Salam said to his teacher... Sir, this medal is a result of your teaching and love of mathematics that you instilled in me". As he then put the medal around his teacher's neck, he said, "this is your prize, Sir. Not mine," and hugged his recumbent teacher from college.

-- input from Dr. Pushpa Rao

IWSA Members Honoured

The Office of the Principal Scientific Advisor to the Government of India in partnership with Red Dot Foundation, British High Commission, and FICCI FLO will commemorate India's 75th year of Independence by honouring 75 Indian Women in STEAM (fields of Science, Technology, Engineering, Arts and Mathematics) through 'She Is' book series. The aim of the book series is to showcase more women role models for youth, make visible the leadership of women and generate interest in the SDGs. The first edition of 'She Is - Stories of Women Advancing the Sustainable Development Goals in India' was launched on November 25, 2021 by the British High Commissioner Alex Ellis. We are proud that two members of IWSA, **Dr. Archana Sharma**, and **Dr. Susan Eapen** are also among these distinguished women achievers.

Dr. Archana Sharma

After completing her degree in Electrical Engg from REC Bhopal in 1986 Archana Sharma joined Bhabha Atomic Research Centre in 1988 through 31st Batch of BARC Training School. Subsequently she did master and PhD from High voltage Dept of Indian Institute of Science (IISc), Bangalore.

At present she is an Outstanding Scientist & Director of Beam Technology Development Group, in BARC.



Her specialization is in the design and development of multi gigawatt pulsed electron beam generators based on Marx Generators and Linear Induction Accelerators. Her research interests also include high-power microwave (HPM), Flash X-ray (FXR) and industrial electron beam accelerators. She is a recognized Ph.D. guide of Homi Bhabha National Institute (HBNI) and Mumbai University (MU). She has more than 100 scientific publications / presentations in international / national journals / conferences. She is a recipient of Homi Bhabha Science & Technology Excellence Award and many group achievement awards for her contributions in the field of Pulsed Power Technology, Electron Beam Accelerators and Plasma Technologies. She has been recognized as fellows of INAE, IET and IET(UK). Among the 75 women, she is listed in the Engineering category.

Recently she has been awarded “EMC Engineer of the Year”. Her current efforts are to develop indigenous BARC technologies and deploy in other organisations to minimise import requirements of India. In addition to these responsibilities in Science, Engineering and Technology, being an allrounder and sports person, she is also serving as the Secretary of DAE Sports & Cultural Council.

Dr. Susan Eapen

Stanford University included Dr. Susan Eapen in the World 2% top ranking Scientists List in the category 'Plant Biology and Botany in the year 2020, a decade after she retired from Bhabha Atomic Research Centre, Mumbai in the year 2011 as a Senior Scientist and Head of Plant Biotechnology and Secondary Products Section. Currently she is engaged in motivating scientific temper among faculty and students at Union Christian College, Aluva as an Adjunct Professor in Biosciences Group. She is a Past President and Member, Board of Trustees of IWSA and continuing her activities with them organising Symposia, Workshops, Webinars and other virtual activities remotely from Aluva where she has relocated in the year 2018.



She is considered one of the pioneers in transgenic plant research and her interest varies from plant biotechnology, production of secondary metabolites from in vitro cultures and phyto-remediation. She has published 140 research papers, contributed several book chapters and presented papers in several national and international symposia. Her latest paper is on 'Phytoextraction of Uranium using Vetiver plants (2020). During an Indo FRG bilateral program in 1986 at Free University, Berlin she developed the first transgenic grain legume from protoplasts using 3 different techniques. Later she developed transgenic plants which could take up heavy metals and degrade organic pollutants. She was also involved in the “Cotton Mini Mission” project of Government of India and was a collaborator for several BRNS funded programs all over India.

Scientists from Russia, Cuba and Syria have come to her lab to get trained in latest techniques. She had been in the editorial board of international journals “In-Vitro Plant” and “BMC Biotechnology”. She received Elsevier Award in 2010 for the best quoted paper of the year and the H-Index of her publications were in the 40s which is considered outstanding. She is also a recipient of UNESCO and British Council fellowships.

BRNS Popular Science Lectures in Colleges

Popular Science Lecture
Organized by
Indian Women Scientists' Association,
Vashi, Navi Mumbai

Supported by Board of Research in Nuclear Sciences (BRNS)-DAE
In association with
Zoology Department
Maharshi Dayanand College of Arts, Science
and Commerce, Panvel, Mumbai.

