



IWSA NEWSLETTER

The Official Publication of the Indian Women Scientists' Association

Volume 48

Issue No. 3


ISSN 0972-6195

August – December 2021

Webinars under the "Science and Our Life" Series

INDIAN WOMEN SCIENTISTS' ASSOCIATION
www.iwsa.net

17th Talk under IWSA's SCIENCE AND OUR LIFE Lecture Series



**Water Issues in Rural Areas:
IIT Jodhpur Interventions**

On 14th August 2021 at 5PM
On Zoom
Meeting ID: 699 420 2891
Pass code- IWSA@vashi

Prof. Pradip K. Tewari
Head
Department of Chemical
& Engineering,
Indian Institute of Technology
(IIT) Jodhpur

INDIAN WOMEN SCIENTISTS' ASSOCIATION
www.iwsa.net

18th Talk under IWSA's "Science and Our Life" Lecture Series
Supported by Board of Research in Nuclear Sciences (BRNS)-DAE




**EXPLORING SUSTAINABLE
ARCHITECTURE IN INDIA**

12th September 2021 at 5PM
On Zoom
Meeting ID: 699 420 2891
Passcode- IWSA@vashi

Dr. (A) Pratheek Sudhakaran
Architect, Educator,
Researcher

INDIAN WOMEN SCIENTISTS' ASSOCIATION
19th Talk under IWSA's Science And Our Life Lecture Series
Now supported by Board of Research in Nuclear Sciences

Digital Library Projects & Digital Preservation of Cultural Heritage
by




Shipra Rale
Scholarly Communication
& Data Curation Librarian,
Rutgers University, Glassboro, NJ, USA

Date- 9th October 2021
Time- 7PM
Zoom -
Meeting ID- 811 4939 2327
Passcode- SAOL@IWSA

INDIAN WOMEN SCIENTISTS' ASSOCIATION
20th Talk under IWSA's Science And Our Life Lecture Series
Supported by Board of Research in Nuclear Sciences

**Excitement of studying Lothal and Dholavira:
Geological applications in Marine Archaeology**



SPEAKER
Dr Rajiv Nigam
Emeritus Scientist,
Former Head,
Geological Oceanography Division
& Head Marine Archaeology Unit
National Institute of Oceanography,
Dona Paula, Goa

Date & Time of Lecture
13th November 2021
at 6pm
Please join by 5.55 pm

On Zoom-
Meeting ID- 811 4939 2327
Passcode- SAOL@IWSA
<https://us02web.zoom.us/j/81149392327?pwd=SDZlRDJlSjVlbnRlWHlQcWVWbWp0Y010>

19th SAOL on 9th October 2021

20th SAOL on 13th November 2021

INDIAN WOMEN SCIENTISTS' ASSOCIATION
21st Talk under IWSA's Science And Our Life Lecture Series
Supported by Board of Research in Nuclear Sciences



The Science of Consumerism

Speaker- Priya Anantaraman
Head, Global Marketing & Insights Analytics.

Date- 11th December 2021
Time- 5 PM
On Zoom-
Meeting ID- 811 4939 2327
Passcode- SAOL@IWSA

21st SAOL on 11th December

BRANCHES

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

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 - DAE
In Association with
Department of Biosciences,
Union Christian College, Aluva

Lecture on
Climate Smart Agriculture in the Era of Plant Genomics



Prof. Paramjit Khurana Ph.D.
FNA, FASc, FNASc, FNAAS, FTWAS
J.C. Bose National Fellow
Department of Plant Molecular Biology,
University of Delhi South Campus, New Delhi
Saturday, 4th of September at 10.30 AM

[Zoom](#) [YouTube](#)

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 Zoology
Wilson College, Mumbai-400 007

Webinar on
Development of Human Embryos: 40 weeks or 800 Million Years?

Guest Speaker
Prof. Sreelaja Nair Ph.D.
Department of Biosciences & Bioengineering,
IIT - Bombay, Powai, Mumbai-400076



Friday, 17th September, 2021 at 4.00pm (IST)
ALL ARE CORDIALLY INVITED TO ATTEND!
<https://forms.gle/sVFGq3ajFwckxT47>

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
Dept of Zoology,
D. G. Ruparel College of Arts, Science & Commerce
Mahim, Mumbai

Webinar on
Blood Coagulation and Related Disorders

Guest Speaker


Dr. Shrimati D. Shetty
Consultant Biomaterial Scientist
Suryaya Medical College and Research Centre,
Mumbai

Date & Time
22nd Sept. 2021
11:30 am
Registration link
<http://forms.gle/3887CsuUmYCb7d>

Note:
1. Registration is free
2. Google Meet link will be sent on registered email id.

Dr. Shrimati Shetty
22nd September 2021


Prof. Paramjit Khurana,
4th September 2021

Prof. Sreelaja Nair
17th September 2021

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
METHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE & AMRUTEN
JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS (AUTONOMOUS)
Mile Park, Mumbai.

Webinar on
Demystifying Research, Development, Innovation and Entrepreneurship

Guest Speaker


Prof. B. N. Jagtap
Indian Institute of Technology, Gandhinagar

Abstract:
Postgraduate students have been always advised to take up research and development as a career option. In the last century, the idea of research was largely confined around the academic research in universities and research institutes. In the 21st century, however, this idea has expanded into the industrial, service and social domains, thereby creating enormous opportunities of work and professions. Integration of innovation and entrepreneurship in research is at the first of this transformation. This field is wide open to post graduates, graduates and even undergraduates, basically to all those who possess the 21st century skills. This talk provides an overview of the current research ecosystem with a few illustrative examples and focuses on the interdisciplinary research opportunities.

Prof. B.N. Jagtap
24th September 2021

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
Shriromani Gurdwara Prabandhak Committee's
Guru Nanak Khalsa College of Arts, Science and Commerce (Autonomous)
Matunga, Mumbai
Accredited by NAAC with 'A' grade with CGPA of 3.54

Webinar on
Stem Cells in Regenerative Medicine: What is the Reality?

Guest Speaker


Dr. Sanjeev Waghmare
Senior Scientist,
Career Research Institute,
ACTREC, Tata Memorial Centre,
Kharghar, Navi Mumbai

Date & Time
14th Oct. 2021
11:00 am
Please join by 10:55 am

Link for Webinar
<https://meet.google.com/hqs-strm-fjz>

All are cordially invited to join


Dr. Sanjeev Waghmare
14th October. 2021

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 Chemical Engineering
Finolex Academy of Management and Technology, Ratnagiri

A Webinar on
Chemical Engineers and Atomic Energy in service of Humanity

Guest Speaker


Dr. Sheela Choudhary
Retired Outstanding Scientist
Deputy Chief Executive
Nuclear Fuel Complex Hyderabad

Date- 25th October 2021
Time- 11:00 am
Google Meet Link
<https://meet.google.com/hjd-fjat-cdo>

Dr. Sheela Choudhary
25th October, 2021


Popular Science Lecture
Organised By
Indian Women Scientists' Association
Vashi, Navi Mumbai

Supported by
Board of Research in Nuclear Sciences BRNS-DAE

In association with
Kishinchand Chellaram College, HSNC University,
Departments of Biotechnology and Microbiology
Churchgate, Mumbai- 400020

Under the aegis of
DBT STAR College Status

Lecture on
Gut-brain Axis



by **Dr. Dhiraj Dhotre**
National Centre for Cell Science,
National Centre for Microbial Research, Pune

Date and Time: Thursday, 21st October, 2021 (4.30 pm IST)

ALL ARE CORDIALLY INVITED TO ATTEND

[Register Here](#)


Dr. Dhiraj Dhotre, 21st October, 2021

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
Janardan Bhagat Shikshan Prasarak Sanstha's
Changu Kana Thakur
Arts, Commerce and Science College, New Panvel (Autonomous)
Department of Microbiology

Webinar on
Gut Microbiome and its Implication on Human Health

Guest Speaker


Dr. Sahayog N. Jamdar
Senior Scientific Officer,
Food Technology Division/ F&L
Bhambha Atomic Research Centre,
Mumbai

Date and Time
Saturday, 30th Oct. 2021
3:00 pm
Please join by 2:55 pm

Link for Webinar
<https://bit.ly/3mzqz6h>

Meeting Platform
Microsoft Teams

All are cordially invited to join

Dr. Sahayog Jamdar, 30th October, 2021



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 of various Committees of IWSA, viz. Nursery and Education Committee, Health Centre, Computer Centre, Activities of various Branches etc. Most of the activities reported in this Newsletter have been conducted online due to the COVID Pandemic. Two activities of the Health Centre were conducted offline at IWSA Campus. During the period of August to December 2021, eighteen Popular Science Lectures supported by BRNS were conducted for college students by headquarters and two more such lectures were conducted by Bengaluru and Kalpakkam Branches. In addition to these, four Popular Science Lectures supported by BRNS were organised for school students. In our "Science and our Life" Lecture Series, also supported by BRNS, five interesting lectures were held during this period. New initiatives in collaboration with Vigyan Prasar were started during this period such as Garden based Workshops, Each One Teach One, VIPNET Science Club activities for school students etc. Reports on all these interesting activities are included in this issue of the Newsletter. Internship Programs for SIES college students were a grand success, The students prepared detailed dissertations on their respective projects and submitted them to the University of Mumbai for the partial fulfilment of the Degree of Bachelor of Science in Biotechnology for the year 2021- 2022. Some groups are working on bringing out some booklets based on the projects carried out by them. IWSA's Satish Haware Computer Education Centre celebrated 30 years of its existence by organizing an International Webinar on the "Changing Face of Digital Era" and a Panel Discussion on "Women in Science - Then and Now". This issue also brings the interesting online activities held at IWSA Branches at Amravati, Bengaluru, Kalpakkam, Kolhapur, Nagpur, Nellore and Roorkee. Dr. Neha Kumar, Assistant Professor from Demaji College, Assam has written an interesting article about "Organic Electronics for Better Tomorrow". We have also included our usual features of "Nobel Laureates 2021" and "We Salute these Women Achievers". I hope that all of you will enjoy reading about these reports and the scientific information content of this Newsletter.

With best wishes,

Shyamala Bharadwaj

shyamala.bharadwaj@gmail.com

Contents

From the Editor's Desk
President's Message
Reports from Headquarters
Reports from other Branches
Article on: Organic Electronics for a Better Tomorrow
Nobel Prize Winners 2021
Women Achievers 2021

Editorial Board

Dr. Shyamala Bharadwaj (Editor)
Dr. Lalitha Dhareshwar
Dr. Susan Eapen
Dr. Dhanya Suresh
Dr. Sheela Donde
Dr. Paramjit Anthappan
Dr. Smitha Kekatpure



President's Message

I would like to congratulate the immediate past president Dr Lalitha Dhareshwar, and the editorial board members for their persistence to bring forth quality information in the Newsletter for our members and visitors to our website where the publications are archived. Our readership is enriched with contributory articles of relevance and information about the outreach programs and activities held during this period of publication. Recordings of all public lectures held by us are made available in the YouTube channel. I welcome the members of new executive committee of IWSA 2021-2023. Your leadership roles shall steer our association through all constrains of the pandemic. I am honoured to shoulder the responsibility as your president. Our board of trustees, senior members Dr Niyati Bhattacharya, Dr Susan Eapen and founder member Dr Sudha Padhye are a constant source of guidance on the path to move forward.

Vaccines against SARS COV II have arrived in the country and by now senior citizens have taken their 2 shots of immunizations. Slowly and cautiously IWSA shall begin offline activities in the near future. Our part time staff who were working from home have resumed for three days of work at the headquarters from September. Members are making informed visits in compliance with COVID safety norms like double masking, maintaining 3 ft distance and others. The pandemic taught us new skills. Our online presence reached to over 18000 viewers. We conducted the second internship program for undergraduate students of SIES College, Sion, Mumbai. As colleges began to welcome back their students on campus our interns could perform few microbiology experiments in the college laboratories. Satish Haware Computer Education Centre (CEC) completed 30 years. The half day online International Seminar brought together eminent speakers and panelists who enlightened our student audience and members with the latest progresses in the field of computer sciences.

On the final leg of collaboration with Vigyan Prasar, New Delhi, the 'Each one Teach one' program was launched with participating college students and members of the science awareness committee. The BRNS supported popular science lecture series had reached our branches from last year and now schools have welcomed this activity.

The office of Women & Child Welfare, Thane, visited the working women's hostel in October and their queries were attended satisfactorily. The hostel housed average 20 residents and we hope this will increase post pandemic. The IWSA Day Care Center and Nursery school committees are contemplating reopening by new year after fulfilling the new norms and training of staff for COVID safety.

Our mandate to nurture the value of science to common people shall continue to evolve means for reaching out to society, promoting advancements in science education, shaping young minds towards the right direction viz. societal responsibilities, environment consciousness, and scientific logic.

Wishing our readers, a happy new year 2022. Stay safe & healthy.

Dr. Rita Mukhopadhyaya
rita45@gmail.com

Reports from Head Quarters

Science Awareness Programs

A. IWSA – BRNS Popular Science Lectures for Colleges

1. Online BRNS Popular Science Lecture at UC College, Aluva, Kerala on 4th September, 2021

A popular science lecture was conducted at UC College, Aluva, Kerala on Saturday, the 4th September, 2021 at 10.30 am under IWSA – BRNS popular science lecture series. J. C. Bose National Fellow Prof. Paramjit Khurana Ph.D., FNA, FASc, FNASc, FNAAS, FTWAS, Department of Plant Molecular Biology, University of Delhi South Campus, New Delhi – 110021 spoke on “Climate Smart Agriculture in the Era of Plant Genomics”.

Agriculture has to change effectively to produce more output in the face of declining land and water resources to feed the increasing world population. Currently we are living in an era of genomics, transcriptomics, proteomics and metabolomics, which can be used effectively for crop improvement. University of Delhi participated in international initiative on rice genome sequencing (Chromosome 11), tomato genome sequencing and recently in wheat (Chromosome 2A) genome sequencing. They also completed sequencing of mulberry chloroplast genome.

Due to climate change, crop plants have to withstand heat stress, drought stress etc which hit the productivity of crops. We have to develop new varieties of crops which can grow under drought and heat stress. The speaker explained how the information of genomics of crop species can be used in developing stress tolerant crops. About 242 persons participated in the programme and actively got involved in the discussion that followed. Dr. Rita Mukhopadhyaya, President IWSA spoke about the activities of IWSA and Dr. Susan Eapen introduced the speaker. Mr. Shyam Mohan, HOD, Biosciences Group, UC College welcomed the participants and Dr. Sareen Sarah John, Asst. Professor, UC College proposed vote of thanks.

You tube link for the Lecture: <https://youtu.be/5nd1CYGbSkw>

2. Online BRNS Popular Science Lecture at Department of Zoology, Wilson College, Mumbai on 17th September, 2021

An IWSA BRNS popular science lecture hosted by Wilson College, Mumbai was held on Friday, the 17th September at 4.00 pm. The speaker Prof. Sreelaja Nair Ph.D., Associate Professor, IIT (B), Mumbai spoke on “Development of Human Embryos: 40 Weeks or 800 million Years?”

The transformation of an embryo from a single-cell at fertilization to a multi-cellular animal with a distinct three-dimensional shape and anatomy has fascinated researchers and layman alike, Prof. Nair said. The process of embryo development is often viewed using representative animal embryos to understand human embryo development. However, the complex mode of human embryo development originated as small, individual development modules in the very first animal that came into existence during evolution, she further added. What were the first developmental modules that the first ever animal had? Which additional developmental modules got added as evolution progressed? Which developmental modules does the human embryo currently use to transform itself into a foetus after fertilization? These were the questions answered during her talk.

Dr. Shyamala Bharadwaj, Vice President, IWSA spoke on the various activities of IWSA. Dr. Susan Eapen and Dr. Neha Koshy co-ordinated the programme. About 200 participants were there on Zoom and live YouTube platforms. The talk was followed by a lively discussion.

YouTube link for the lecture: <https://youtu.be/Vpvc09Cm22c>

3. Online BRNS Popular Science Lecture at Department of Zoology, Ruparel College, Mumbai on 22nd September, 2021

An IWSA BRNS popular science lecture hosted by D. G. Ruparel College of Arts, Science and Commerce, Mumbai was held on Wednesday, 22nd September at 11.30 am. The speaker Dr. Shrimati D. Shetty, former Senior Scientist, ICMR-National Institute of Immuno-haematology, presently Consultant Biomedical Scientist, Somaiya Medical College and Research Centre, Mumbai spoke on “Blood Coagulation and related disorders”. The lecture was conducted virtually on the Google meet platform. There were 96 participants for the webinar.

Hemostasis or coagulation is the process which stops haemorrhage or bleeding whenever there is a breach in the blood vessel. Under coagulation can lead to bleeding and over coagulation can lead to thrombosis. Multiple components in blood namely platelets, the coagulation factors and the fibrinolytic system with additional contribution of endothelium work in a concerted manner to maintain this tightly regulated hemostatic balance. The defects/deficiencies of any of these factors can result either in bleeding or thrombotic disorders. Hemostatic disorders may be genetic or acquired. They may be severe, moderate or mild depending on the level of specific factor which they are deficient for. The commonest congenital bleeding disorders are von Willebrand disease, hemophilia A (factor VIII deficiency) and hemophilia B or Christmas disease (factor IX deficiency). Remaining factor deficiencies being rare, are grouped under “rare bleeding disorders” (RBDs). The treatment has evolved tremendously over the past few decades from fresh frozen plasma as the only available therapy to more specific plasma-derived and recombinant-derived factor replacement and more recently the novel non-factor therapies and factor mimetics. Identification of carriers, genetic counselling and antenatal diagnosis of confirmed carriers go a long way in preventing the birth of children with these genetic disorders. Gene therapy and gene editing using AAV vectors aim to provide sustained factor levels with a single treatment. When there is excess of platelet or coagulation activation, excessive blood clot or thrombosis can occur in unwanted sites.

Anticoagulants targeting different pathways of coagulation are used as therapeutic products to maintain the hemostatic balance in these patients.

Dr. Meenakshi Sunderesan, HOD, Dept of Zoology, welcomed the audience, Dr. Surekha Zingde, Trustee, IWSA spoke about the activities of IWSA, and Dr. Minaxshi Gurav introduced the speaker. The participants clarified their doubts through exchange of questions and answers. Dr. Gayatri Narayan, delivered the acknowledgements.