Lecture on
"Model Organisms: Unity in Diversity"
by
Dr. Jacinta S. D'Souza
Professor & Chairperson, School of Biological Sciences,
UM-DAE, Center for Excellence in Basic Sciences,
Salun Campus, Mumbai

Thursday, 15th Sep, 2022, 10.30 am
Venue: Auditorium, Ground Floor
Maharshi Dayanand College of Arts, Science and Commerce, Mumbai

ALL ARE CORDIALLY INVITED TO JOIN THE LECTURE

Popular Science Lecture
Organized by
Indian Women Scientists' Association,
Vashi, Navi Mumbai

Supported by Board of Research in Nuclear Sciences (BRNS)-DAE
In association with
Department of Biotechnology
Amity Institute of Biotechnology,
Amity University Maharashtra, Panvel.

Webinar on
"Artificial Intelligence for Health Care"
by
Dr. Reena Pagare
IEEE Power Section - Chair, Engineering in Medicine & Biology Society,
Associate Professor, Dept. of Computer Science & Engineering,
Associate Professor, School of Engineering,
MIT Art, Design and Technology University
Leah Kolker, Pune

Friday, 14th Oct, 2022, 11.00 am
Please Register on this URL: <https://amitym.live/86233772955>
Zoom link will be sent to Registered participants

ALL ARE CORDIALLY INVITED TO JOIN

Popular Science Lecture
Organized by
Indian Women Scientists' Association
Vashi, Navi Mumbai

Supported by
Board of Research in Nuclear Sciences (BRNS) - DAE

In association with
IOAC and Science Departments
Sacred Heart College (Autonomous), Kochi - 682013

Lecture on
"Beauty of Science and Science of Beauty"
by
Prof. S. M. Shivaprasad
Director, Karnataka State Higher Education Academy, Dharswad And Former Professor,
Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru

Monday, 19th September, 2022 (10.00 am)
Venue: Malesius Hall, SH College, Thevara, Kochi - 682013

ALL ARE CORDIALLY INVITED TO ATTEND

Popular Science Lecture
Organized by
Indian Women Scientists' Association
Vashi, Navi Mumbai

Supported by BRNS-DAE
In association with
Department of Botany and Centre for Research
St. Teresa's College (Autonomous), Ernakulam,
Kochi

Lecture on
Gene Editing: The Last Ten Years
by
Dr. Chitra Seetharam Misra
Scientist, Applied Genomics Section, BARC, Mumbai

Date and Time
Saturday, 24th September, 2022, 10.30 AM

POPULAR SCIENCE LECTURE
ORGANIZED BY
INDIAN WOMEN SCIENTISTS' ASSOCIATION,
VASHI, NAVI MUMBAI

SUPPORTED BY BOARD OF RESEARCH IN NUCLEAR SCIENCES (BRNS)-DAE
In association with
JOHN WILSON SOCIETY'S WILSON COLLEGE (AUTONOMOUS)
DEPARTMENT OF MICROBIOLOGY,
CHOWPATY SEA FACE ROAD, MUMBAI
UNDER THE AEGIS OF DBT STAR SCHEME

Lecture on
"Confocal Microscopy and its Applications in Biology"
By
Dr. Rohan Khadilkar
Principal Investigator, Cancer Research Institute
ACTREC, Tata Memorial Centre, Navi Mumbai

DATE AND TIME: SATURDAY, 12TH NOV., 12.00 NOON
VENUE: AUDIO VISUAL ROOM (A.V), WILSON COLLEGE.

ALL ARE CORDIALLY INVITED TO ATTEND
To Register, Please click on the link below
<https://forms.gle/3S2zbyhLMPxoFKtW9>

Popular Science Lecture
Organized by
Indian Women Scientists' Association,
Vashi, Navi Mumbai

Supported by Board of Research in Nuclear Sciences (BRNS)-DAE
In association with
Department of Biotechnology
SIES College of Arts, Science & Commerce (Autonomous)
Sion (W), Mumbai

Lecture on
"3D Printing Techniques for Biomedical Applications"
by
Dr. Prakriti Tayalia
Associate Professor,
Dept. of Biosciences and Biomechanics,
Indian Institute of Technology, Bombay, Mumbai

Monday, 19th Sep., 10.00 am
Venue: Auditorium, Ground Floor
SIES College of Arts, Science and Commerce

ALL ARE CORDIALLY INVITED TO ATTEND

POPULAR SCIENCE LECTURE
Organized by
Indian Women Scientists' Association
Vashi, Navi Mumbai.