4. Online BRNS Popular Science Lecture at Mithibai College, Vile parle, Mumbai on 24th September, 2021

An IWSA BRNS popular science lecture hosted by Mithibai College of Arts, Chauhan Institute of Science & Amrutben Jivanlal College of Commerce and Economics (Autonomous), Vile Parle, Mumbai on 24th September 2021. The speaker Prof. B.N. Jagatap, Department of Physics, Indian Institute of Technology, Bombay spoke on “Demystifying Research, Development, Innovation and Entrepreneurship”. The lecture was conducted virtually on the MS Teams platform. About 145 participants attended the webinar.

Postgraduate students have been always advised to take up research and development as a career option. In the last century, the idea of research was largely centred around the academic research in universities and research institutes. In the 21st century, however, this idea has expanded into the industrial, services and social domains, thereby creating enormous opportunities of work and professions. Integration of innovation and entrepreneurship in research is at the root of this transformation. The field is wide open to post graduates, graduates and even undergraduates; basically, to all those who possess the 21st century skills. This talk provided an overview of the current research ecosystem with a few illustrative examples and focused on the India-centric research opportunities.

Dr. Krutika Desai, Principal, Mithibai College, welcomed the audience and spoke about the college. Dr. Shyamala Bharadwaj, Vice President, IWSA spoke about the activities of IWSA. Dr. Prajakta Sarang, Chemistry Department, Mithibai College introduced the speaker. Dr. Tushima Basak, Mithibai College conducted the Question and Answers session. The participants clarified their doubts through exchange of questions and answers.

5. Online BRNS Popular Science Lecture at G N Khalsa College of Arts, Science and Commerce, Matunga, Mumbai on 14th October, 2021

An IWSA BRNS popular science lecture was hosted by Guru Nanak Khalsa College of Arts, Science and Commerce (Autonomous), Matunga, Mumbai on 14th October 2021. Dr. Sanjeev Waghmare, Senior Scientist, Cancer Research Institute, ACTREC, Tata Memorial Centre, Kharghar, Navi Mumbai spoke on “Stem Cells in Regenerative Medicine: What is the Reality?”. The lecture was conducted virtually on Google Meet Platform. About 165 participants attended the webinar.

Abstract: Stem cells (SCs) have a property to self-renew and differentiate into lineages of the tissue throughout the life of an organism. These SCs reside in a specialized microenvironment termed as “niches” and they divide either during the normal process to maintain tissue homeostasis or during injury to the tissue. There are several cellular processes that regulate stem cells such as signaling, metabolism, epigenetics, DNA repair etc. that enable to retain their functionality. For instance, signaling pathways such as Wnt / Notch / Sonic-hedgehog and others like EGFR pathways etc. regulate these stem cells and deregulation leads to tumorigenesis. In cancer, there exist subpopulations of cells that have stem cell like properties that are termed as Cancer-stem cells, which develop resistance against chemotherapeutic agents leading to recurrence of tumor. Notably, adult hematopoietic stem cells are being used in the treatment for leukemia; however, there is a problem of rejection associated *i.e.*, graft-versus-host disease. Similarly, skin keratinocytes stem cells have been used to treat the third degree burn patients. With the advent of induced pluripotent stem cells in 2006, the major problem associated with graft-versus-host disease can be circumvented thereby providing an extraordinary potential to treat various human disease. In addition, hard to treat neurological disorders such as Parkinson’s, spinal cord injury etc. are showing promising results with several ongoing clinical trials in process. However, there is very little information about SCs maintenance and regulation. Therefore, it is very important to understand the various molecular mechanism that maintain these SCs, that would pave its way to move forward more robustly in regenerative medicine.

6. Online BRNS Popular Science Lecture held at KC College, Mumbai on 21st October, 2021

An IWSA BRNS popular science lecture hosted by Department of Biotechnology and Microbiology of Kishinchand Chellaram College (HSNC University), Churchgate, Mumbai was held on Thursday, the 21st October at 4.30 pm. The speaker Dr. Dhiraj Dhotre, Scientist ‘D’, National Centre for Cell Science, Pune spoke on ‘Gut-Brain Axis’.

Dr. Dhotre said that it was over 2,000 years ago when the Greek physician Hippocrates, oft-lauded as the father of modern medicine, is claimed to have made proclamation: “All disease begins in the gut.” It has always been central to Indian Ayurvedic concept “*Agni*” that all diseases some ways or the other are linked with the gut. The connect between gut and brain in maintaining homeostasis has long been appreciated. However, the past 15 years have seen the emergence of the “Human Microbiome” (the trillions of microorganisms within and on our bodies) as one of the key regulators of gut-brain function; the microbiota-gut-brain axis. This axis is gaining ever more traction in fields investigating the biological and physiological basis of psychiatric, neurodevelopmental, age-related, and neurodegenerative disorders. The microbiota and the brain communicate with each other via various routes including the immune system, the vagus nerve and the enteric nervous system, involving microbial metabolites such as short-chain fatty acids (SCFA), branched chain amino acids (BCAA), and peptidoglycans.

Dr. Dhotre emphasised that many factors can influence microbiota composition in early life, including infection, mode of birth delivery, use of antibiotics, the nature of nutritional provision, environmental stressors, and host genetics. At the other extreme of life, microbial diversity diminishes with aging. Stress and trauma in particular, can significantly impact the microbiota-gut-brain axis. Much recent work has implicated the gut microbiota in many conditions including autism, anxiety, obesity, schizophrenia, Parkinson's disease, and Alzheimer's disease. Animal models have been paramount in linking the regulation of fundamental neural processes, such as neurogenesis and myelination, to microbiome activation of microglia. Moreover, translational human studies are ongoing and will greatly enhance the field. Future studies will focus on understanding the mechanisms underlying the microbiota-gut-brain axis and attempt to elucidate microbial-based intervention and therapeutic strategies for neuropsychiatric disorders, he said.

Dr. Sejal Rathod, Head, Microbiology Department, KC College welcomed the speaker and the participants. Dr. Rita Mukhopadhyaya, President, IWSA spoke on the various activities of IWSA. Dr. Susan Eapen introduced the Guest Speaker and Ms. Rajitha Sathish, KC College spoke about the College and also compered the programme. Ms. Priyanka Yadav proposed vote of thanks. About 125 participants were there on Zoom platform. The talk was followed by an active discussion. The feedback from participants confirmed that the talk was very informative and it enhanced their knowledge.

7. Online BRNS Popular Science Lecture held at Finolex Academy of Management and Technology, Ratnagiri on 25th October 2021

An IWSA BRNS popular science lecture hosted by Department of Chemical Engineering of Finolex Academy of Management and Technology, Ratnagiri on 25th October 2021. The speaker Dr. Sheela Chaudhary, Retired Outstanding Scientist and Deputy Chief Executive Nuclear Fuel Complex, Hyderabad spoke on "Chemical Engineers and Atomic Energy in service of Humanity". The lecture was conducted online through google meet platform. About 55 participants attended the webinar.

Abstract: Chemical engineering is one of the oldest disciplines of science and technology known to humanity. Engineered means doing something well in a systematic way that can be replicated. We know that entire universe is made of Chemicals, to name a few, the air we breathe is basically a mixture of oxygen and nitrogen, the sand along the riverside or seashore is silica with many other oxides of various elements. Every element is a conglomerate of atoms arranged in various forms. The reaction of atoms at electron level is a chemical reaction and at nucleus level is atomic reaction. The speaker described briefly the application of these reactions in serving humanity.

8. Online BRNS Popular Science Lecture at Changu Kana Thakur Arts, Commerce and Science College, New Panvel on 30th October 2021

An IWSA BRNS popular science lecture hosted by Department of Microbiology of Janardan Bhagat Shikshan Prasarak Sanstha's Changu Kana Thakur Arts, Commerce and Science College, New Panvel (Autonomous) on 30th October 2021. The speaker

was Dr. Sahayog Jamdar, Senior Scientific Officer, Food Technology Division, FIPLY, Bhabha Atomic Research Centre, Mumbai. He spoke on “Gut Microbiome and its Implication on Human Health”. The lecture was conducted online through Microsoft Teams platform. About 129 participants attended the webinar.

Abstract: The human gastrointestinal tract is estimated to be colonized by over 10^{14} bacteria, approximately 10-fold of the total number of cells in the human body. Recently, the composition of these microbiota has been associated with many host factors like normal development, immune system maturation, CNS functions. Also, accumulating evidence suggests that gut bacteria play critical roles in maintaining human health in many aspects. Gut microbiota dysbiosis can also lead to diseases, like GI disorders, obesity, CVD, allergy and CNS-related diseases. Various aspects of the microbial metabolism, interaction of the microbes with host either directly or through their metabolic products can influence human health. The lecture covered all these aspects in detail.

9. Online BRNS Popular Science Lecture at Smt Chandibai Himathmal Mansukhani College, Ulhasnagar on 30th October 2021

An IWSA BRNS popular science lecture hosted by Science Association, Smt Chandibai Himathmal Mansukhani College, Ulhasnagar on 30th October 2021. The speaker Dr. Hemant Dhamne, Head, Vector and CAR-T Process Development & Manufacturing, Immuneel Therapeutics Pvt Ltd, Bengaluru spoke on “Viruses - Our Foes and our Friends too”. The lecture was conducted online through Zoom platform. About 225 participants attended the webinar.

Abstract: Viruses have impacted human civilization affecting crops, animals and human lives. Scientists deciphered their mechanism of infection and our Immune System. This led to finding tests, drugs and vaccines for the same. With recombinant engineering technology, Scientists and Clinicians started using them for gene delivery purpose both as search tool and as a part of Gene Therapy. The talk covered all these aspects in order to create awareness and provide Basic and Applied Virology primer to attendees.

10. Online BRNS Popular Science Lecture at Gokhale Education Society's N.B. Mehta Science College, Bordi, Palghar on 13th November 2021

An IWSA BRNS popular science lecture hosted by the Department of Microbiology of Gokhale Education Society's N.B. Mehta Science College, Bordi, Palghar on 13th November 2021. The speaker Dr. Yogesh Shouche, Emeritus Scientist, National Centre for Cell Science (NCCS) & Principal Investigator, National Centre for Microbial Resources, Pune spoke on “Career Opportunities for Microbiologists in the New Era”. The lecture was conducted online through Google Meet platform. About 100 participants attended the webinar.

Abstract: The ongoing pandemic has underlined the importance of Microbiology like never before. Starting from the identification of infectious agent to development of vaccine, the impact of Microbiology was seen everywhere. The subject is very diverse and touches all aspects of human life and thus opportunities for the career are tremendous. Besides conventional areas, the advent of metagenomics and

microbiome studies have further expanded the scope to include areas like personalized medicine, nutrition and therapies. With tremendous scope for start-ups, skill development in these areas is not only crucial for career development but also important for the country. Dr. Shouche discussed these upcoming areas along with an overview of conventional areas.

You tube Link for the Lecture: https://youtu.be/ltRnk4FFs_g

11. Online BRNS Popular Science Lecture at SIES College of Arts, Science and Commerce (Autonomous), Sion (W), Mumbai on 16th November 2021

An IWSA BRNS popular science lecture hosted by Department of Biotechnology of SIES College of Arts, Science and Commerce (Autonomous), Sion (W), Mumbai on 16th November 2021. The speaker Dr. Manoj Mahimkar, Associate Professor, HBNI & Principal Investigator, Cancer Research Institute, ACTREC, Tata Memorial Centre, Kharghar, Navi Mumbai spoke on “Global Profiling using Microarrays”. The lecture was conducted online through MS Teams platform. About 113 participants attended the webinar.

Abstract: Conventional cytogenetic karyotype analysis is still the standard test in genetic diagnostics to identify numerical and structural chromosomal aberrations, which are the major cause of mental retardation, miscarriages, congenital anomalies, and also common findings in neoplasia. However, conventional cytogenetic analysis of solid tumors is often difficult and has limited success in the analysis due to multiple reasons. Development of fluorescence in situ hybridization (FISH) and PCR-based technology for studying molecular cytogenetics have offered powerful means to overcome the limitations imposed by conventional methods. However, both these techniques are targeted approaches and fail to identify global alterations in the tumor genome. Comparative genomic hybridization (CGH), a molecular cytogenetic approach, is a direct method for comparing genetic imbalances in DNA from tumor and normal cells which helps in rapid screening of tumor genome. The final deciphering of the complete human genome, together with the improvement of high throughput technologies, is causing a fundamental transformation in cancer research. Microarray has been a powerful tool for studying the molecular basis of interactions on a scale that is impossible using conventional analysis. This technique makes it possible to examine the expression of thousands of genes simultaneously. Microarray technology has led the way from studies of the individual biological functions of a few related genes, proteins or, at best, pathways towards more global investigations of cellular activity. This technique has been used for large-scale DNA mapping and sequencing and for transcript-level analyses. It has spread into many areas by adapting the basic concept and combining it with other techniques. More detailed analysis of genomic DNA has become possible with respect to sequence, copy number, identification and characterization of protein binding sites, structural variations and nucleotide modifications. Microarrays have become important because they are easier to use, do not require large-scale DNA sequencing and allow the parallel quantification of thousands of genes from multiple samples. This lecture covered all the details on these technologies with examples.

12. Online BRNS Popular Science Lecture held at Ramnarain Ruia College, Mumbai on 18th November, 2021

An IWSA BRNS popular science lecture hosted by Dept. of Botany of Ramnarain Ruia College, Matunga, Mumbai was held on Thursday, the 18th November at 9.00 am. The speaker Dr. G. A. Ravishankar, Vice President and Professor of Biotechnology, Dayananda Sagar Institutions, Bengaluru spoke on 'Strategies to augment plant secondary metabolite production to develop processes and products of commercial value'.

Dr. Ravishankar said that plants are wonderful resources of secondary metabolites which are of tremendous value as medicine, functional foods and chemicals of varied uses to mankind. From time immemorial, the plants have been explored for their utilities beyond food needs, which have provided sound knowledge to expand our understanding through modern scientific ways. The application of knowledge in chemistry has led to the exploration of a range of compounds which are termed phytochemicals and they have been analysed, isolated and evaluated for biological activities and utilities. There has been a constant endeavour for bio-prospecting based on traditional knowledge, systematic analyses, and bioinformatics approaches. He discussed the production of secondary metabolites through *in vitro* technologies, augmentation of the secondary metabolites through the manipulation of the cellular processes, elicitation of the levels of useful compounds through applications of biotic and abiotic agents, regulation of desired metabolites through targeted channelling of intermediates and using metabolic blocks, use of genetic engineering or synthetic biology-based strategies to enhance the desired metabolite production and scale-up of processes and production of novel compounds in newer hosts cutting across genetic barriers. These aspects were delineated through examples and the possibilities of developing processes and products through scientific and technological endeavours were discussed.

Dr. Bhavna Narula, Botany Department, Ruia College welcomed the speaker and the participants. Dr. Susan Eapen spoke about IWSA and introduced the Guest Speaker. Ms. Bhakti compered the programme and Ms. Manjusha Nikale of Ruia College proposed vote of thanks. About 120 participants were there on Zoom platform. The feedback from participants confirmed that the talk was very informative and it enhanced their interest in the subject.

13. Online BRNS Popular Science Lecture at Telangana University, Dichpally, Nizamabad, Telangana on 24th November 2021

An IWSA BRNS popular science lecture hosted by Department of Botany of Telangana University, Dichpally, Nizamabad, Telangana on 24th November 2021. The speaker Dr. Surekha Zingde, Member, IWSA Board of Trustees, Vashi, Navi Mumbai and Former Dy. Director, Cancer Research Institute, ACTREC, Navi Mumbai spoke on "Proteomics: Where we are and where we are going". The lecture was conducted online through google meet platform. About 1075 B.Sc. students, 250 M.Sc. students, 40 research scholars and 65 Faculty members from university affiliated Colleges (total 1430) participants attended the lecture.

Abstract: In the early 1970's, the number of proteins in different sources were determined by one dimensional sodium dodecyl sulphate polyacrylamide gel electrophoresis (1D-SDS-PAGE) and later by 2D-SDS-PAGE. In 1994, Marc Wilkins coined the term "Proteomics" to represent the "PROtein complement of the genOME". Today, proteomics is the simultaneous study of all proteins in the cell. The proteome of the cell determines the functions of each cell and interactions between cells in turn regulate the physiology of the living system. The study of the number of proteins, their size, post translational modifications, expression levels, location, turnover, solubility, stability, structure and interaction with other proteins is the realm of Proteomics.

In 2001, just before the completion of the human genome sequence, the Human Proteome Organization (HUPO) was established to identify the proteins from the protein coding genes through its Human Proteome Projects. Today, 20 years on, we know 92.8% of the human proteome. This target has been achieved by major technological developments in the three main pillars of HUPO—mass spectrometry, antibody resources and knowledgebase-bioinformatics.

Proteomic approaches/tools are now available to determine the number, identity and characteristics of multiple proteins together in a high throughput manner. These technologies have advanced immensely and today it is possible to analyse proteins in complex tissues and to investigate the proteins in single cells too. To comprehensively understand the link between the gene, mRNA and the protein which is actually responsible for cell function and the observed phenotype of a system, science is now moving towards Integromics, that is integration of the Big Data emerging from genomics, transcript omics and proteomics. Dr. Surekha Zingde explained in brief about these exciting and complex developments which enable the understanding of basic biology to disease management.

14. Online BRNS Popular Science Lecture at PTVA's Sathaye College (Autonomous), Vile Parle(E) Dixit Road, Mumbai on 4th December 2021

An IWSA BRNS popular science lecture hosted by Department of Microbiology of PTVA's Sathaye College (Autonomous), Vile Parle(E) Dixit Road, Mumbai on 4th December 2021. The speaker Dr. Kirti Laddha, Professor of Pharmacognosy and Phytochemistry, Department of Pharmaceutical Sciences and Technology, Institute of Chemical Technology, Mumbai spoke on "Extraction and Isolation of Commercially Important Phytochemicals". The lecture was conducted online through Zoom platform. About 59 participants attended the lecture.