Supported by
Board of Research in Nuclear Sciences (BRNS) - DAE

In association with
Science Association of
SVKM'S Mithibai College of Arts, Chauhan Institute of Science &
Amrutben Jivanlal College of Commerce and Economics
(AUTONOMOUS), Mumbai.

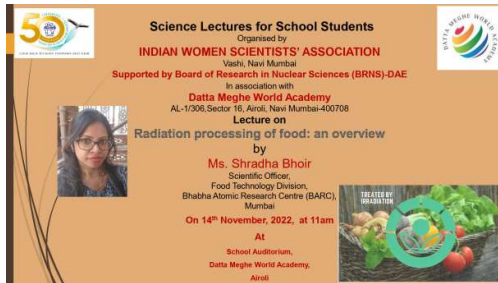
Renewable Energies for Sustainability - The Nuclear Option
by
Dr. Umashankari Kannan
Head, Reactor Physics Design Division
Bhabha Atomic Research Centre, Mumbai

Date and Time
19th September, 2022,
11:00 am onwards

Venue
Mini Auditorium
Next to Mukesh Patel
Auditorium, NMIMS University,
Mumbai 44.

BRNS Popular Science Lectures in Schools

50
 Science Lectures for School Students
 Organised by
INDIAN WOMEN SCIENTISTS' ASSOCIATION
 Vashi, Navi Mumbai
 Supported by Board of Research in Nuclear Sciences (BRNS)-DAE
 In association with
Datta Meghe World Academy
 AL-1096, Sector 16, Airoli, Navi Mumbai-400708
Lecture on
Radiation processing of food: an overview
 by
Ms. Shraddha Bhoir
 Scientific Officer,
 Food Technology Division,
 Bhabha Atomic Research Centre (BARC),
 Mumbai
On 14th November, 2022, at 11am
 At
 School Auditorium,
 Datta Meghe World Academy,
 Airoli



50
 Science Lectures for School Students
 Organised by
INDIAN WOMEN SCIENTISTS' ASSOCIATION
 Vashi, Navi Mumbai
 Supported by Board of Research in Nuclear Sciences (BRNS)-DAE
 In association with
Radcliffe School
 Plot 3, opposite Little World Mall, Sector 8, Kharghar, Navi Mumbai
Lecture on
Significance of Cryogenics in Energy Storage & Industrial Applications
 by
Dr. K.V. Srinivasan
 Scientist-in-charge
 Low Temperature (Cryogenics) Facility
 at
 Tata Institute of Fundamental Research, Mumbai
On 29th September, 2022, at 12 noon




50
 Science Lectures for School Students
 Organised by
INDIAN WOMEN SCIENTISTS' ASSOCIATION
 Vashi, Navi Mumbai
 Supported by Board of Research in Nuclear Sciences (BRNS) DAE
 In association with
D.A.V. Public School
 Airoli, plot no.11 sector - 10, Navi Mumbai
Lecture on
Applications of Artificial Intelligence (A.I.)
 by
Prof. Omprakash Mandge
 Course Coordinator
 MET Institute of Computer Science, Mumbai
On 15th October, 2022, at 11AM
 At
 3rd floor Hall
 D. A. V. Public School, Airoli

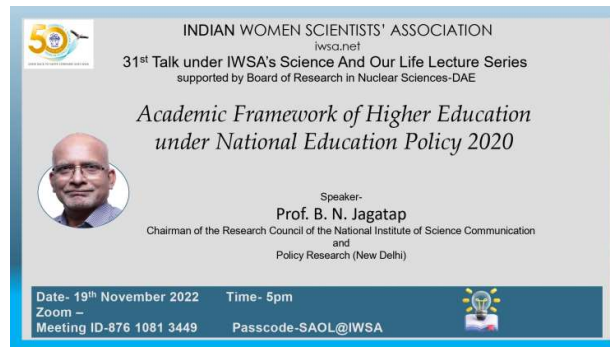


50
 इंडियन विमेन साइंटिस्ट्स एसोसिएशन
 और
साईनाथ हिन्दी उच्च विद्यालय
 जुहू नगर, सेक्टर 10ए, वाशी
 नाभिकीय विज्ञान अनुसंधान बोर्ड
 की सहायता से आयोजित
 विद्यालय के छात्रों के लिए विज्ञान व्याख्यान
जल ही जीवन है
 २९ सितंबर, २०२२, गुरुवार, प्रातः ११ बजे
 स्थल-आई. सी. आई. सी. आई. हॉल, इ. व. सा.
 सेक्टर 10ए, वाशी
 वक्ता-
 डॉ. कृष्ण कुमार मिश्र
 सहप्रोफेसोर
 होमी भाभा विज्ञान शिक्षा केन्द्र,
 टी.आई.एफ.आर.