Abstract: For centuries, drugs were entirely of natural origin and composed of herbs, animal products, and inorganic materials. Herbs formed the bulk of these remedies. Soon it was realized that the biological activities of these herbs are due to the presence of phytochemicals in them. This has led to the development of extraction, isolation, and identification techniques of these phytochemicals from plants. Today health professionals are gradually recognizing the role of phytochemicals in health enhancement. As chemical techniques improved, especially extraction, isolation and analytical instrumentation, the phytochemicals which were isolated from plants, were structurally characterized, and in due course, many were synthesized. Sometimes, more active, better tolerated drugs were produced by chemical modifications (semi-

synthesis), or by total synthesis of analogues of the active principles. However, there are many challenges in the field. The talk covered the aspects related to opportunities and challenges in extraction, isolation, and chemical modifications of commercially important phytochemicals.

You tube Link for the lecture: <https://youtu.be/0FbjkntwQDQ>:

15. Online and offline BRNS Popular Science Lecture at R.P. Gogate College of Arts & Science and R.V.Jogalekar College of Commerce, Ratnagiri on 6th December 2021

An IWSA BRNS popular science lecture hosted by the Department of Biotechnology, Biochemistry and Microbiology of R.P. Gogate College of Arts & Science and R.V.Jogalekar College of Commerce, Ratnagiri on 6th December 2021. The speaker Dr. Radhika Patil, Head, Department of Physiotherapy, Jehangir Hospital, Pune spoke on “Ageing: Promoting Health and functioning in older persons”. The lecture was conducted online through Google Meet platform. About 155 participants attended the lecture offline and there were 72 online participants.

Abstract: Populations around the world, at all income levels, are rapidly ageing. In India, the proportion of persons aged 60+ years now make up an estimated 9% of the total population (Census of India 2011). This proportion is expected to grow to 11% in 2025 and 19% in 2050. Opportunities for good quality of life that may arise from older populations, their increasing longevity and active ageing will be heavily dependent on the maintenance of good health. The WHO Global strategy and Action plan on Ageing and Health (2016-2020) acknowledges the role of healthy, accessible, and supportive environments, which can enable people to age in a place that is right for them and to do the things they value. Good physical functioning and mobility are essential for older adults’ independence. Decline in physical functioning predisposes older adults to loss of independence, poor quality of life, falls and institutionalization. This talk focused on the effects of ageing on bone and muscle health, and discussed the evidence base for preventing functional decline, falls and injuries in older persons.

Lecture Recording Available in Google Drive

https://drive.google.com/file/d/1xqb7IbIT0fK_ehbNoKs71ZwkJGNbVx/view?usp=sharing

16. Online and Offline BRNS Popular Science Lecture at Royal College of Arts, Science and Commerce, Mira Road, District Thane on 7th December 2021

An IWSA BRNS popular science lecture hosted by Department of Microbiology of Royal College of Arts, Science and Commerce, Mira Road, District Thane on 7th December 2021. The speaker Dr. Ashok Giri, Senior Principal Scientist, Division of Biochemical Sciences, CSIR- National Chemical Laboratory, Pune spoke on “Cut, Copy and Paste Genes for Crop Improvement”. The lecture was conducted online

through Zoom platform. About 98 participants attended the lecture online, there were also 9 on YouTube and 21 participants attended offline.

Abstract: Recombination is the basis of the evolution of organisms. Recombination is a process by which pieces of genetic material (typically DNA) are broken and recombined to produce new combinations of alleles. Further, genetic recombination is the exchange of genetic material between different organisms which leads to production of offspring with combinations of traits that differ from those found in either parent. The process of genetic recombination in prokaryotes is called horizontal gene transfer in which an organism incorporates genetic material from another organism asexually. In nature there are several examples of horizontal gene transfer. In recent times researchers have developed techniques to understand gene function, and advancement in this area allowed to cut or copy and paste genes into the target organisms to obtain desired trait(s). These traits are qualitative as well as quantitative. Thus, the genetics of these traits could be simple or much more complicated than expected. A trait is a specific characteristic of an organism. Traits can be determined by genes or the environment, or more commonly by interactions between them. The genetic constitution of a trait is called the genotype. The outward expression of the genotype is called the phenotype. Since human civilization we are using selection methods to improve plant traits but after the advent of scientific revolution, we are using various methods such as classical hybridization, mutagenesis and genetic engineering to improve plant traits and select further for cultivation. Advancements in these understanding provided scientists to apply genetic engineering strategies to modify traits of plants and other organisms. Genetic engineering is the act of modifying the genetic makeup of an organism. By application of genetic engineering strategies scientists have modified plant nutritional content, produced tasty and attractive fruits, manipulated fruit ripening processes and have also produced important medicinal products such as drugs, vaccines. Dr. Ashok Giri elaborated the process of genetic engineering and provide examples of transgenic plants which are already in use or in pipeline to be commercialized.

17. Online BRNS Popular Science Lecture at Jai Hind College of Arts, Science and Commerce, Churchgate, Mumbai on 9th December 2021

An IWSA BRNS popular science lecture hosted by Department of Microbiology of Jai Hind College of Arts, Science and Commerce, Churchgate, on 9th December 2021. The speaker Dr. Janesh Kumar, Scientist E, Macromolecular Structure & Function, National Centre for Cell Science, Pune spoke on “Cryogenic Electron Microscopy (CryoEM): A Structural Biology Revolution”. The lecture was conducted online through Google Meet platform. About 110 participants attended the lecture.

Abstract: CryoEM is the most popular method currently for high-resolution structure determination of purified macromolecules or their complexes in solution. The requirement of a lower amount of protein samples and removal of bottlenecks such as crystallization and size limit has contributed significantly to the widespread use of CryoEM. Besides, the availability of user-friendly, intuitive, and free software packages for academic researchers has further boosted its usage. CryoEM has provided a new

impetus to the structural biology of complex biological molecules that can now be examined with unparalleled ease and efficiency, illuminating the molecular structure and the dynamics of biologically relevant molecules at high resolution. In this talk Dr. Janesh Kumar discussed the basics of the method and contributions of Jacques Dubochet, Joachim Frank, and Richard Henderson towards its development. They were jointly awarded the 2017 Nobel Prize in Chemistry for their work.

18. Online Popular Science Lecture at Thakur College of Engineering and Technology, Kandivali East, Mumbai on 24th December 2021

An IWSA BRNS popular science lecture hosted by Department of Engineering Sciences and Humanities, Thakur College of Engineering and Technology, Kandivali East, Mumbai on 24th December 2021. The speaker Prof. Prakash C. Ghosh, Associate Professor, Department of Energy Science and Engineering, Indian Institute of Technology Bombay, Mumbai spoke on “An Overview of Green Hydrogen Economy”. The lecture was conducted online through Zoom platform. About 468 participants attended the lecture.

Abstract: Climate change along with the rapid depletion of fossil fuel, necessitates cleaner energy sources for our fast-growing economy, thus initiating power production from renewable sources of energy. Renewable sources are considered to be the backbone of future sustainable and cleaner energy solutions of the future. One of the significant drawbacks of renewable energy sources is intermittent in nature, and if the energy is not trapped continuously, it is wasted in other forms. Hydrogen is considered as a potential energy carrier for the future to trap renewable energy effectively and efficiently. An overview of the green hydrogen economy was presented in this lecture, which mainly included production and utilization.

Dr. Sunita Pachori, FE Incharge, TECT welcomed the audience and spoke about TECT. Dr. Shyamala Bharadwaj, Vice President, IWSA spoke about the activities of IWSA. Mr. Tukaram Patil, Assistant Professor, ES and H Department, TECT introduced the speaker, conducted the Q & A session and proposed a vote of thanks.

You tube link for the lecture: <https://youtu.be/THvWYg-zJ4E>

B. IWSA – BRNS Popular Science Lectures for Schools

1. Online Popular Science Lecture at Radcliffe School Sector 8, Kharghar, Navi Mumbai on 20th September 2021

An IWSA BRNS popular science lecture hosted by Radcliffe School, Sector 8, Kharghar, Navi Mumbai on 20th September 2021. The speaker Ms. Lalitha Ramaswami, Retired PGT (physics), National Awardee (Best teacher) spoke on “Light - Reflection and Refraction”. The lecture was conducted online through Zoom platform. About 64 participants (Class X Students and Faculty) attended the lecture.

Abstract: Physics is what we deal with in everyday life. Light is the most beautiful and complicated form of energy in nature which is so much essential in our life. The phenomenon of reflection and refraction help us tremendously in our daily activities. So, we will be curious to know and understand it. The phenomena of reflection in curved mirrors and refraction through lenses were discussed.

2. Online Popular Science Lecture at St Mary's High School (SSC), Mazagaon, Mumbai on 8th October 2021

An IWSA BRNS popular science lecture hosted by St. Mary's High School (SSC), Mazagaon, Mumbai on 8th October 2021. The speaker Shri Chintamani Pai, Research Scholar, Univ of Mumbai in Magnetism and Photonics with special interest in Aerospace and allied technologies spoke on "Space Missions". 84 students from X Std linked through zoom platform and 207 on YouTube.

Abstract: Lecture focused on recent Space Missions and others in the history of mankind. Information on space flights, rockets and techniques used in conducting space missions was described pictorially. The lecture included the topics in the text book chapter of Space Missions in Maharashtra State Board and also many more interesting facts.

3. Online Popular Science Lecture at Dr. Pillai Global Academy, New Panvel on 12th November 2021

An IWSA BRNS popular science lecture hosted by Dr. Pillai Academy, New Panvel, on 12th November 2021. The speaker Shri Alok Singh, Wastewater service engineer at A.T.E. Huber Envirotech Ltd., Mumbai. spoke on "Between Waste Water to Water". 96 students from Std 8th to 10th linked through zoom platform and 175 on Youtube.

Abstract: Lecture focused on the process of industrial and domestic wastewater treatment. The speaker highlighted the need for wastewater management and the various stages in the process of wastewater treatment for both industry and housing societies.

4. Online Popular Science Lecture at St. Augustine's School, Barampur, Vasai West, Palgarh, on 11th December 2021

An IWSA BRNS popular science lecture hosted by St. Augustine's School, Barampur, Vasai West, Palgarh, 11th December 2021. The speaker Shri Uday Doshi, Founder Excelsior Engineering Solutions, Navi Mumbai spoke on "Introduction to power generation through Solar energy and its benefits". 92 students from Std 8th to 10th linked through google class room.

Abstract: Solar power is a conversion of energy from sunlight into electricity. It is renewable, and therefore a 'green' source of energy. With the recent climatic changes and pollution levels increasing drastically, dependence on fossil fuels needs to be reduced. Implementing various clean source of energy is the need of the hour. The talk focused on the renewable energies, benefits of solar projects, technologies involved and its various forms. The speaker threw light on how solar can be implemented & used in our daily lives and discussed a few marquee projects.

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

The following webinars were conducted through Zoom platform during August to December 2021 under “Science and Our Life” Series.

1. “Water Issues in Rural Areas: IIT Jodhpur Interventions” by Prof. Pradip Tewari on 14th August 2021

The 17th lecture of the series on “Science and Our Life” was held on 14th August, 2021 as an ON-LINE webinar, through Zoom platform. Prof. Pradip Tewari, Head, Department of Chemical Engineering, Indian Institute of Technology, Jodhpur spoke on “Water Issues in Rural Areas: IIT Jodhpur Interventions”.

Several rural and remote areas face the twin challenges of physical water scarcity as well as water contamination. IIT Jodhpur has taken up the responsibility of translating design, development and research on water technologies for the benefit of society at large, particularly in rural and remote areas in the neighbourhood.

The interventions have been carried out at government schools in the districts of Jodhpur, Pali, Sirohi and Jhunjhunu. By involving the stakeholders such as staff members, students, village manpower, local institutions and local community, these installations have empowered these communities to adopt decentralized and self-reliant technology solutions to address the problem of water contamination.

Along with the provision of a low-cost, indigenous, non-polluting and user-friendly solution to the problem of potable water, the introduction of water purification units in village schools enables students to get exposure to practice-based, skill-oriented learning. Such examples of hands-on experience inspired the students in these schools towards understanding the importance of water purification, operation, maintenance and developing such technologies in the future. IIT Jodhpur is planning to set up several such water purification units in different schools of rural and remote areas. IIT Jodhpur has recently received the provisional sanction of Corporate Social Responsibility (CSR) funding for design, installation, testing and commissioning of similar water purification systems in twenty-five (25) primary schools in villages across Jodhpur.

Before Prof. Pradip Tewari's lecture, the participants were welcomed by IWSA Member Ms. Manashi Chakraborty, who also gave a brief introduction to IWSA and its objectives. She also explained the objective behind the series (Science and Our Life) of lectures and the relevance of this special lecture. Dr. Shyamala Bharadwaj introduced the speaker and thanked the distinguished speaker for sparing his valuable time to speak about this important lecture about water issues and how IIT Jodhpur has been helping the villages around Jodhpur. Ms. Manashi Chakraborty conducted the question – answer session and gave the vote of thanks. About 26 participants attended the webinar.

You tube link for Prof. Tewari's Lecture : <https://youtu.be/cBep3AiuVNY>

2. “Exploring Sustainable Architecture in India” by Dr. Pratheek Sudhakaran on 12th September 2021

The 18th lecture of the series on “Science and Our Life” was held on 12th September 2021 as an ON-LINE webinar, through Zoom platform. Dr. Pratheek Sudhakaran, Architect, Educator and Researcher spoke on “Exploring Sustainable Architecture in India”.

‘India’, a living civilization, enters its 75th year of Independence, with its vast, pluralistic, and timeless traditions. Where towns, streets and cities are a sort of celebration and architecture has been an undeniable union of space and time. One then wonders, what makes Indian architecture truly 'sustainable'? Traditionally buildings in India have grown intuitively out of an interaction with the landscape, soil, climate, material, and types of culture. Just as a bird shapes its nest with its own body, so the traditional community shaped its habitat with its collective memory. Through this tradition, the overall interaction between physical conditions, a way of life, and psychological needs are developed towards a balance. In this lecture, Dr. Pratheek explained the timeless and sustainable architecture in India, through anecdotes and tales of this incredible journey

Before Dr. Pratheek's lecture, the participants were welcomed by Dr. Priya Jacob, who also introduced the speaker. She also compered the program and conducted the question – answer session. About 56 participants attended the webinar.

3. "Digital Library Projects and Digital Preservation of Cultural Heritage” by Ms. Shilpa Rele on 9th October 2021

The 19th lecture of the series on “Science and Our Life” was held on 9th October 2021 as an ON-LINE webinar, through Zoom platform. Ms. Shilpa Rele, Scholarly Communication & Data Curation Librarian, spoke on “Digital Library Projects and Digital Preservation of Cultural Heritage”.

Digitization and digital preservation of cultural heritage objects has been implemented as a practice since the late 1990s. The act of providing digital access to cultural heritage materials, and those from archives and special collections makes them more accessible for research, teaching and learning purposes. In this talk, Ms. Shilpa outlined a variety of things that one needs to consider when making such items available digitally, publicly (or openly), or otherwise. She explained digitization standards, best practices for metadata, privacy and ethical considerations and copyright that are taken into account when developing digital library projects. Such considerations are similar to objects being digitized either from galleries, libraries, archives, and museums (GLAM). She gave examples of digital library initiatives and those that serve as federated repositories from where metadata (descriptive information) for content from a variety of repositories can be explored from one platform. She also shared examples of how digitized objects can be integrated into digital scholarship or digital humanities projects to further our understanding of the past by using technology to conduct research and ask questions that were not possible before.

Before Ms. Shilpa's lecture, the participants were welcomed by Ms. Vijaya Tilak. She also gave a brief introduction of IWSA and SAOL. The speaker was introduced by Dr. Shyamala Bharadwaj. Ms. Vijaya Tilak also compered the program and conducted the question – answer session. About 21 participants attended the webinar.

4. “Excitement of studying Lothal and Dholavira: Geological Applications in Marine Archaeology” by Dr. Rajiv Nigam on 13th November 2021

The 20th lecture of the series on “Science and Our Life” was held on 13th November 2021 as an ON-LINE webinar, through Zoom platform. Dr. Rajiv Nigam, Emeritus Scientist, Former Head, Geological Oceanography Division & Head Marine Archaeology Unit, National Institute of Oceanography, Dona Paula, Goa, spoke on “Excitement of studying Lothal and Dholavira: Geological Applications in Marine Archaeology”.

The recent announcement of declaring Dholavira as India's 40th World Heritage Site by UNESCO has created considerable interest and curiosity to know more about the thousands of years old past settlements in the country and about other Archaeological finds. Marine archaeology has its crucial contribution in elucidating some ambiguities which puzzled archaeologists. Some of these aspects were addressed in the lecture. Marine Archaeology, has a significant role in areas where sea level fluctuations have shaped the destiny of several ancient coastal cities like Lothal and Dholavira in Gujarat. Through application of geological tools like Ground Penetrating Radar [GPR- which helps to decipher buried structures without excavation] and microfossils [which assist in understanding ancient environments], interesting and exciting conclusions are drawn to answer vital mysteries about these ancient cities.

Based on past sea level fluctuations about which dependable information is available and foraminiferal occurrences (exclusively marine microfossils), it was conclusively proved that the rectangular structure at Lothal (a Harappan Settlement, near Ahmedabad ~4500 years old) was a dockyard (first Naval dockyard of the world as claimed by archaeologists) and not a fresh water storage tank as presumed earlier. A recent study by our group proved that Dholavira in Gujarat was an island town when sea level was higher ~5000 years back, and famous for its excellent water conservation system. Further the study indicated that the unusual thickness of about 18 m wall of the citadel was interpreted as a tsunami protection measure - the first of its type anywhere in the world. Therefore, we can postulate that the ancient Indians were aware of the tsunami protection measures. However, GPR investigations and marine microfossils occurrences in subsurface sediments revealed that the area outside the citadel could not be saved from a tsunami.

Before Dr. Nigam's lecture, the participants were welcomed by Dr. Srirupa Mukherjee. She also gave a brief introduction of IWSA and SAOL. The speaker was introduced by Dr. Surekha Zingde, one of the Members of Board of Trustees of IWSA. Dr. Srirupa Mukherjee also compered the program and conducted the question – answer session. About 58 participants attended the webinar.