Webinars under the “Science and Our Life” Series


50
 INDIAN WOMEN SCIENTISTS' ASSOCIATION
 iwscs.net
 31st Talk under IWSA's Science And Our Life Lecture Series
 supported by Board of Research in Nuclear Sciences-DAE
**Academic Framework of Higher Education
 under National Education Policy 2020**

 Speaker-
Prof. B. N. Jagatap
 Chairman of the Research Council of the National Institute of Science Communication
 and
 Policy Research (New Delhi)
 Date- 19th November 2022 Time- 5pm
 Zoom -
 Meeting ID-876 1081 3449 Passcode-SAOL@IWSA

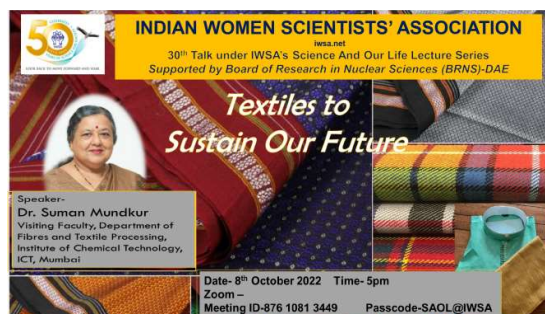


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 INDIAN WOMEN SCIENTISTS' ASSOCIATION
 iwscs.net
 29th Talk under IWSA's Science And Our Life Lecture Series
 supported by Board of Research in Nuclear Sciences-DAE
**THE WEIGHT OF DARKNESS - DARK MATTER HALOS
 AND THEIR ROLE IN COSMOLOGICAL EVOLUTION**


 Dr. Sushmita Adhikari
 Department of
 Physics
 IISER Pune
 Date- 10th September 2022 Time- 5pm
 Zoom -
 Meeting ID-876 1081 3449 Passcode-SAOL@IWSA



50
 INDIAN WOMEN SCIENTISTS' ASSOCIATION
 iwscs.net
 30th Talk under IWSA's Science And Our Life Lecture Series
 Supported by Board of Research in Nuclear Sciences (BRNS)-DAE
**Textiles to
 Sustain Our Future**

 Speaker-
Dr. Surman Munkur
 Visiting Faculty, Department of
 Fibres and Textile Processing,
 Institute of Chemical Technology,
 ICT, Mumbai
 Date- 8th October 2022 Time- 5pm
 Zoom -
 Meeting ID-876 1081 3449 Passcode-SAOL@IWSA



Activities of IWSA – VIPNET Science club




INDIAN WOMEN SCIENTISTS' ASSOCIATION
Science Awareness Committee In Collaboration with Vigyan Prasara


ACTIVITY NO. 12
IWSA - VIPNET CLUB (UID- VPMH0248)

*Fun with Science and Maths-
Hands-on activities*

On 13th Sept., 2022 at 3:30pm
On Zoom-
Meeting ID-812 9797 5773
Passcode-IWSA VIP




Ashok Rupner,
Senior Technical Officer,
Smt. Indrani Balan Science
Activity Centre,
IISER, Pune



Ankish Tirpude,
Technical Assistant,
Smt. Indrani Balan Science
Activity Centre,
IISER, Pune

The Science Activity Centre (SAC) is engaged in developing low-cost interactive science toys that can be used to teach science in a participative and hands-on way. The objective is to strengthen teaching and learning of science & mathematics through these simple toys and hands-on activities, which students/teachers can build and experiment with. SAC also generates educational resource material for students and teachers, aimed at improving conceptual understanding of topics from the curriculum.





INDIAN WOMEN SCIENTISTS' ASSOCIATION
Science Awareness Committee In Collaboration with Vigyan Prasara

ACTIVITY NO. 13
IWSA - VIPNET CLUB (UID-VPMH0248)

**Try
your hand
at
Design Thinking**

On 30th Sept., 2022 at 4:00pm
On Zoom-
Meeting ID-812 9797 5773
Passcode-IWSA VIP




Megha Chougule
Project Scientific Assistant
Homi Bhabha Centre for Science
Education, Mumbai



Disha Dbritto
Project Scientific Assistant
Homi Bhabha Centre for Science
Education, Mumbai






INDIAN WOMEN SCIENTISTS' ASSOCIATION
Science Awareness Committee in Collaboration with Vigyan Prasara


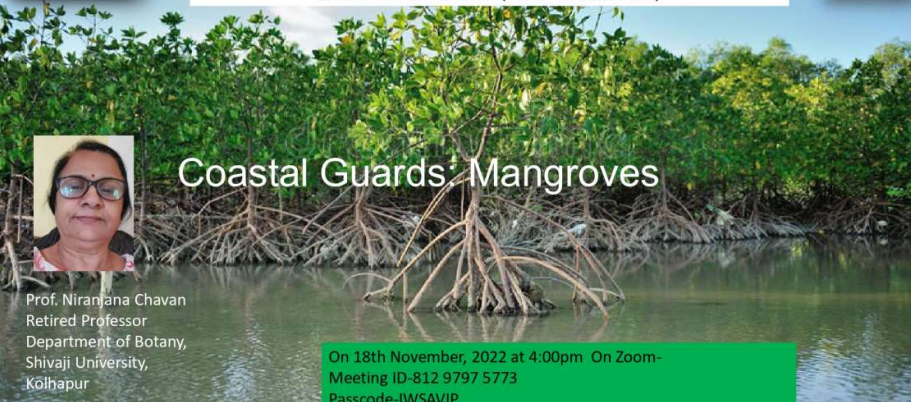
Activity no. 14
IWSA- VIPNET Club (UID- VPMH0248)

Coastal Guards: Mangroves

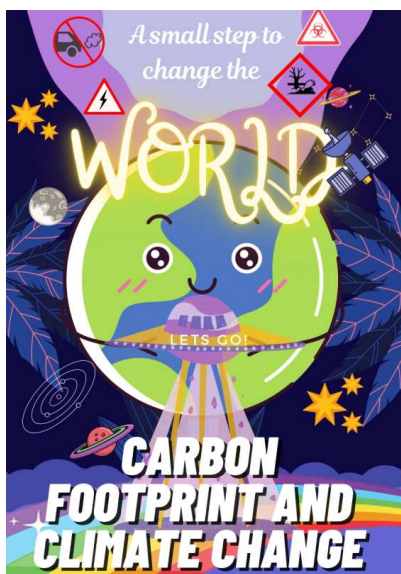
On 18th November, 2022 at 4:00pm **On Zoom-**
Meeting ID-812 9797 5773
Passcode-IWSA VIP



Prof. Niranjana Chavan
Retired Professor
Department of Botany,
Shivaji University,
Kolhapur



Internship Program



-WORDS OF WISDOM-

Congratulations to the team of students of SIES college Mumbai, for presenting their project outcome in the form of this pictorial booklet for young readers. Titled 'A small step to change the world - Carbon Footprint and Climate Change' this booklet is an embodiment of their knowledge gained during the month long internship with IWSA mentors. They were exposed to the concerns on climate change and awareness on reduction of carbon footprint to rebuild the green planet. In an age playway method they have created narratives, quiz and coloring pages that will engage readers to hold on to it for longer duration. Let this ignite the spirit to get close to nature and its leading process. We wish them the best for pursuing careers in science.

Dr Rita Mukhopadhyaya
PRESIDENT
Indian Women Scientists' Association

I am very delighted to write about this booklet titled 'A small step to change the world - Carbon footprint and Climate Change' which is the culmination of the new and unique program 'Women Internship Program for college students', undertaken by IWSA to promote Science Education among students.

Our association with IWSA dates to almost a decade. We have together heard many of the popular science lecture series which have benefited our students very much. It is very heartening to note that this new program not only encouraged students to take up and execute science projects from their homes but also assimilate the knowledge gleaned from their internship in the form of a booklet with the purpose of creating awareness among the younger generation regarding the growing threat of climate change in a hard and interesting style.