5. “The Science of Consumerism” by Ms. Priya Anatharaman on 11th December 2021

The 21st lecture of the series on “Science and Our Life” was held on 11th December 2021 as an ON-LINE webinar, through Zoom platform. Ms. Priya Anatharaman, Head, Global Marketing & Insights Analytics, Pepsico spoke on “The Science of Consumerism”.

Ever wondered how Amazon knows what I want to buy next? Or how does Netflix recommend a movie that has always been on my watchlist. How do I see certain products more prominently in stores?

Our purchase decisions are not merely a reflection of our choices. There are many opportunities to influence shoppers while they're considering a purchase. We can be driven by what is shown to us and there is deep science behind driving consumerism. In this talk, Ms. Priya Anatharaman explained the ways in which scientific techniques are applied to study and influence consumer behaviours.

Before Ms. Priya's lecture, the participants were welcomed by Ms. Vijaya Chakravarthy and she introduced the speaker. She gave a brief introduction of IWSA and SAOL. She also compered the program and conducted the question – answer session. About 41 participants attended the webinar.

D. Garden Based Workshops in Collaboration with Vigyan Prasar

1. Workshop on the Goodness of Roses: Healthy Flavonoids on 5th September 2021

The 1st Garden based learning workshop, an initiative of IWSA's Learning Garden Living Museum [LGLM] and jointly organized by IWSA and Vigyan Prasar was conducted online through zoom platform on Teacher's Day, 5th September 2021. Ms Madhu Pahwa conducted the program.

Dr Alka Singh, HOD, Floriculture and Landscape architecture, Navsari agricultural university gave the keynote address. She highlighted the aesthetic and curative properties of flowers and fragrance as well as their use all over the world. Alka also spoke on age-old practices of using various floral infusions for curing ailments like headache, stress etc. Her presentation was captivating and she managed to engage the audience long after her keynote address while connectivity with Mussoorie speakers could be restored.

Dr Prof Jyoti Marwah, Aromatherapist and Educator. Retd Principal and HOD, History of KLE college and ICL college, Mumbai University conducted a workshop on how to make products from Roses. Dr Marwah is currently the director of Mussoorie Flavors and Fragrance Institute. She spoke on the health benefits of roses, which are a potent source of antioxidants. Flavonoids, carotenoids and phenolic compounds are present in every part of the rose plant. Roses have a tremendous potential for use in health foods, perfumes plus skin, body, and hair care formulations. Dried flowers make refreshing tea and when pulverized can be used for skin care. Jyoti demonstrated the preparation Rose water, gulkand and rose candies with agar agar. A young girl and a lady from the self-help groups mentored by Jyoti demonstrated soap making and the use of Deg Bhapka—the traditional method of extracting attar [perfume]. It was inspiring to see the work done by the villagers.

Ms Vidushi Sharma is a biotechnologist. She has got her postgraduate degree in biotechnology and Enterprise from the University of Manchester. Her master's thesis was focused on algal cultures. She spoke about the goodness of roses and gave a demonstration on how to prepare frosted roses to use as decoration in cakes and pastries.

About 89 participants attended the workshop.

2. Workshop on Ayurveda and Diabetes on 19th September 2021

The workshop on ayurveda and diabetes, 2nd in the series of capacity building workshops was organised by Indian Women Scientists Association's multidisciplinary Garden based learning in collaboration with Vigyan Prasar. The workshop was conducted online through zoom platform on 19th September 2021 and compered by Dr. Smita.Kekatpure.

Dr.Atish Taukari gave the keynote address. Dr. Atish Taukari is Associate Professor in Psychology and Dean (Research & Extension) at K.J.Somaiya College (Autonomous),

Mumbai. He spoke about the scientific aspects of positive psychology & how it affects the relationships, physical & mental health which in turn affects the immunity of an individual. With the help of key studies, he explained how the positive psychological aspects affect the health & how a person can lead a long & happy life. He also discussed how offering voluntary services plays a major role in one's life & diseases like heart attacks can be prevented if a person has some purpose in life.

Dr. Joyoti Goswami, the second speaker of the workshop, is an Ayurveda graduate with a post-graduation in Bioinformatics. She has over 25 years of experience in various sectors including clinical practice, pharma advisor, and technology areas. Dr. Joyoti spoke about Ayurveda & Diabetes & how lifestyle management can help to keep a check on the blood sugar levels. She emphasized on type 2 diabetes and touched on various dietary aspects in management of diabetes. She explained the importance of glycaemic index of foods & enlisted a few of them. She explained the preparation of Amla juice & how tejpatra can reduce sugar levels & cholesterol.

Ms. Vijaya Chakravarthy, the third speaker of the workshop, is a Landscape Designer and an organic gardener. She has studied psychology, sociology and social psychology from University of Mumbai. She specializes in biodiversity gardens, natural play spaces for children, restorative spaces for seniors, learning gardens, pollinator gardens, Eco restoration projects. Her topic for the workshop was Managing modern maladies; gardening for lifestyle diseases. Ms. Vijaya talked about the role of gardening in managing anxiety, stress & many other modern day lifestyle diseases. She explained what horticulture therapy is & also shared her own experiences with patients who showed improvement when given horticulture therapy. She also talked about sensory gardens for the challenged & the gardens she designed for the patients with dementia. She also talked about hidden hunger which is nothing but micronutrient deficiency in children whether they come from rich or poor backgrounds & how it can be corrected with proper diet.

Total participants were about 117.

3. Workshop on Digital Herbarium – A Step into the Future on 3rd October 2021

The 3rd Garden Based Learning [GBL] capacity building workshop was jointly organized by the Learning Garden Living Museum [LGLM] of Indian Women Scientists' Association (IWSA) and Vigyan Prasar, Dept of Science and Technology, Govt. of India. The topic was 'Digital Herbarium—A Step into the Future.

Dr. Srirupa Mukherjee, co-ordinator of GBL welcomed the speakers and participants. The workshop was conducted by Dr. Paramjit Anthappan, Jt. Secretary IWSA.

Dr. S. Noorunnisa Begam, Associate Professor of Trans Disciplinary University, Bengaluru gave the keynote address titled: 'Role of Herbaria in Ethnobotany'. She mentioned 300 million specimens were collected over 400 years and to catalogue them for posterity and for ongoing research they have to be recorded systematically. It was

based on Man-Plant relationship involving medicinal and cultural needs. She said initially it was referred as Aboriginal Botany, then Ethnographique Botany and finally Ethnobotany over a period of nearly 200 years. In India in Vedas, Puranas and other scriptures mention various plants and their properties are mentioned, but most systematic records are found in Charak Samhita written in 400 B.C where more than 100 plants with their medicinal properties are documented.

Hundred years ago, Sir George Watt in his Dictionary of Economic Products of India collected region-wise details of more plants of India having different benefits. The trend was followed by Dr. E. K Janaki Ammal whose relentless work has helped to identify a large no. of plants having curative properties and opened new vistas in drug research in India. Ethnobotany in India is indebted to Dr. S.K. Jain, Father of Ethnobotany, who founded the Society of Ethnobotany which is looking after the Intellectual Property Rights of Indian plants, their origins and history associated with them. There are 461 tribal communities in India with knowledge of over 4500 folk medicinal plants and these are classified on the basis of shape of plant part vs shape of organ or body part on which they are effective. However more scientific basis of differentiation is necessary to identify a specific species which provides accurate application and here herbaria plays an important role in providing taxonomical and ethnobotanical information which help in new drug development, in different aspects of art, culture, traditional practices, zonal and intellectual rights etc.

Dr. Suchandra Dutta, Assistant Professor of Botany, R.D. and S. H. National College, Bandra, Mumbai was the second speaker of the day and she spoke on 'How to start and maintain a Herbarium'. She mentioned about taxonomy and how herbarium is a repository of identification, nomenclature and essential tool in botanical research. Digital herbarium is a present-day concept, which requires physical herbaria maintenance first of all. She listed the tools required for specimen collection, how to collect specimen without harming the mother plant, size of specimen and size of herbarium sheets to preserve them, how not to physically collect endangered species but to draw them, etc. She indicated how to collect different specimens according to their specific nature and how to preserve them eg aquatic plants, plants with gum, very big plants, bulbous plants, etc. In order to protect them from insect attacks use of Mercuric chloride, hot water, alcohol, fumigation, applying oil, Patchulli leaf powder, Para dichlorobenzene were explained. In order to preserve the specimen on herbarium sheets the process of mounting, gluing, stitching on ash-free paper and the technique of mounting properly were explained in minute details with several ppts. Recording of collection details with date, area, specificities and other details like flowering/fruiting time and their significance were well explained.

The 3rd and last speaker of the day was Mr. Hensal Rodrigues, Assistant Professor in Botany from Viva College, Virar, Mumbai and the topic was 'Scientific Photography for e-Herbarium'. He spoke about scaling, photographing everything related to the plant, geotagging, collection of the specimen. He explained the equipment required for this purpose and taking many more photos of the same specimen in order to get the best. Geotagging, background, scaling using reference material and lighting are to be taken care of. Extra photos can be deleted at will later on but one should not repent about

losing a lifetime chance. Background must be selected carefully to give maximum importance to the subject without any distortion to it, if necessary, the background can be blurred later on. He gave many examples and ideas regarding identifying the location, latitude, longitude, elevation, etc. Use of software and power point presentation to make image plate were elaborated in great details using proper scaling techniques like dotted plates. The practical aspects and overcoming the probable problems in photographing the actual specimen were discussed with simple calculations for scaling up or scaling down. It was a very student-friendly presentation so that participants learnt the techniques clearly along with Printer-scan, Mobile phone-scan, light adjustment without using flash, zooming, barcoding and how to store the information. Students and faculty from various states of India—Andhra, Goa, Karnataka, Maharashtra, Telangana etc participated.

About 115 participants attended the workshop.

4. Workshop on Insect Life: A Peep into their Busy Life on 17th October 2021

The fourth Garden Based Learning [GBL] Workshop, an initiative of IWSA's Learning Garden Living Museum [LGLM] was jointly organized by Indian Women Scientists' Association [IWSA] and Vigyan Prasar. Dr. Sweedle Shivkar conducted the program online through zoom platform on 17th October 2021.

Dr. Shubhalaxmi V., Entomologist and Ecopreneur, delivered the keynote address on 'Gardening for Wildlife'. She highlighted the major differences governing the planning and execution principles for aesthetic and wildlife gardens. She also shared practical tips for attracting a holistic ecosystem of abundance in wildlife species of butterflies, insects and birds while nurturing the intended garden. Her audio-visual presentation and the depth of her vast knowledge appealed to the logged in audience, across all ages.

Next, Ms. Katie Bagli, Naturalist and Children's Author, mesmerized the participants with her lucid and comprehensive talk on 'Insect-Plant Interactions' in the form of a captivating story in simple language. She ignited sparks of curiosity, wonder, passion and appreciation with her exemplified selection of real wonders prevalent in nature accompanied with pictorial and video presentations.

Ms. Ashvini Menon, Graphic Designer and Illustrator, next conducted an absorbing skill based practical interactive session on 'Visual Notes from My Garden' aimed at empowering and enriching young minds with effective documentation tips for recording and reporting field trips and educational visits, using minimal drawing, shading and coloring tools and a notebook. The attendees were indeed thrilled with the learning instructions and whole-heartedly participated, sharing their exercises on the online interactive platform group specially created for this purpose.

About 115 participants attended the workshop.

5. Workshop on Biofertilizers and Biopesticides on 14th November 2021

The 5th Capacity building workshop on Biofertilisers and Biopesticides was organised by Indian Women Scientists' Association in association with Vigyan Prasar on 14th November 2021. The workshop was moderated by Dr. Shyamala Bharadwaj.

The keynote address was given by Dr. Sheela Donde Ex-Vice Principal, and Head, Department of Life Sciences and Biochemistry, St. Xavier's College (Autonomous), Mumbai on *Organic Farming: Is it the solution for achieving Food security?* Dr. Donde elaborated on the History of organic farming, its advantages and disadvantages, its impact on climate change, possible solutions and the ways ahead and today's scenario. The initial part of the presentation was an overview of organic farming which was followed by introduction of Green Revolution of 1960s. The lecture highlighted the positive and negative impacts of Green Revolution in India. Agriculture contributes to nearly 1/3rd of global Green House Gases which is a cause of concern. Dr. Donde has emphasised on various important aspects of food and Climate change.

First speaker Dr. Pramila Battase Organic Gardener said the need of the hour is to opt for organic farming. The talk was on *Biofertilisers – Role of bacteria in farming and gardening-* a step towards organic farming with emphasis on the disadvantages of Chemical biofertilisers, their effect on environment and how their production puts a pressure on the environment/ecosystem. Dr. Battase explained the natural constituents of soil viz. physical, chemical and biological properties of soil. The advantages of biofertilisers for keeping the soil chemical free and maintaining its natural fertility. The components of biofertilisers and applications of biofertilisers were explained in detail.

Second speaker Dr. Dhanashree Patil Asst. Prof. Br. Balasaheb Khardekar College, Vengurla presented on *Botanical Biopesticides for garden and safety*. She defined the biopesticides, their types – microbial pesticides, biocontrol pests, traps and lures and so on. The adverse effects of chemical pesticides like chromosomal aberrations in humans were stressed upon. The harmful effects of chemical pesticide biomagnification were explained with examples. The women green leaders - Vandana Shiva, Rachel Carson & Padmashri Rahibai Popere were featured along with their immense contribution to the field of agriculture. About 11 plant species like Soapnut, Custard apple, *Vitex negundo* are some of the species available around us which have biopesticidal properties. The importance of *Dashparni arka* along with positive effect of *Acacia concinna* on pests of Soyabean was showcased. The takeaway message was the implementation of Sustainable agriculture in our lives. The workshop ended with a moderated question and answer session and a vote of thanks.

About 118 participants attended the workshop.

6. **Workshop on Seeds: The Generation Next – Conserving the Diversity on 28th November 2021**

Ms. Vijaya Chakravarty coordinator of (LMLG) of IWSA welcomed the speakers and the participants for IWSA's 6th capacity building workshop on "Seeds: The Generation Next – Conserving the Diversity" in collaboration with Vigyan Prasar. The workshop was conducted online through zoom platform on 28th November 2021.

Dr. Vipul Kumar Parekh, Assistant Professor Biotechnology, College of Forestry Navsari was the keynote speaker and was introduced by Dr. Maitrayee Paul (IWSA member).

Dr. Parekh said the seed is considered as the foundation of sustainable life on mother earth. It offers source of energy as well as material of inheritance for biological variability to propagate from generation after generation. The seed conservation is an ancient practice through domestication to conserve the biodiversity of food grains, legumes and important vegetable plant species. The awareness about seed conservation at individual home garden level is very essential for balanced ecological systems, improved lives and sustainability.

2nd speaker of the day was Ms. Vaishali Gadgil, Founder of Shashwat Organics. She highlighted the traditional methods of Seed selection, harvesting and conservation. She began her presentation with a poem by St. Tukaram 'Adhi Beej Akle', which means that a single seed can produce millions of flowers fruits and seeds. She explained that seeds are the first link in the food chain and the repository of life's future evolution. Having different cultures in India with every crop the seed evolves, and with climate the seed changes. But with the current industrial food system based on agrochemicals, patenting of seeds and GM seeds are major threats to the seed quality. Today of the original 10,000 species barely 150 species are under cultivation, and day by day the species are reducing. Seeds are a source of food and medicine. She explained the methods of selection of seeds, like organically grown seeds with geographical indications are good. The quality of seed is defined by the micro-climatic conditions and the origin. For propagation open pollinated seeds are better than hybrid varieties. According to Ms. Gadgil the most sustainable agriculture would come from local and indigenous seeds for they are resilient to weather changes, need less water and are full of nutrients and flavours. Seeds are like 'HAPPINESS' they increase by sharing. Ms. Gadgil 's talk was engrossing and full of information.

3rd speaker of the day was Ms. Farida Pacha, award winning Documentary film maker, co-founder of 'Leaf Bird Films,' Switzerland. She is well known by the film 'My Name is Salt' which has been telecasted 135 times. Ms. Farida has made many films of women farmers who are using traditional systems of preserving seeds and seed grains like sun drying, use of wood ash and plastering of storage bins with clay and cow dung. By these methods seeds may be preserved for hundreds of years. Ms. Farida has been teaching the women farmers to make Video films for the methods they are using in preservation of seeds.

It was very informative workshop for all the participants to learn about the preservation methods and importance of seeds.

E. Webinar on “Lasers in the Service of the Nation” in Collaboration with Bhabha Atomic Research Centre on 13th October 2021

The LASER (Light Amplification by Stimulated Emission of Radiation) was invented in 1960 by Theodore Maiman. When the first working laser was reported, it was described as "a solution looking for a problem." The Laser's distinctive properties such as a high degree of coherence, very narrow spread in wavelength, directionality and high intensity could be harnessed for a wide range of applications. Today, lasers are everywhere, from research laboratories at the cutting edge of quantum physics to medical clinics, supermarket checkouts and the telephone network. The various lasers today are operated at a wavelength from infrared to X-rays and the power levels from Milliwatts (CW Lasers) to Petawatts (Ultra short pulse Lasers). They are used to explore the world of biological cells to generate extreme conditions prevalent in stars. There is perhaps no field in science and technology where lasers are not used.

Celebrating the 75th year of India's independence, exploring the Technologies for New India@75, Bhabha Atomic Research Centre (BARC) in collaboration with Indian Women Scientists' Association (IWSA) organized a webinar on 13th October 2021 on "Lasers in Service of Nation". The following two lectures were delivered by eminent laser scientists of BARC:

1. Introduction to Lasers by Dr. Padma Nilaya
2. Applications of Lasers in Diodes and Photodetectors by Mr. Aseem Singh Rawat

The webinar was attended by 60 participants

F. Each One Teach One Program for School Students in Collaboration with Vigyan Prasar October - December 2021

“**Each one Teach one**” is a program for ‘Nurturing Scientific Talent’ jointly initiated by IWSA and Vigyan Prasar (an autonomous organization under the Department of Science and Technology).

This program is designed to bring together a college student mentor with a student from a school. The rationale behind the program is to motivate an educated student to understand their moral and social responsibility of educating the less privileged students. The idea here is to encourage college students to learn teaching methodology, learn the value of inclusiveness, improve their communication skills and in turn understand the basics of various scientific concepts of Science and Technology.