Dr Ema Shankar
PRINCIPAL
SIES College of Arts, Science and Commerce (Autonomous), Sion (W)

Published in December 2022 by _____
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Indian Women Scientists' Association (IWSA)
Plot No. 20, sector 10A, Vashi, Navi Mumbai 400703
Tel No-022 27661806, 2766216
www.iwsa.net

Booklet published from SIES internship



INDIAN WOMEN SCIENTISTS' ASSOCIATION
PLOT NO. 20, SECTOR 10-A VASHI, NAVI MUMBAI 400703

IWSA MIDAS TOUCH 2022
Student Orientation Program
IWSA-ITM Internship
(ITM Business School, Sector 4, Kharghar East Navi Mumbai, 410210)
December 5th-17th, 2022

Theme: To understand the role of NGOs in sustainable development
Venue: IWSA Multipurpose Hall
Date: December 5, 2022
Time: 11 am - 1:00 pm

ITM internship program

IWSA Learning Garden Activities



SHRUBS



DR. SWEEDLE SHIVKAR (I.W.S.A) EXPLAINING ABOUT PLANTS



IT'S CHRISTMAS PARTY TIME!!!!



BITTER GOURD



CACTUS



THANK YOU ALL I.W.S.A MEMBERS & INVITES



MASTI KA PITARA - PLANT SERIES

INDIAN WOMEN SCIENTISTS ASSOCIATION



STORY ABOUT SAVE TREES & UP CYCLING CONCEPT USING PUPPETS

TREE SONG - KARADI RHYMES



"THANK YOU TREE" ACTIVITY



DECORATING CHRISTMAS TREE & THANKING TREES FOR SAVING OUR ENVIRONMENT



Kimchi Preparation

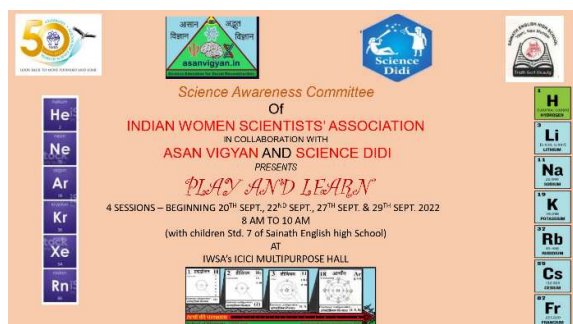


Sauerkraut Preparation



Participants

Workshop on Fermentation – Learning Garden Activities



Play and Learn with Science Deedi and Asan Vigyan

BRNS School Lectures



Pragati Vidhyalaya



Datta Meghe World Acad.

Mathematics Olympiad in Mumbai



Mumbai VAMMO Team



Mumbai VAMMO Award Function

Hostel and Day Care Celebrations



Activities of IWSA's Computer Centre



TISS

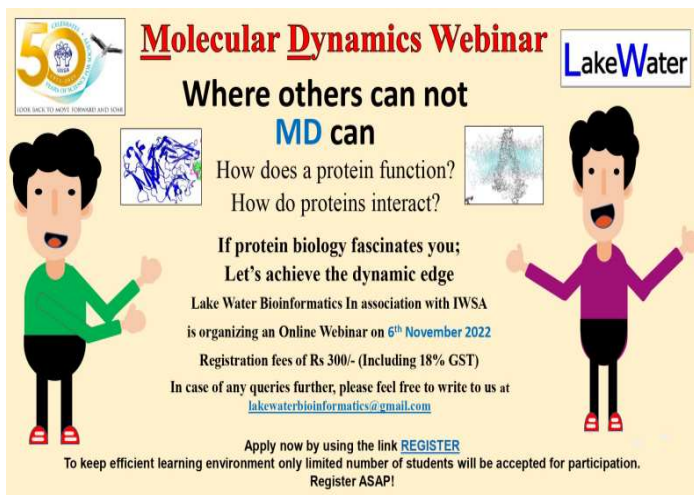


Bhavan's College



ECCE

Activities of IWSA's Computer Centre



Molecular Dynamics Webinar LakeWater

Where others can not MD can

How does a protein function?
How do proteins interact?

If protein biology fascinates you;
Let's achieve the dynamic edge

Lake Water Bioinformatics In association with IWSA is organizing an Online Webinar on 6th November 2022

Registration fees of Rs 300/- (Including 18% GST)

In case of any queries further, please feel free to write to us at lakewaterbioinformatics@gmail.com

Apply now by using the link REGISTER
To keep efficient learning environment only limited number of students will be accepted for participation. Register ASAP!



50 CELEBRATE 50 YEARS OF INDEPENDENCE

LOOK BACK, TRY NOT TO FORGET AND MOVE FORWARD

---Indian Women Scientists' Association---
under the aegis of IWSA's Computer Education Centre offers 15 days online/offline/hybrid mode

ADVANCE COMPUTER COURSE

Course starts from 10th oct 2022, 6 days a week (Monday - Saturday)

- Google Tools
- MS. Office
- Canva, Notice, Resume, Cover Letter
- Social Media Platforms
- Office application software
- Video Editing

For Further Details Kindly Contact
iwsa.computercentre@gmail.com

90th Birthday of Dr. Sudha Padhye, our founder member



Library

E Granthalaya workshop



Meeting with Mr. Patil, Directorate of Libraries



Visit by Red Dot Foundation



Nursery and ECCE Activities



Activities from our branches

Hyderabad Branch



Kohlapur Branch



Flower festival series

Felicitation of Woman Achiever



Drawing Competition

Kalpakkam Branch

Technical talk on 10th November



Technical Talk on 7th December



Nagpur Branch

POPULAR SCIENCE LECTURE

ORGANISED BY
**Indian Women Scientists' Association
 Nagpur Branch**
 Supported by Board of Research In Nuclear Sciences (BRNS)-DAE

In association with
**Microbiology and Biochemistry students Cell
 Seth Kesarimal Porwal College of Arts and Science and
 Commerce, Kamptee**

Lecture on
**Combating Multidrug Resistance in UTI
 (Urinary Tract Infection)**
 by



Dr. Archana Moon
 Professor
 PGTD Biochemistry, RTM Nagpur University,
 Nagpur

17TH SEPTEMBER, 2022, SATURDAY
 11.30 AM IST
 VENUE : Seth Kesarimal Porwal College of Arts and Science and Commerce,
 Kamptee, Library hall



Pune Branch

Popular Science Lecture
 Organized by
**Indian Women Scientists' Association,
 Pune Branch**

Supported by Board of Research in Nuclear Sciences (BRNS)-DAE
 in association with
 Department of Chemistry
 Z. E. Society's Modern College of Arts, Science and Commerce, Ganeshkhind, Pune

Lecture on
Thermal Methods of Analysis
 by

Dr. Neelima Bolakh
 Principal Technical Officer, Polymer Science and Engineering Dept., National Chemical Laboratory, Pune, India

Friday, 19 November 2022 at 11:30 am
 Audio Visual Hall, Modern College of Arts, Science and Commerce, Ganeshkhind, Pune
 All are cordially invited to attend the lecture




BRNS Popular Science Lecture on 6th November

Popular Science Lecture
 Organized by
**Indian Women Scientists' Association,
 Pune Branch**
 Supported by Board of Research in Nuclear Sciences (BRNS)-DAE
 in association with
 Department of Chemistry,
 Sir Parashurambhau College (Autonomous), Tilak Road, Pune-30

Lecture on
Chromatographic Techniques
 by
Dr. D. G. Naik
 Project Coordinator, Maharashtra Education
 Society, Pune-411004

Wednesday, November 16, 2022 11:00 am
 Lady Ramabai Hall (S. P. College, Pune)

Scan for Registration




BRNS popular science lecture on 16th November

BOOK POST

Regd. No.N.R.24208/74
ISSN 0972-6195



Strange Insects

EMPRI Latest Science Snippet 2022/3

DID YOU KNOW?

Nanoplastics can travel through food chain

Reference: Mondal, F. A., Helm, S., Korset, R., Bandekar, M., Kekäläinen, J., Kolstinen, A., & Kukkonen, J. V. (2022). Quantifying the trophic transfer of sub-micron plastics in an assembled food chain. *Nano Today*, 46, 101611.

The diagram shows a flow from soil containing polystyrene and polyvinyl chloride (PVC) particles to lettuce grown in that soil. The lettuce is harvested and fed to black soldier fly larvae. These larvae are then fed to a freshwater roach fish. The fish is examined via Scanning Electron Microscopy (SEM) to detect the presence of sub-micron plastics (SMPs).

Lettuce takes up 250 nm polystyrene and polyvinyl chloride Sub-Micron Plastics (SMPs) from soil

The SMPs accumulate mostly in the fish liver

Content Credits: Dr. Vinaya Chaitanya, Information Officer, EIACP

Environmental Information, Awareness, Capacity Building and Livelihood Programme (EIACP)
Environmental Management and Policy Research Institute
Government of Karnataka

To

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

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Editor Dr. Shyamala Bharadwaj.