The first batch of EOTO was held in the months of August and September 2021. IWSA facilitated in bringing together the college mentor student and the school students. There were 14 trios formed each with a college mentor, school mentee and IWSA

mentor. The scope of work for the mentor college students would include- teaching of Science and Math for 8th Std students, monitoring the performance of the school students during the mentorship period, assessing the impact factor etc. All teaching and interaction took place online. Each trio was allotted a classroom on the zoom platform. IWSA mentors were allotted to the groups to look after the proceedings. Mentors adopted very innovative teaching methodology including demonstrating of experiments practically.

Every session had a small test for the mentee to evaluate her/his understanding of the topic. At the end of the program, feedback was obtained from the college mentors, school mentees and IWSA mentors. It was observed that just in a matter of two months, there was a remarkable improvement in the grasping, understanding and expression of the mentee. A very pleasant bond was developed between the mentee and mentor.

G. Activities of VIPNET Science Club August to December 2021

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:

ACTIVITY-1

INAUGURATION OF IWSA- VIPNET CLUB with a talk on “50 Effective and innovative methods of teaching science- a Science Fiesta.”

Date of Program: 28th August 2021, 11 am

Total No. of Participants: 75

On 28th August 2021 at 11AM, the inauguration function of the IWSA- VIPNET Science Club (VP- MH 0248) was held on zoom virtual platform. The club coordinator and past president of IWSA, Dr. Lalitha Dhareshwar enlightened the audience about VIPNET, VIPNET Science Club, its objectives, age limit for its members and the advantages of being connected to VIPNET. The president of IWSA, Dr. Rita Mukhopadhyaya introduced IWSA and its objectives and various programmes conducted by IWSA. Next, Dr. Arvind C. Ranade, the National coordinator of VIPNET clubs briefed the (75 participant strong) audience about the collaboration between IWSA and Vigyan Prasara. The chief guest, Ms. Jyoti Shiddanagoudar, head of the Science Department at Lokmanya Tilak International School (LTIS), Navi Mumbai, then gave a talk on “50 Effective and innovative methods of teaching science- a Science Fiesta.” She spoke about and showed 50 methods in which learning science could be made very exciting and interesting. Her talk excited both teachers and students in the audience since it made use of readily available materials and tools. Both of them liked the low budget, innovative and simple teaching aids which made use of waste materials. This enhances creativity whilst strengthening scientific concepts. Ms. Jyoti’s two decades of experience of teaching was explicitly evident and the students in the audience eagerly answered the questions she asked them. The program was compered by Dr. Suparna Kamath. The teachers and students of the St. Mary’s School, Mazgaon and

New Horizon Public School, New Panvel, participating in the function, came forward to introduce themselves at the end of the session. They were all excited looking forward to the club's forthcoming activities. IWSA members Manashi Chakraborty, Sukhvinder Sandhu and Tripta Tewari helped in smooth conduction of the programme.

ACTIVITY-2

Date of Program: 14th September 2021, 3 pm
Total No. of Participants: 36

On 14th September 2021 at 3 pm, the second activity of the IWSA- VIPNET Science Club (VP- MH 0248) was held on zoom virtual platform. The club member Ms. Tripta Tewari compered the program and coordinator of the club, Dr. Lalitha Dhareshwar spoke about the importance of such demonstration activities online, as we are unable to hold hands on activities at our premises.

IWSA members and members of the club from the two schools, St. Mary's school, Mazgaon and New Horizon Public School, Panvel participated in this event.

In this activity, 3 experiments were conducted.

1. Experiments with an egg- integrating physics, chemistry and biology.
2. Fermentation and Budding in Yeast.
3. Experiments on making a multi-purpose, natural cleaner bio-enzyme using citrus fruit peels.

1 and 2 were conducted by Ms. Malti Kelkar, IWSA member- Pune branch and founder of Quest Lab at Pune. No 3 was conducted by Ms. Rochelle D'sa, science teacher of St. Mary's school.

In experiment no 1, it was shown how the egg sinks in pure water whereas it floats in a saline solution, making concept of density clear. The different parts of the egg were explained to clarify the need of these parts for the new life to emerge as a chick. The characteristic of the outer hard shell and how it can be dissolved in vinegar to keep the inner parts intact and make the egg bounce was very interesting. These experiments were an eye opener for the teachers as well as for the students. She had used the easily available materials at home and explained integrating the Science branches...Physics, Chemistry and Biology.

In experiment 2, the reaction of yeast with sugar solution was shown to emit carbon dioxide gas and how the gas was tested using lime water. Frothing during the reaction and budding of yeast cells was also nicely explained.

In the experiment 3, Ms.Rochelle D'sa showed making of Bio-enzyme cleaner from the citrus fruits peels. A step towards the protection of the environment. The exact proportion of the peels, jaggery and water were explained and procedure to note the observations during the 90 days when the bio-enzyme was formed.

One student Moshin khan showed a chart made on the basis of activity -1. All other students who had made the bio-enzyme showed the bottles containing the preparation.

Question Answer session after every experiment was the indication of the students' curiosity to know more about Scientific processes.

ACTIVITY-3

Robotic Arm

Date of Program: 12th October 2021, 3 pm

Total No. of Participants: 29

On 12th October 2021 at 3 pm, the third activity of the IWSA- VIPNET Science Club (VP MH 0248) was held on zoom virtual platform. The club member Ms. Tripta Tewari compered the Program. She introduced Mr. Prateek Phadtare and R & D Engineer from TechShiksha Labs.

Mr. Phadtare then demonstrated how to make a mechanical robotic arm using cardboard, straws, cotton thread, Elastic rubber bands, glue, paper tape and paper cutter. The program was aimed at understanding the mechanics of robotic arm and learning about mechanics and design. Ms. Sheela Abraham from St. Mary's school informed the children about the biology behind human arm and how bones, nerves and muscles help the phalanges to move.

IWSA members and members of the club from the two schools, St. Mary's school, Mazgaon, Sainath English School, Vashi and New Horizon Public School, Panvel participated in this event.

The children, teachers and adults enjoyed the hands-on session very much and excitedly showed their handiwork at the end of the session.

ACTIVITY-4

- (i) Preparation of Hand Sanitizer and Room Freshener-by Students of New Horizon Public School, Panvel
- (ii) Checking for food adulterants using simple home testing methods
- (iii) Modern methods using handheld spectrophotometers- by IWSA members

Date of Program: 16th November 2021, 3 pm

Total No. of Participants: 31

On 16th October 2021 at 3 pm, the fourth activity of the IWSA- VIPNET Science Club (VP MH 0248) was held on zoom virtual platform. The session began with Ms. Christy Joy introducing the importance of hand sanitisers in the context of the current pandemic. Then Parth Laad, Aditya Kulkarni and Swar Chandebhamar demonstrated how it can be made using simple ingredients. They elaborately explained the importance of each ingredient. There was a detailed discussion in which Dr. Srirupa Mukherjee informed the children what was exactly happening at the molecular level.

Next, Amartya Lambe and Samruddhi Mane demonstrated the making of a DIY room freshener. They explained its use and preparation in detail.

This was followed by talks by Ms. Tripta Tewari, Dr. Srirupa Mukherjee and Dr. Suparna Kamath aimed at creating awareness of simple adulterants in food. Ms. Tripta Tewari showed how simple tests could be used to detect adulterants in milk, ghee etc. The children were made aware of a green dye used to colour green vegetables to

make them look fresh.
Finally, the audience was informed how Raman spectrophotometers work and how they are used to detect food adulterants.

IWSA members and members of the club from the three schools, St. Mary's school, Mazgaon, Sainath English School, Vashi and New Horizon Public School, Panvel participated in this event.

The children, teachers and adults enjoyed the discussion especially the one where hydrogen bonding was explained by Dr. Srirupa Mukherjee.

ACTIVITY-5 A

Unseen worlds: fun online lecture on microscopy

Date of Program: 2nd December 2021, 4 pm

Total No. of Participants: 15

On Thursday 2nd December 2021 at 4:00 pm, conducted an online lecture on microscopy. The lecture was titled as "Unseen Worlds", and organized for the students of grade 8th-9th under the internship program of Indian Women Scientists Association (IWSA), to enlighten young children about the basics of microscopy.

It was an hour-long session attended by a total no. of 15 participants where we covered topics like the history of microscopes, types and parts of optical microscopes, important terminologies like resolution, magnification and field of view, basics of ray optics and how image formation takes place in a microscope, different types of stains used in sample preparation and the steps involved in simple staining method. Fun activities for students like guessing the images taken under a microscope as well as a virtual tour on the working of a microscope were also included. Lastly a trivia quiz game for testing the knowledge gained and attentiveness in the lecture was arranged. All the students were able to answer those questions.

ACTIVITY - 5 B

Natural Indicators

Date of Program: 8th December 2021, 3 pm

Total No. of Participants: 25

On 8th December 2021 at 3 pm, the fourth activity of the IWSA- VIPNET Science Club (VP MH 0248) was held on zoom virtual platform. The session began with Ms. Sheela Abraham introducing her team from St. Mary's school and their guest Ms. Neha Nachanolkar, from the Department of Life Sciences and Biochemistry, St. Xavier's College Mumbai.

Ms. Smita Gupta from St. Mary's High School gave a historical account of how Robert Boyle discovered indicators. Then Master Mohsin Khan defined indicators. Next Ms. Poonam Mehta from St. Mary's High school compered the session on Natural indicators. Master Mohsin and Master Siddharth Jadhav told the audience about red cabbage and its pigments. They explained how it is different from the green cabbage only due to the soil it is grown in. Ms. Smita then showed how purple cabbage indicator

can be prepared. Similarly, Ms. Poonam Mehta and Master Siddharth informed the audience how turmeric can act as an indicator and how turmeric paper can be prepared. Next Ms.Poonam Mehta explained how litmus papers are prepared from Lichen extracts. Finally Master Aryan Vaity listed out various substances that act as natural indicators. There was a hands-on demonstration session by Ms. Smita Gupta wherein she checked the colour change of various substances like Vinegar, Lemon juice, salt solution, sugar solution and toothpaste on various indicator papers like turmeric paper, blue litmus, red litmus and pH paper as also on red cabbage extract.

In the latter half of the programme, Ms. Neha Nachnolkar explained chromatography and chalk chromatography in particular. She then went on to demonstrate chalk chromatography and presented a video on chromatographic separation of leaf pigments and colour dyes. All the participants were engrossed in the activity.

H.IWSA – SIES College Student Internship Program 18th November – 18th December 2021

IWSA conducted Internship Programs with 31 students of SIES College (Autonomous), Sion, Mumbai during November – December 2021. The students were from SY B.Sc. (6) and TY B.Sc. (25) degree courses of Biotechnology. They were divided into 6 teams. Six college faculty members along with about 20 IWSA mentors from HQ and branches guided the students. The topics that were covered under the Internship Program were as Follows:

1. Common Project of Simulation of Basic DNA Molecular Biology Techniques using Snapgene Software Program (all the six groups)
2. Carbon footprint and climate change (Group 1)
3. Colouring of Food and Fabric using Plant-based Natural Dyes (Group 2)
4. Use of plants to produce ethanol as alternative fuel for petrol (Group 3)
5. Bioremediation of wastewater by microbes (Group 4)
6. Yeast the magic behind the rising dough and the fizz in carbonated drink (Group 5)
7. Evolution of microscopes with microbiology and biotechnology research (Group 6)

Dr. Akhilesh Chaurasia from Department of Molecular Cell Biology, Institute for Antimicrobial Research and Therapeutics, Sungkyunkwan University School of Medicine, Suwon, South Korea interacted with all the 31 students every Saturday and guided them to use the software Snapgene to carry out the following six simulation studies on basic molecular biology techniques:

1. Group 1 - *Lactococcus lactis* integrated expression vector construction for steady and improved synthesis of Short-chain fatty acids.
2. Group 2 - Identification and Validation of an Antivirulence Agent Targeting SlyA-regulated Virulence in uropathogenic *Escherichia coli*.
3. Group 3 - Rapid and efficient genome editing in *Staphylococcus aureus* by using an engineered CRISPR/Cas9 system

4. Group 4 - In-silico design and simulation of genome-integrated orthogonal drug screening platform for the identification of antivirulence agent by targeting a master virulence regulator in *Vibrio vulnificu*
5. Group 5 - Developing a marker-less Cre-lox-based system for multiple gene deletions and genome engineering of *Lactobacillus lactis*
6. Group 6 - Construction of Promoter-probe Vector for the Assessment of Divergent Promoters in Bacteria

SIES Faculty from Biotechnology department, worked together with IWSA internship core team and mentors. SIES online platform was made available for joint meeting eg. orientation, mid-term appraisal, report presentation, expert review etc. Special lectures by experts in the respective topics were organised to enhance the knowledge of the students. For example,

1. Dr. K. Shankari, Center for Integrated Mobility Sciences (CIMS) National Renewable Energy Laboratory, California, USA, on “Pathways to Decarbonising Indian Transportation” on 27th November 2021.
2. Dr. Y.V. Nancharaiah, Water and Steam Chemistry Division, Chemistry Group, Bhabha Atomic Research Centre, Kalpakkam -603102, Tamil Nadu on “Microbes in Wastewater treatment & Bioremediation” on 30th November, 2021.
3. Dr. Shovan Kumar Majumder, Senior Scientist at Raja Ramanna Centre for Advanced Technology (RRCAT), Indore on “Optical Tweezers: The force of light in making revolution in micromanipulation” on 8th December 2021.
4. Ms. Janjri Jasani, Deputy Director, Centre for Environmental Research and Education (CERE), Mumbai on “Fundamentals of GHG Accounting and Reporting” on 10th December, 2021.

All the six teams made poster presentations on their respective simulation studies of Basic Molecular Biology Techniques and their respective practical projects on the topics chosen by them during the final review. They also prepared detailed dissertation on their respective projects and submitted to the University of Mumbai for the partial fulfilment of the Degree of Bachelor of Science in Biotechnology for the year 2021-2022. Some groups are working on bringing out some booklets based on the project carried out by them.

This internship program provided practical knowledge of the topics chosen through observation-based learning, nurtured the scientific ethics into young minds, established the importance of mentor mentee relationship, encouraged the students to take up community work, inculcated social responsibility and sensitised the students to environmental issues.

Nursery School and Education Committee

1. Virtual Nutrition Competition was organized on 11th August 2021 which focused on Nutritious, Innovative and Traditional dishes. Dr.Anuradha Shekhar judged all the recipes and declared the results.
2. Independence Day was celebrated by ECCE students with teaching aids and crayoning techniques.
3. On the occasion of Rakshabandhan, Rakhis were made by the students.
4. Onam was celebrated by making gifts like coconut tree gift box.
5. Dahi Handis were also made to mark the festival of Janmashtami.

6. Semester 2 final exams were conducted on 26th and 27th August online. All students appeared for exams.
7. Mrs. Kadambari conducted an activity session for ECCE students on 6th September 2021 to make eco-friendly Ganpati.
8. New batch of Drishti courses commenced from 6th September 2021.
9. Golla, a digital play was specially organized for IWSA's Nursery Students on 2nd October, 2021 by Ms. Sananda Mukhopadhyay, an educator and theater maker. In the beginning there was a ball of dough, but soon other forms emerged from and formed a world. Golla is alive material theater performance for children of 2-5 years old. The play is told through movement, music and actions.
10. A seminar on "Healthy Eating for Pre Schoolers" was organized on 23rd October 2021 through zoom platform. The seminar was conducted by Ms. Anuradha Shekhar, Ex-Vice Principal and HOD, BMN College of Home Science. Parents, Teachers and Caregivers of Nursery School Students were invited for the seminar.
11. Children's Day was celebrated on 13th November 2021 by organizing a Story Time Program with Children's Author Ms. Katie Bagli through zoom platform. Ms. Katie Bagli told an interesting story to the children titled "Our Pet Dog Cleo is Missing".
12. Christmas was celebrated by Nursery School Children on 25th December 2021, by decorating the Christmas Tree and various other activities.

IWSA's Murli Laj Chugani Health Care Centre

1. Webinar on "Ear, Nose, Throat - Our Natural Doorways to Wellness" on 3rd September 2021

Under the webinar series Wellness, Health & Happiness, MLC-Health Care Centre hosted the session titled "Ear, Nose, Throat-Our Natural Doorways to Wellness".

Dr Nalini Bhat, Head & Neck Surgeon was the speaker for the event. She was introduced to the audience by Dr. Rajeswari Rao, Head, BARC Dispensary, Vashi.

Dr. Nalini Bhat gains experience of 29 years as a Head and Neck specialist. She has retired from BARC Hospital in March 2021 as Head of ENT. She is a senior consultant at Hiranandani Hospital and Zynova Shalby Hospital. She won the Scientific and Technical Excellence Award in 2012 by BARC Hospital, was member of the Local Safety Committee in 2018-21. She was on the editorial board of the newsletter for IWSA and BARC for two years.

Dr. Bhat gave an overview of maintaining ear, nose and throat healthy and functioning. She opened the talk on how ENT is fundamental for overall well-being and crucial for a good quality of life. It allows us to lead a fulfilling life of good hearing, sound sleep, pleasant voice, and unhindered nasal breathing.

The speaker presented common conditions of the three organs.

Ears: Some common conditions of the ear presented were:

Deafness, Wax, pain during flights, vertigo.

Deafness is on the rise due to unsafe listening practices. Some facts and figures were shown: 6.1% of the world population suffering from disabling hearing loss and 1 billion young adults at risk of permanent hearing loss. Safe practices like immunization and protection against noise should be adopted as preventive methods. Simple rules to

follow to reduce noise exposure and good ear practices were addressed. Information on screening for hearing loss and rehabilitative therapy to develop communication and linguistic abilities were presented. Managing ear pain during flight using the Valsalva manoeuvre, avoiding the use of earbuds was explained in detail.

Nose: Common conditions highlighted were allergy, watering from eyes and sinus headache.

IgA in nasal secretions plays an important role against bacteria and viruses and forms the first line of immune defense. They also can neutralize the toxin levels. Deep and slow nasal breathing is extremely vital for survival.

Management of nasal conditions such as allergic rhinitis, dust mite allergy and asthma, rhinorrhoea were explained in depth. The speaker shed light on the assessment and treatment of the above conditions.

Throat: Common conditions of the throat presented were:

Snoring and sleep apnoea, burning in throat, tongue lesion, voice care and thyroid swelling and cancer.

The talk focused on the interrelation of sleep and health and its implications on health and how sleep-disordered breathing can affect the intake of oxygen levels. Childhood obesity and enlarged adenoids and tonsils are seen as common causes of sleep apnoea and snoring in children. Various physical findings were shown to cause obstructive sleep apnoea such as nasal polyps, smaller lower jaw, and receded chin amongst other findings. Signs and symptoms of sleep apnoea ranging from depression, excessive daytime sleepiness, nocturia and other prevailing physiological conditions were briefed.

Different treatment modalities depending on the severity of the conditions were explained. Good practices of chewing, swallowing and physical exercises can prevent chronic conditions of the throat. Importance of voice care by ensuring voice breaks and keeping voice box hydrated can prevent risks.

Some important warning signs such as hoarseness of voice, swelling in neck or face, difficulty in swallowing food and bleeding from nose, mouth or ear without trauma should not be ignored and needs the attention of an ENT doctor.

The talk emphasized thyroid swellings and head and neck cancer.

Dr. Bhat concluded with few rules to be followed to preserve hearing, avoiding cleaning ears often, and nasal breathing for sound sleep. The talk summarized leading a stress-free life through exercise and being alert rather than worried about signs and symptoms of cancer.

The webinar was attended by 49 participants. The session was followed by a Q&A session and a quiz on the topic.

2. Oral Health Awareness Program on 5th October 2021

HCC members organized an oral health awareness programme at IWSA on 5th October 2021. The beneficiaries were caterers, cooks, and helpers of IWSA. The programme commenced with a welcome note by Ms. Tripta Tewari. She spoke about the two functional units, mainly dental and physiotherapy taken care of by dentist Dr. Raichel Thomas and physiotherapist, Dr. Nabha Deshpande. Ms. Tripta Tewari took the opportunity to introduce Sangita Chavan, assistant cum receptionist of HCC to the

participants. The welcome note was followed by a short Marathi skit, “Dantoba Kai Radla” performed by HCC members, written and directed by Ms. Sneha Bhavsar. The skit helped in strengthening the awareness of timely interventions needed for good oral health and overall wellbeing. It concluded by highlighting the advantages of using the services of IWSA clinic. The characters were played by Manashi C, Madhu P, Tripta T, Anita Dash, Malati R, and Priya J. The participants were left to chuckle on a few funny notes and the skit was well received.

Two small videos on oral health were presented. The participants were sensitized regarding improving oral hygiene practices, causes and prevention of dental diseases and timely treatment of dental conditions. The programme focused on bringing a positive change in participants. Ms. Sneha Bhavsar thanked the participants and explained the advantages of using the dental and physio services at IWSA as being affordable under the hands of experienced and qualified doctors.

Dr. Rita Mukhopadhyay graced the occasion and conveyed the message of dealing with the post-pandemic situation and being united, and sent a strong message on “charity begins at home”. She encouraged HCC members to continue to serve the staff of IWSA and the community. The programme focused on means to facilitate HCC and be alert and aware of various health conditions. The participants were taken for a visit to the clinic where samples of oral hygiene products were distributed, sponsored by Dr. Reddy’s group.

All Covid norms were followed throughout the programme. With this initiative HCC aimed to promote patient inflow and at the same time build trust and confidence in using affordable quality services. HCC members thanked Dr. Bhakhtaver M. and Dr. Surekha Zingde for their continuous support and advice. 19 participants attended the program.

3. Workshop on Bone Health & Osteoporosis conducted by HCC on 21st November 2021

IWSA’s MLC Health Care Centre organized a half-day Workshop on Bone Health & Osteoporosis on 21st November 2021. The workshop was held at IWSA Campus in Navi Mumbai and 44 participants attended the workshop. The purpose of the workshop was to assess bone mineral density using a portable bone densitometer machine. The screening helped to identify the risk for osteopenia and osteoporosis leading to bone fragility and fractures.

A healthy bone is a measure of maintaining optimum levels of bone mass. With age, bone mass may vary depending on how much a new bone is formed and lost.

Osteopenia is a condition that weakens the bone as a result of low bone mass or bone mineral density. The condition arises due to many factors such as age-related hormone changes, certain long-term medications, diseases, and a low calcium diet. Osteopenia is a strong indicator of osteoporosis.

Osteoporosis is a bone disease that is characterized by extremely low bone mass. Over the years, it causes deterioration of skeletal bone tissue. Osteoporosis is more prevalent amongst postmenopausal women, older adults and people who lead a sedentary lifestyle.

The workshop commenced by screening the participants and providing a report on the results of the T-score. The T-score values indicate the presence of osteoporosis and osteopenia.

After evaluation, participants were counselled on bone health & nutrition by Post Graduate students of Nutrition from Dr. BMN College, SNDT University Matunga. Information on the anatomy of bone was conveyed to the participants in layman's language. Emphasis on improving the blood calcium levels by incorporating rich sources in diet such as flax seeds, ragi, spinach, milk and milk products, Quinoa, sattu were discussed. Samples of barnyard millets and finger millets were displayed. Certain plants like Hadjod, Malabar Spinach, and Moringa were displayed to introduce the idea of gardening calcium-rich sources at their own houses. Certain easy-to-make sample recipes like ragi laddoo, methi multigrain paratha, and flax seed packets were displayed to elaborate on easy cooking recipes as well. The importance of vitamin D for better absorption of calcium, exposure to sunlight, vitamin K sources, and its role in bone health was covered in the counselling session provided to the participants.

Dr. Nabha Deshpande, physiotherapist at MLC-HCC delivered a lecture on strengthening exercises of the muscles and bone. Handouts on resistance training and dumbbell workouts for upper and lower body were distributed and explained to the audience.

Chief consultant of orthopaedics, Dr. Manish Sontakke, Bone & Joint Surgery, Fortis Hospital Vashi was the chief guest at the workshop. He engaged the participants in an interactive session on weight training. He cautioned participants on the dangers of over walking and suggested best exercises such as swimming, cycling and walking. He encouraged setting goals on weight management and achieving them by a minimum weight reduction of 5 kg. For strengthening muscles and joints, he advised placing weights of a minimum of 2 kg on each foot and slowly moving up with a gradual increase of weights up to 10 kg. For the prevention of osteoporosis, he recommended 60,000 units of vitamin D per week and sunbath whenever and wherever possible. He focused on weightbearing and strength training activities that one should start along with proper hydration of 3 liters of water before 5 pm. He suggested dinner can be light without rice, wheat and oil and instead have soups and salads.

Screening Test Results:

Total participants screened: 42 (38 Females: 4 Males)
Normal Range: 4 participants
Osteopenic range: 35 participants
Osteoporotic range: 3 participants

Age Groups:

Youngest participant-14 years (Female-Normal range)
Oldest participant-86 years (Female -Osteoporotic range)
From the results obtained, it is evident that osteoporosis and osteopenia are highly prevalent with advancement of age.
The session concluded with a vote of thanks to the doctors, dietitians, organizers and participants for the successful completion of the workshop. Overall, this workshop provided a road map for improving bone health with good nutrition and exercise that focuses on resistance training and strengthening exercises. The workshop gave an opportunity to educate the community and create awareness to bring osteoporosis under control.

IWSA's Satish Haware Computer Education Centre

1. International Seminar on "Changing Face of Digital Era" on 26th September 2021

Indian Women Scientists' Association (IWSA), Navi Mumbai, celebrated 30 years of the Satish Haware Computer Education Centre (CEC) on Sunday, 26th September from 9 Am to 1 PM.

It was a virtual program arranged via zoom on the theme "Changing Face of Digital Era", followed by a panel discussion on "Women in Science- Then and Now". The webinar was inaugurated by Dr Sudha Padhye, the founder member of IWSA. Then the convenor Dr Sunita Mahajan gave a brief introduction to IWSA and Computer Centre activities during 30 years. There were about 50 participants to the webinar, some from Hyderabad, Pune, Seattle, Alabama, USA and UK.

In the first part, the two keynote speakers, Padmashri Dr D. B. Phatak and Dr Nagarjun expertly unfolded the changing face of the Digital Era. Dr Phatak described the evolution of education in general and lately the commercialization that has crept in the field of education. He stressed the multidisciplinary approach and the necessity of breaking the silos that have been erected between knowledge domains. He said that mathematics is a basic science which is essential in every field. He focussed on four main topics, evolution of computers, multidisciplinary work, empowerment of women and need for lifelong learning. Dr Phatak also outlined many grand challenges like Engineer better medicines, advanced health informatics, Reverse engineering of the Brain, Develop Carbon sequestration method, etc.

Dr Nagarjun carried this torch forward. He painted a realistic but grim picture of the effect of computers in our life. Using apps has become a second nature to us but we do not realise that all our sensitive data is in the hands of big software Corporates who develop these applications (apps). He outlined fundamental rights of leading a dignified life, privacy, education and freedom of speech. Internet plays an important part in connectivity of systems. He warned that these apps are like Trojan horses. He suggested a cure for this by having transparent transactions, a distributed and decentralised social system, like each Gram panchayat having its own server. Thus, the two senior Computer Scientists discussed the changing scene and possible pitfalls.

The next two topics were linked together and explained the practical concepts of Cloud and Edge computing. Ms Lalitha Mahajan has been working in Cloud technology for a long time. She said cloud computing was on-demand availability of computer system resources. It is like renting a house instead of building it with your own hands. Cloud computing offers flexible service, cost optimization, outsourcing IT, hiding the hardware complexities from the user. She outlined latest trends in cloud computing like IOT, Edge computing, Cloud security. Hybrid cloud etc. Upcoming trends are ambient intelligence like Alexa, machine Learning, Deep learning, Block Chain technology, Crypto currency, AI and Gaming. Dr Rajesh Ingale carried Edge computing forward

and explained that Edge computing is a distributed computing paradigm, which, instead of transmitting the raw data to the central data centres, processes it nearer to its place of origin. He said that Edge computing developed to avoid drawbacks of Cloud. Its applications are in Industrial Automation, smart home, data analytics etc.

Dr Aditi Sen De is working in quantum computing, which may be the future of Computer Industry. She talked about quantum concepts in computing and communications. Without and with security. She compared the way classical computer works and the quantum computer's working. She showed certain Nonlinear Polynomial algorithms which could be solved in polynomial time using quantum concepts. She said that bit was the unit in classical computer and qubit was the unit in quantum computing. Thus, the audience could get a glimpse of the futuristic technology of quantum computing. She discussed about secure communications as quantum cryptosystems are based on quantum states. Aditi gave a very interesting talk on the quantum computing which is the future of computing era.

To summarise, this webinar was successful in many ways. The first part covered the state of research and latest trends in computing. The eminent speakers Dr Phatak and Dr Nagarjun showed the audience a fair picture of the changing face of the Digital Era. The young speakers who followed, like Lalitha Mahajan clarified the concept of cloud computing, Dr Rajesh took the concept of cloud further and described the Edge computing concepts which tried to remove some of the drawbacks of the cloud computing. Dr Aditi Sen De talked about the latest concept of quantum computing which is the future of computing. The participants saw a seamless picture of the changing face, from early times to the futuristic quantum computing

The Second part was the panel discussion on "Women in Computer Science- Then and Now". Six panellists working in Academics, Computer Industry and a start-up company, put forth their views on the challenges they faced during their career, gender bias, their success stories and how they acquired their present standing of lead program head or Head of Institution, or just a newcomer only 6 years in the computer field. They were expertly questioned by the Moderators Dr Seema Purohit and Dr Harshali Patil.

The discussion started with a brief introduction of self with Principal Lead Program Manager, Microsoft, Ms. Keerti Rane, Associate Director, ISB, Hyderabad Dr. Shruti Mantri, AVP – database Bank of America Ms. Meenal Kulkarni, IT Corporate Trainer, Founder of Techgatha Ms. Shalini Mittal, Associate Professor IIT, Mumbai Dr. Kasturi Saha, Executive, Asian Paints Pvt. Ltd. Ms. Priyanka Tawade – Shinde.

Keerti very strong and firm on her life philosophies, gave the tips on how to remain successful in one's professional life, which were then further taken by Dr. Kasturi and Dr. Shruti who confirmed that it is possible to enjoy both your professional and personal life.

Meenal Madam exhibited the strength for taking life with a stride and changing the profile from a second-year student at IUCCA to teaching assignment to database trainer to Assistant Vice – President at Bank of America.

Dr. Kasturi, Dr. Shruti, and Meenal Madam acknowledged that having a strong foundation in basic sciences especially mathematics, physics, and statistics is extremely essential for solving problems of new-age technologies.

Ms. Shalini narrated her journey from a sensitive mother to the IT trainer to the founder of Techgatha, helping children to learn all aspects of technologies.

Priyanka being the youngest, confident executive gave an important message of remaining positive all her life. All the panellists being career women, expressed that it is important to leave the comfort zone, learn to control your mind, yes and go attitude, moving on, be empathetic, break all the rules of typical being confident and believe in yourself, important to be ignorant it is bliss, just be yourselves and it is important to have support at home and from your family.

The conveners of the CEC Ms Rashmi Rastogi, Dr Rita Mukhopadhyaya and Sukhavinder Sandhu talked about the milestones in their Convenorship period. Ms Rastogi gave a brief and pointed description about her period as a Convener. Dr Rita talked about the major change that she brought about the computer centre by introducing latest concepts like Machine Learning, and upgrading the centre to cater to high performance computing. Ms Sukhavinder talked about future plans to convert the Centre to Information Processing Centre (IPC).

Listening to all the panellists it was felt that patience and perseverance have helped them in achieving success in both lives: personal and professional. The audience took active participation by sharing their experiences and appreciation for the panellists.

The whole webinar was expertly conducted by the Master of ceremonies Dr Paramjit Anthappan.

2. Member Enrichment Talk on “Libraries in the Digital Age” on 6th October, 2021

IWSA’s Pirojsha Godrej Public Library, Satish Haware Computer Education Centre and IWSA’s Learning Garden Living Museum organized a webinar on “Libraries in the Digital Age” on 6th October, 2021 through Google Meet. The speaker was Ms Tasneem Gadiwala, Head – KMLC & HiFi Library.

Ms. Tasneem Gadiwala, started her professional career at the prestigious British Council Library, Mumbai. From there she moved on to a couple of corporates setting up their Libraries and Knowledge Centres. Over a decade back, Tasneem quit her full-time job to commence on her entrepreneurial journey. Her organization KMLC [Knowledge Management & Library Consultants] has set up, revamped and automated numerous libraries across India. Last year, amidst the pandemic, it was a dream come true for Tasneem, when she launched HiFi Library in Pune. HiFi Library aims to create the culture of people thronging to the library for its various events, to network and of course to read and borrow books.

The talk was aimed to enrich IWSA members about the prevalent prospects and challenges pertaining to intended functions of libraries and encourage the implementation of creative recent advances for outreach to users in the current scenario. About 25 participants attended the webinar.

Reports from Branches

Amravati Branch

1. Women Health Camp on 20th September 2021

A Women Health Camp was organised in collaboration with the Department of Zoology, Brijlal Biyani Science College and Women Development and Gender Equality Cell, with Dr. R. R. Laharia as the person in-charge. Blood testing and haemoglobin estimation used to be carried out regularly every year for the girl students of 1st year B Sc since 2010-11. However, this activity could not be conducted during Covid. For creation of awareness among adolescent girls about the importance of haemoglobin testing, a lecture was organised and around 42 girls were tested for their Hb gm % and blood group, out of which 11 were severely anaemic, with Hb gm % below 8.

2. Popular Science Lecture on “Women Empowerment” on 25th September 2021

On the occasion of National Girl Child Day, an online popular science lecture was organised by Maj. Santosh Bhandari on the topic of “Women Empowerment,” in collaboration with Vidyabharati Mahavidyalaya, Department of NCC & Pratibha Women’s Studies Centre. About 100 people including students and teachers attended the talk. The activities were coordinated by Dr. V. V. Parhate, Prof. Capt. M. M. Rathore and Dr. Pragnya Yenkar.

Bengaluru Branch

Popular Science Lecture on “Advances in Glass Science – Technology: Impact on society and prospects for women” on 20th November, 2021

A BRNS-DAE sponsored Popular Science Lecture was organized in association with Department of Life Sciences, Padmashree Institute of Management & Sciences, Bengaluru on “Advances in Glass Science – Technology: Impact on society and prospects for women”. The speaker was Dr K Annapurna, Senior Principal Scientist at Glass-division, CSIR-CGCRI. Around 150 participants from various colleges registered and attended the lecture.

Dr K Annapurna started the session by introducing the basics of the material, “Glass”, the origin of the name “glass”, and gave details of the history of Glass. Glass objects were used as tools in ancient days, and man-made glass was made accidentally by fusing sand and sea salt-bones, which since then has grown into the glass factories and technology we see today. Glass blowing pipe discovery was made in 650 BC which allowed forming bottles of different shapes in a controlled way. Because of its transparency and durability, glass objects were initially used for decoration purposes and were considered to be semi-precious stones. Optical glasses were discovered in 17th century and they were of 2 types – crown and flint glass. Optical glass fibres were discovered in mid-19th century.

The speaker gave insights into the major technological achievements or breakthroughs in glass technology that included glass windows, optical glasses, light bulb envelopes, semiconducting glass, glass fibres, solar cell glass etc. The various applications of glass including windows, containers, automobiles, and various uses in the ophthalmic, optical, scientific, and electronic fields were highlighted by the speaker. The main features of the various techniques involved in the processing of glass, for example, heat strengthening, heat toughening, lamination, insulated glazing, ceramic frit etc. were explained in detail. Dr. K Annapurna also explained about the Architectural Glass Research and Testing (AGRT) Facility at CSIR- CGCRI. The session was very interactive with good responses from all the participants.

Kalpakkam Branch

- 1. The Annual General Body Meeting (AGM) of the Kalpakkam Branch was held on 1st August, 2021.** 11 members attended this meeting.
- 2. Distribution of groceries to families in Kuppam on 7th August, 2021**
IWSA Members distributed essential groceries to 40 families in Kuppam for alleviating their poverty.
- 3. A Technical Talk on “Development of Plasma sprayed Yttria coating with suitable interlayers on High Density Graphite for Uranium Melting Applications”**
The talk was delivered by Ms B. Madhura, Sr. Research Fellow, ACPS/CSTD/MMG/IGCAR on 29th September, 2021.

For the reprocessing of future spent metallic fuels, High-density graphite (HDG) offers several important features that make it suitable for developing material with high-temperature oxidation resistance, thermal shock resistance, high-temperature strength, good thermal cycle life, and inertness towards molten uranium in an aggressive high-temperature environment in the range of 1300-1500 °C. The talk dealt with optimizing thermal spray parameters for depositing Yttria (Y₂O₃) coating and developing suitable interlayers on HDG substrate, aiming for longer service life of the material at the corrosive high-temperature environment.

- 4. A camp for distribution of essential groceries to women, and educational material to children, at Irular colony, near Kalpakam, on 9th October, 2021.**
About 60 families and more than 50 children living in real poverty benefited from this drive.
- 5. A BRNS-IWSA lecture on 28th October, 2021, on “Applications of Ionising Radiations” at Hindustan College, Kelambakkam, TN.**

The speaker, Dr. M. Manohari, Professor, Radiological Safety, Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, is also the Treasurer of the Kalpakkam Branch of IWSA.

There is a common misconception and fear that radiations cause cancer, and have several ill effects on the human body. Very few people know that this very same

ionising radiation is used for the diagnosis & cure of cancer, and also has many other useful applications. Starting with the basics of how ionising radiations are generated and discussing the various types of ionising radiations, the speaker enlightened the audience about various applications of ionizing radiations in the fields of medicine, industry, environment, archaeology, material science, aerospace etc. The talk also covered some basic aspects of radiological protection taken in the nuclear industry.

The talk was interactive, and well attended by nearly 190 students, along with the Faculty of the Hindustan Institute of Technology and Science.

6. Technical Talk by Dr. S. Yamini Sudha Lakshmi, Assistant Professor, Department of Medical Biochemistry, University of Madras, Chennai on “Immune Transition in Human Life: Defending with Covid 19, on 29th October, 2021.

After giving a brief introduction about the evolution and structure of viruses, the speaker highlighted the different defence mechanisms present in humans for warding off viral infections, namely: physical barriers like the skin, cellular factors like membrane receptors, and humoral components like Cytokines.

The crucial roles played by different cytokines, like Interleukins, Interferons, Tumour necrosis factors, Growth factors, Colony stimulating factors and Chemokines, in mediating and regulating the human immune response, was explained.

The lecture ended with suggested remedies for treating covid 19 infections: 1. Nutritional therapy 2. Herbal therapy along with Allopathy 3. Inhalation 4. Drinking hot water with Saumph (perunjeeragam) 5. Taking Kashayam and 6. Vaccination. About 50 participants attended the talk.

7. Flood relief work on 10th November, 2021

Members of IWSA(K) and some volunteers provided breakfast and lunch to about 65 very poor families in the flood affected Karaithittu village near Kalpakkam.

8. Health awareness camp for children at Irular colony near Kalpakkam on 21st November, 2021 (in association with the Paediatrics department, DAE Hospital)

Dr. P. Vineetha and Dr. Lakshmi Priya from DAE hospital (IWSA life members) examined more than 50 children in the age group 1-18 years and gave the required medicines. After explaining to the mothers, the importance of providing nutritious food to the children, healthy snacks and lunch was provided to all the participants. IWSA volunteers Dr. Padma S. Kumar and Mrs. S. Padmapriya participated in the programme.

9. Distribution of groceries to village women at Karaithittu on 12th December, 2021

Groceries worth Rs.520 were distributed to 64 families at Karaithittu village. IWSA Members Dr. Padma, Mrs. Revathi Venkatesh (IGCAR), Mr. Venkatesh Babu, Mr. Sasikumar, Mr. Swaroop, Mr. Harikumar and Ms. Cerrina (Social worker) participated in the distribution.

Kolhapur Branch

1. A webinar for college students on “Solar Energy: the need for future,” on 4th September, 2021

A webinar was organised in association with Vidnyan Mahavidyalay, Sangola. The Guest Speaker was Dr. Atul Aradhye, Assistant Professor, Singhgad College of Engineering, Korti, Pandharpur.

2. An online Flower Festival was inaugurated on 7th September, 2021, along with Dr. Balasaheb Khardekar College, Vengurla, Gardens Club Kolhapur, and Rotaract Club of Vengurla Midtown, for exploring Flower diversity in different regions of Maharashtra. Virtual Lectures and demonstrations were scheduled by experts on the first Tuesday of every subsequent month.

3. Lecture on “Nutrition for Youth,” on 16th September, 2021

An online lecture on “Nutrition for youth” was arranged by IWSA in association with Vidnyan Mahavidyalay, Sangola. The Guest Speaker was Dr. Suparna Kelkar, Peadiatrician.

4. Floral School from 28th - 29th October, and from 26th - 27th November

A Floral school was organized for teaching flower arrangements and flower designing. Experts were invited to give presentations and demonstrations. About 40 people participated.

5. The International Multidisciplinary Research Foundation, awarded Dr Varsha Dilip Jadhav (Rathod), The National Distinguished Researcher Award 2021 on 11th November, 2021, in recognition of her consistent superior performance in Ethno-pharmacognosy.

Nagpur Branch

1. Online Discussion on “Responsibilities and Challenges of stakeholders of education in the increasingly digital world” on 25th September, 2021

Stakeholders in this discussion were teachers, Principals, students, and parents from rural and urban areas. Students from in and around Nagpur, a student from IIT, and another school student from USA also participated in the discussion. The total number of participants were 60.

Availability of electricity, proper devices, and strong internet became basic needs for teachers as well as students. Loss of human feel and peer to peer discussions were the difficulties felt by high school and college students. In rural areas students faced a lot of difficulty owing to non-availability of resources. Students felt that they could understand subjects, but missed out on social connect and hands-on skills.

Teachers in their discussion expressed the challenges they faced using a virtual platform. Some teachers even started You Tube channels for their teaching so that students could study at their convenience based on availability of resources. Students seemed to get adapted to online learning but missed physical classrooms. Parents also expressed difficulties in supporting students for online education. Also dealing with increased screen time of children was a challenge before the parents. Principals expressed the whole difficulty of administration of online schools. Submission of assessments, and their evaluation was a challenge as many institutes were still not digitally so well equipped. However, some part of teaching was more effective through online mode. It was felt that a blend of teaching will be more effective. As many as eighteen speakers expressed their views through online or video mode. The program was coordinated by Dr.Surekha Kalkar and Dr.Shalini Chahande.

2. **Talk on “Oral Hygiene for Healthy Life” on 4th October, 2021**

Dr. Shivani Andhare, Endodontist was the speaker. Dr Shivani briefly explained the structure of the oral cavity and its importance in the process of digestion. She elaborated on how oral hygiene can be maintained through regular brushing, flossing, proper rinsing and regular dental check-ups. She explained in detail how failure to maintain a good oral hygiene can harm not only oral but other systems of the body as well. The deliberation was explained using creative power point slides. The total number of participants was 50.

3. **Talks on the occasion of WORLD FOOD DAY on 23rd October, 2021.**

Talks of two eminent personalities were organized, under the theme of World Food Day, namely, “**Safe food now and a healthy tomorrow**” and the programme was conducted through virtual platform. 55 people attended these talks. Speaker **Mrs Nikhat Ali, Dietician and Nutritionist** from Nagpur spoke on the topic “**Fortified foods with micro and macro nutrients**”. Fortified foods are those that have added nutrients to them. These foods are meant to improve nutrition. In the light of several foods available in markets, the concept is not very new but it needs to be understood well. These foods are certainly good for health but there are concerns that harmful amounts of certain vitamins may be consumed. The benefits also depend upon age and related factors.

4. **Talk on the topic” आयुर्वेदातील आहार पद्धती” by Dr.Madhuri Wagh, Professor at Govt Ayurvedic College**

The speaker elaborated in her talk about healthy and traditional ways of eating. Choosing food according to one’s constitution, paying attention to food as per our capacity are some basics which could bring about a good deal of change in overall well-being. She highlighted that eating seasonal foods, following strict dietary schedules, eating slowly with no distractions as being important in Ayurvedic system of diet. She mentioned a few foods which are incompatible and that such combinations must be avoided. Further, she explained the importance of a light walk after meals and sleeping positions for a good digestion.

Nellore Branch

1. A virtual International Seminar on 2nd December 2021, on “Artificial Intelligence and Data Science in Neurology”

The Seminar was organised by Artificial Intelligence in Neurology Research Centre, and Department of Computer Science, Sacred Heart College, Chalakudy.

Roorkee Branch

1. Popular Science Lecture on “Advancement of women in STEM: The past, present and future” on 18th September, 2021.

Dr. Namrata Gupta, who works on women in science and engineering with a focus on participation and rise of women scientists in academia and research laboratories of India, was the speaker, and the lecture was organised using an online platform. Dr. Namrata Gupta's research includes the study of women engineering students and women in STEM entrepreneurship. She has authored a book titled, 'Women in Science and Technology: Confronting Inequalities', published by SAGE (2020). She has several publications to her credit, including those in collaboration with renowned international researchers, such as in the European Commission report 'Gender and Excellence in the Making' (2004) and in the 'Handbook of Science and Technology Studies' published by the MIT Press (2007). She is the recipient of several fellowships and grants from the Indian Council of Social Science Research (ICSSR).

The objective of the talk was to trace the position of women in STEM (science, technology, engineering, and mathematics) education and careers in India, to understand how far we have come and the distance we still have to traverse in order to fully tap the potential of our women in science. The lecture covered the historical context of women's education in STEM and situated women in STEM in the shifting contours of the Indian socio-cultural context. The lecture discussed many aspects such as the factors that influence the choice for STEM subjects in school, the reason for very few women in research in spite of a high proportion of women doctorates in STEM, the caste/class dimension to the problem of women in STEM future, the role of government policy, the gaps in our understanding of the situation, the role of the civil society, visualization of new gender-neutral spaces in STEM careers etc. 13 participants were present.

2. Popular Science Lecture on Artificial Intelligence on December 17, 2021

The speaker was Dr. Shilpi Saxena from Department of Hydrology, Indian Institute of Technology, Roorkee. The objective of this lecture was to spread awareness among the scientists, professors, engineers, scholars, students and the common society to understand the ontological distinction between the Artificial and Natural intelligence. Natural Intelligence works spontaneously while AI is impelled with some external forces. Most AI programs currently programmed have been limited primarily to making

simple decisions or performing simple operations on relatively small amounts of data in the field of robotics, Aerospace, medical etc., However, the most sophisticated brain simulations are unlikely to produce conscious feelings or subjective feeling. Artificial intelligence and other analytical concepts do not explain consciousness. Cognitive features like intelligence are found even in organisms which do not possess any brain or nervous system. Scientific American Newsletter mentioned that to create consciousness, the intrinsic causal powers of the brain are needed. And those powers cannot be simulated but must be part and parcel of the physics of the underlying mechanism. On the other hand, natural intelligence engages all the conscious and unconscious knowledge of a human/living being. That immense field stretches from genetics to culture to society and psychology. The distinguished intrinsic phenomenon like free-will is found only in natural intelligence that cannot be computed in the artificial intelligence/robot. If people are capable of making any decision they desire, then there is free will, however, if humans are only capable of following set patterns of behavior like in AI, then there is no free-will. Consciousness and free-will is the uniqueness of Natural/human intelligence, it can never be programmed. Natural intelligence is based on internal teleology while AI is based on external teleology. Natural intelligence is connected to everything inside a living being let it be, an immune system, a cardiovascular system, a hormonal system, a muscular system, or dozens of interconnected systems. Unlike robots/AI, the body doesn't do one thing at a time. It coordinates all the different information systems at the same moment. Our medical attempts to make ourselves not ill are generally far less impressive than the actions natural intelligence engages every moment to keep us healthy. The lecture was an attempt to take up a comparative study to examine the difference between two forms of intelligence. This lecture helped to understand the deeper questions about life and artificial intelligence.

BOARD OF TRUSTEES

Dr. Sunita Mahajan	Chairperson
Dr. Bakhtaver S. Mahajan	Secretary
Dr. V. Sudha Rao	Treasurer
Dr. Surekha Zingde	Member
Dr. Devaki Ramanathan	Member

Articles

Organic Electronics for a Better Tomorrow

*Dr. Neha Rami Kumar, Assistant Professor, Department of Chemistry,
Dhemaji College, Assam-787057, India
nehakumar0926@gmail.com*

What is Organic Electronics?

The great eras of mankind are defined by materials that shape technology. Back in 19th century, the technology was dependant on steel but the discovery of new alloys redefined manufacturing. In the current era, technology is defined by plastic and semiconductors. We are now passing through a period of Micro Electronics revolution. For the common man, the word “Electronics” creates a “virtual” image of audio-visual gadgets like radio and T.V. in his mind.

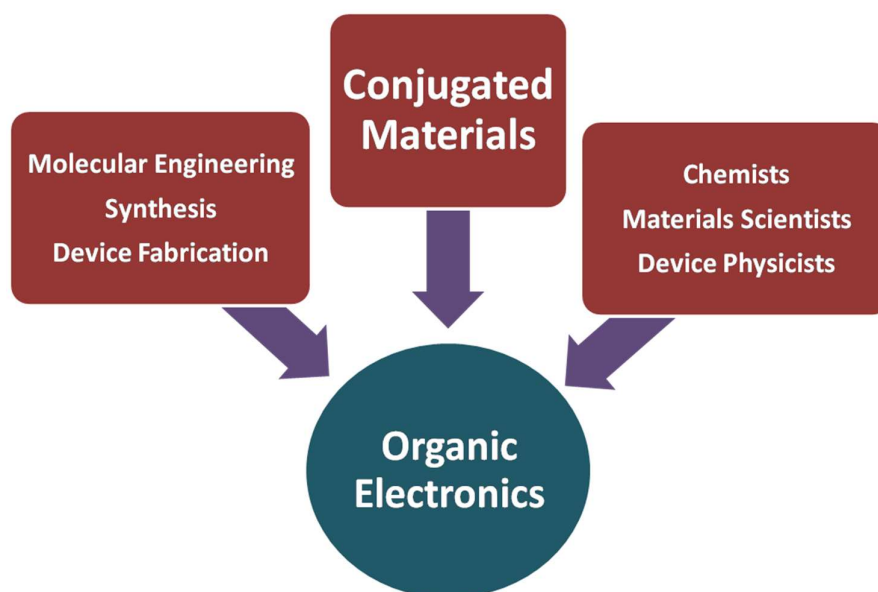


Figure 1: Introductory representation of organic electronics

Inorganic semiconductors such as silicon and gallium arsenide, insulators such as silicon dioxide, metals such as aluminium and copper have been an integral part of the microelectronics industry since the invention of the first transistor in 1947 at Bell Laboratories. Organic electronics is a branch of material science dealing with

conjugated small-molecules and related polymers. These are mainly carbon-based organic compounds and hence the name organic electronics. The main target of scientists working in organic electronics is to replace costly inorganic materials by the relatively cheaper organic conjugated moieties. There is a great scope for structure versatility in organic semiconductors, and this allows the incorporation of functionality by molecular design which cannot be accomplished in the inorganic materials. A large number of π -conjugated semiconducting materials are continuously being discovered, thus generating an interesting array of conjugated systems for organic electronics. The development of organic electronics in the past few decades is a result of strong collaboration between material scientists, device physicists and chemists (Figure 1). The main target of chemists is to design new organic materials and present their easy synthesis or present an easier synthesis of existing conjugated systems.^[1]

Dawn of Organic Electronics:

A brief history of organic electronics is given in Figure 2. The dawn of organic electronics dates back to 1950's with the first discovery of conducting organic molecule by H. Inokuchi and colleagues. Their study unearthed a new fact that organic molecules can behave as semiconductors, thus defying the then commonly accepted fact that only inorganic materials like silicon and germanium can serve as semiconductors. The discovery by Inokuchi and group was just a beginning of a new era in organic chemistry and device physics and it turned out that organic semiconductors have a number of advantages over traditional semiconductors. Another breakthrough discovery took place in 1960's by W. Helfrich and W. G. Schneider when they found that organic molecules can emit light, which was observed for the very first time in a molecule called anthracene.

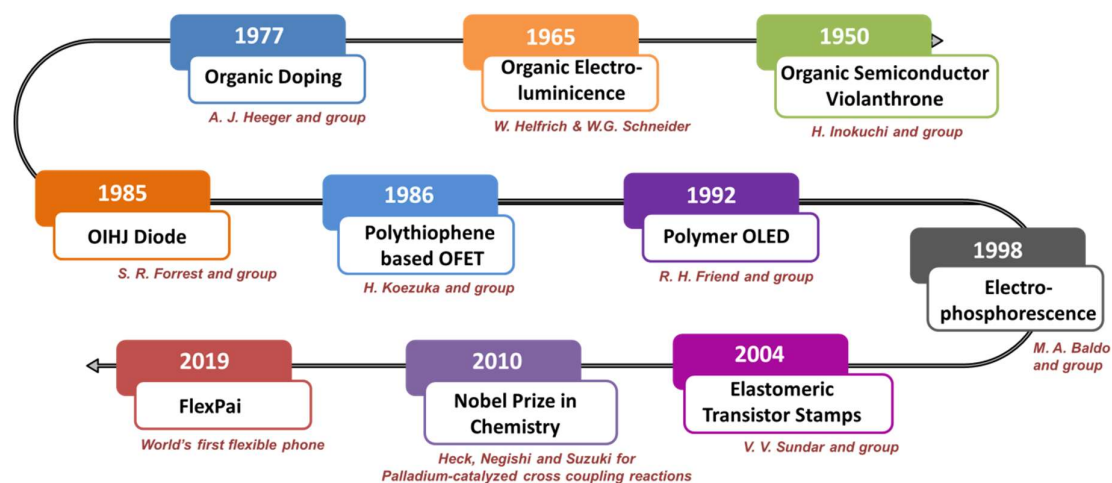


Figure 2: Brief history of organic electronics

In 1977 Shirakawa, MacDiarmid and Heeger discovered the highly conducting polyacetylene and since then, π -conjugated materials have gained much attention as next-generation organic electronics materials. In fact, their discovery earned them the highest award for scientific breakthroughs i.e., they won the Nobel Prize in Chemistry

in the year 2000 for their discovery of conducting polyacetylene. After a span of few years, came the discovery of PTCDA, an organic dye molecule which is still used in car paints and possess semiconducting properties. Another milestone in the history of organic electronics was the discovery of Organic Light Emitting Diodes invented by Ching Tang and Steven Van Slyke in 1987 at Kodak. This was the discovery that in the coming years was to bring a new revolution in the field of display industry. The most recent breakthrough has been the production of world's first flexible phone "FlexiPai" in the year 2019. [2,3]

Applications of Organic Electronics:

Since the discovery of organic semiconductor materials by Inokuchi and group, organic electronics have garnered a wide range of applications for the benefit of entire mankind (Figure 3). The major of these applications include the use of organic ingredients in displays, photovoltaics, transistor technologies and biomedicines. [4]

Display:

The first breakthrough in the field of organic displays *i.e.*, Organic Light Emitting Diodes (OLED) was made by Ching Tang and Steven Van Slyke in 1987 at Eastman Kodak. OLEDs consist of an organic film that generates their own light instead of using back light by using the phenomenon of phosphorescence. Phosphorescence is the emission of radiation due to excitation of electrons which lasts for a long period of time. In our day-to-day life, this phenomenon can be observed in wristwatches and clock dials that glow in the dark.

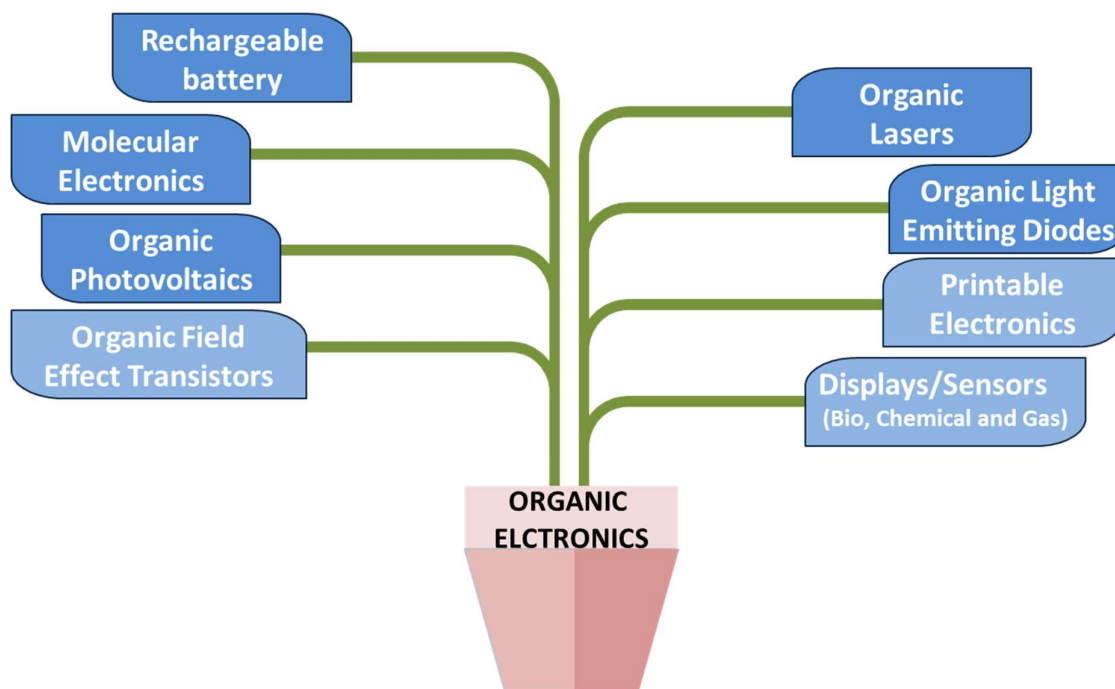


Figure 3: Applications of Organic Electronics

Photovoltaic applications:

Organic photovoltaic devices refer to organic solar cells. Most often, it is the organic conjugated polymers that are used as photovoltaic material. Organic materials supersede their inorganic counterparts in solar cell manufacture as the optical absorption coefficient of organic molecules is generally very high so that a large amount of light can be absorbed with a small amount of material, usually on the order of hundreds of nanometres. Besides this, other advantages of the organic ingredients are their flexibility and their thin nature such that they can be rolled up and even composted. Researchers believe that organic solar cells with efficiencies as high as 15-20% will be a reality very soon.

Flexible printed organic transistors:

Transistors find their use in several modern electronic devices by amplifying signals or operating as switches. Transistors that employ organic ingredients are known as Organic Field Effect Transistors (OFETs). They contain conductive electrodes, an organic semiconductor and a dielectric. Their production involves printing electronic circuits using organic dyes on a flexible substrate in printing presses. However, incorporation of even trace amounts of impurities during the manufacturing process can have adverse effect on the device performance.^[5]

Biomedicine:

The most important and challenging use of organic semiconductor ingredients currently and something that holds a promising future is their biological applications. Earlier, it was believed that organic electronics is a field that will be dominated by organic chemists and device physicists, but now it is turning to be a multidisciplinary field. One of the most important applications of organic electronics in medicine is in curing blindness, using a retinal chip which is inserted in the eye. This chip registers light signals entering the eye and further changes the light signals into electric signals which are received by the brain. Electrodes which are coated with organic dyes transmit electric signals to the receptor cells in the eye. With the advent of scientific technologies, application of bioelectronics to make artificial skin with tactile sensitivity that could be used to treat burns or add functionality to prosthetic limbs will soon be a reality.

Researchers are now focusing on ways to make organic electronics more energy sufficient and conservative than the existing silicon based electronic world.^[6] Organic electronics also holds the capacity to make electronics productions, usage and disposal more environment friendly. The benefits of using organic ingredients for electronic manufacture are:

- **Unique abilities** such as sensing, bio-compatibility and flexibility.
- **Energy efficient** such that the use of organic ingredients in electronic manufacture will lead to more energy-efficient electronic displays, lights and other electronic devices.
- **Less wastage, more safety** will rely on fewer, safer, and more abundant raw materials.

Sustainable Electronic Materials:

Sustainability refers to using raw materials that have a basis in renewable resources. Considering the current environmental scenario, the electronics industry will face challenges if sustainability is not taken into account. The demands for electronic devices will obviously not go away but the materials used to construct those devices will cease to exist if sustainability in organic electronics is not realized. In fact, the future of mankind lies in organic electronics that involves sustainability, innovation and accessibility.^[7] Sustainability in organic electronics has to be dealt in with three different aspects (Figure 4).



**SUSTAINABILITY IN ORGANIC ELECTRONICS
NEEDS TO COVER THREE ASPECTS:**

- ENVIRONMENTAL SUSTAINABILITY
- SOCIAL SUSTAINABILITY
- TECHNOLOGY SUSTAINABILITY

Figure 4: Sustainability in organic electronics (<https://3rrecycler.com/sustainability/>)

Environmental sustainability: When one refers to environmental sustainability in organic electronics, it refers to building an electronic world that ensures sustainable management of natural resources including energy efficiency, resource use, and waste disposal or recycling. Sustainability refers not only to building eco-friendly device but also more eco-friendly manufacturing methods. Sustainability can reduce the life cycle of an electronic device in the process beginning from its manufacture to safe disposal. An example of environmental sustainability in today’s electronic world is the use of carbon-based materials in place of precious earth-mined resources.^[8]

Social sustainability: More broadly, “sustainable electronics” also implies building an electronic world that enables a more sustainable society – that is, as described in the United Nations 2012 report *Realizing the Future We Want for All*, one that ensures

“inter-generational justice and a future world fit for children ... in which children will be able to grow up healthy, well-nourished, resilient, well-educated, culturally sensitive and protected from violence and neglect With the advent of organic electronics, technology has become more accessible.^[9] An important example of this is the use of “off-the grid” solar cells, compatible water sensors etc. in locations which are otherwise deprived of the basic amenities of life. In future, organic electronics will supersede the inorganic electronics mainly because of the more cost-effective large-scale manufacture of the former type which further ensures opportunities for high throughput production of devices that could help protect the environment. For example, chemists envision item-level food spoilage sensors that would significantly reduce the amount of wasted food.

Technology sustainability: The term sustainable electronics refers not only to the electronics which is long lasting but also the organic electronic technology. Researchers from varied backgrounds have just begun to explore the vast potential for innovative functionality made possible through the use of organic materials in electronic devices. Bioelectronics itself opens up a vast ocean of possibilities with respect to medical, sensing and other human interface applications. The versatile nature of organic electronics in addition to the potential that this field holds for environmental and social sustainability indicates towards the technological sustainability in organic electronics.

e-Biologics:

Preliminary research has indicated that use of microbial processes for the production of metallic and semi-metallics offer conductive, capacitive, photoluminescence and photoactive properties in a nutshell. In fact, production of semiconductor materials using microbial methods has already been realised and advantages such as improvement in performance, design flexibility, large scale production for a minimum cost etc. have been obtained. The flexibility of organic bioelectronics devices is of great significance in ensuring stable and reliable performances by improving the contact and interaction of the devices with biological systems.

Some other important applications of flexible organic bioelectronics include ion bipolar junction transistors (IBJTs), flexible organic thin film transistors (OTFTs), polymer electrodes, smart textiles, organic electrochemical ion pumps (OEIPs), and chemoreceptors etc.

Conclusion:

The high performance of organic electronic devices can be ensured if the following issues can be addressed

- Improving and understanding the self-assembly in devices to ensure better reproducibility.
- Improving the existing analytical tools to gain a better insight into how the materials are assembling and further study their behaviour in devices.

- Improving the processing methods for three-dimensional (3D) processing
- Improving and increasing the multifunctionality of organic electronic devices to further expand the research.

The field of organic electronics has made tremendous progress since the last few decades changing the way society interacts with technology as physicists, chemists, biologists, engineers and other scientists work synergistically to address the research challenges. However, with the combined efforts of all scientists, advanced organic devices have already reached into the hands of the general public. The call of the hour is to establish collaborative efforts to meet the existing challenges. To address these challenges, multidisciplinary training and research programs that bring scientists from different fields of knowledge and from varied sectors of activity under one umbrella are to be carried out.

References:

- 1) <http://www.123seminaronly.com/Seminar-Reports/025/7149108-The-Rise-of-Organic-Electronics.pdf>
- 2) <https://onlinelibrary.wiley.com/doi/abs/10.1002/adma.201402625>
- 3) https://www.einnews.com/pr_news/552217241/organic-electronics-market-industry-analysis-top-key-players-growth-overview-share-forecast-by-2028
- 4) <https://www.rsc.org/news-events/articles/2013/04-april/organic-electronics-will-transform-the-way-society-interacts-with-new-technology/>
- 5) <https://medium.com/iete-sf-mec/organic-electronics-182c91d33432>
- 6) <https://www.rsc.org/globalassets/04-campaigning-outreach/policy/research-policy/global-challenges/organic-electronics-for-a-better-tomorrow.pdf>
- 7) <https://cse.umn.edu/college/feature-stories/pioneering-organic-electronics-daniel-frisbie>
- 8) <https://resources.pcb.cadence.com/blog/2020-sustainable-electronics-materials-the-future-of-electronics-design>
- 9) https://xrcc.external.xerox.com/edit/files/research/printed_organic_white_paper_br12417.pdf



Dr. Neha Rani Kumar is Assistant Professor, Department of Chemistry Dhemaji College, Assam. Her research work has focused on organic synthesis and purification techniques for application in organic electronics. She has also worked on catalytic reactions and multistep process protocols based on functionalized heterocyclic compounds. She has used several modern scientific instruments and computational tools in her research. She is Life Member of IWSA and several other professional scientific societies like Indian Chemical Society, Materials Research Society of India, Catalysis Society of India, and Association of Chemistry Teachers.

Nobel Prizes - 2021

Physics

The Nobel Prize in Physics for 2021 has been awarded to **Syukuro Manabe** of Princeton University, U.S., **Klaus Hasselmann** of Max Planck Institute for Meteorology, Hamburg, Germany, and **Giorgio Parisi** of Sapienza University of Rome, Italy, for their “ground breaking contributions to our understanding of complex physical systems”. Professors Manabe and Hasselmann will share half the prize, awarded to them “for the physical modelling of Earth’s climate, quantifying variability and reliably predicting global warming”. Professor Parisi will receive one-half of the prize, awarded “for the discovery of the interplay of disorder and fluctuations in physical systems from atomic to planetary scales”. Complex systems are characterised by randomness and disorder and are difficult to understand. This year’s Laureates have all contributed to us gaining deeper insight into the properties and evolution of complex physical systems, and thus the Prize is a timely recognition of new methods for describing such complex systems and predicting their long-term behaviour.

Syukuro Manabe, born in 1931 in Shingu, Japan was awarded Ph.D. in 1958 from University of Tokyo, Japan. At present he is Senior Meteorologist at Princeton University, USA. **Klaus Hasselmann**, also born in 1931 in Hamburg, Germany, was awarded Ph.D. in 1958 from University of Göttingen, Germany. He is Professor at Max Planck Institute for Meteorology, Hamburg, Germany. **Giorgio Parisi**, who was born in 1948 in Rome, Italy, graduated with Ph.D. in 1970 from Sapienza University of Rome. At present he is Professor at the same University.

One complex system of vital importance to humankind is Earth’s climate, largely driven by temperature variations in the atmosphere. By the end of the 19th century, Arrhenius, the famous physicist who is one of the founders of Physical Chemistry, understood the physics responsible for the greenhouse effect and the role of atmospheric carbon dioxide in keeping the earth’s surface temperature high and he also proposed the possibility of increase in temperature due to human activities (published in *The Philosophical Magazine* in 1896). This was confirmed in 1970s by Dr. Charles Davis

Keeling from Scripps Institution of Oceanography, San Diego, who started continuous monitoring of atmospheric CO₂ in remote locations since 1957 – 58. In addition to the seasonal oscillations in the concentration of CO₂, the data showed continuous increase in the annual average values. Meanwhile in 1950s **Prof. Manabe** tried to understand how increased levels of carbon dioxide can cause increased temperatures. While Arrhenius had focused on radiation balance, in the 1960s Manabe led work on the development of physical models to incorporate the vertical transport of air masses due to convection, as well as the latent heat of water vapour. To make these calculations manageable, he chose to reduce the model to one dimension – a vertical column, 40 kilometres up into the atmosphere. Even so, it took hundreds of valuable computing hours to test the model by varying the levels of gases in the atmosphere. Oxygen and nitrogen had negligible effects on surface temperature, while carbon dioxide had a clear impact: when the level of carbon dioxide doubled, global temperature increased by over 2°C.

The one-dimensional model, which was relatively simple, confirmed that this heating really was due to the increase in carbon dioxide. Manabe believed in simplifying, because he believed that one cannot compete with the complexity of nature – there is so much physics involved in every raindrop that it would never be possible to compute absolutely everything. But the insights from the one-dimensional model led to a climate model in three dimensions, which Manabe published in 1975; this was a milestone on the road to understanding the climate's secrets. His work laid the foundation for the development of current climate models.

Klaus Hasselmann, who worked in oceanography, fluid dynamics and geophysics, created a model that links together weather and climate. Our planet has vast shifts in its weather because solar radiation is so unevenly distributed, both geographically and over time. As mentioned above, it is impossible to have a model precise enough to state the air temperature, pressure, humidity or wind conditions for every point in the atmosphere. Also, the equations are nonlinear; small deviations in initial values can make a weather system evolve in entirely different ways. Thus, weather being a classic example of a chaotic system, producing reliable climate models for several decades or hundreds of years into the future appeared to be almost impossible. Hasselmann's seminal work in 1976 involved the creation of a stochastic climate model that shows how weather disturbances could be integrated into larger, more stable atmospheric and ocean circulation patterns to produce changes in climate. He also developed methods for identifying specific signals, fingerprints, that both natural phenomena and human activities imprint in the climate. Thus, the warming signals generated by human activities, such as those produced from greenhouse gas emissions and their effects on global temperature, could be separated from the background noise of natural climate variability. In 1979 he published these statistical techniques that allowed climate scientists to identify the presence and relative strength of these warming signals. This work became the basis for attribution studies—which seek to explain the links between human activities that contribute to climate change and specific weather and climate events, such as tropical cyclones (hurricanes), droughts, extreme rainfall events, and the pattern of rising global average temperatures—that appear frequently in national and global climate risk assessment that help to guide climate policy. It is a coincidence that while working in Scripps Institution of Oceanography from 1961 to 1964, he had met Prof. Charles Keeling (famous for the longest CO₂ measurement) and together they had started a choir. Later, in his seminal work he was regularly using the Keeling curve, which shows the variation of atmospheric concentration of CO₂.

Around 1980, **Giorgio Parisi** presented his discoveries about how apparently random phenomena are governed by hidden rules. His work is now considered to be among the most important contributions to the theory of complex systems. Modern studies of complex systems are rooted in the statistical mechanics developed in the second half of the 19th century by James C. Maxwell, Ludwig Boltzmann and J. Willard Gibbs, who named this field in 1884. This method takes the particles' random movements into account and successfully provides a microscopic explanation for macroscopic properties in gases and liquids, such as temperature and pressure. However, when such systems of particles are subjected to rapid changes, a complex disordered system arises, which appear to be unpredictable. For example, when a liquid is cooled slowly a crystal with definite arrangement will be formed which is repeatable, but when cooled rapidly, a disordered structure / pattern will arise which will be different each time the experiment is repeated. Based on his original work on spin glass, Parisi discovered a hidden pattern in such disordered systems and was able to describe them mathematically.

Spin glass is a special type of metal alloy in which iron atoms, for example, are randomly mixed into a grid of copper atoms. Even though there are only a few iron atoms, they change the material's magnetic properties in a radical and very puzzling manner. Each iron atom behaves like a small magnet, or spin, which is affected by the other iron atoms close to it. A spin glass is called a frustrated system, where unlike an ordinary magnet, some spin pairs want to point in the same direction and others in the opposite direction. How the spins find an optimal orientation was a question which could not be answered for a long time. One method used was the replica trick, a mathematical technique in which many copies, replicas, of the system are processed at the same time. However, in terms of physics, the results of these calculations were unfeasible. In 1979, Parisi made a decisive breakthrough when he demonstrated how the replica trick could be ingeniously used to solve the spin glass problem. He discovered a hidden structure in the replicas, and could describe it mathematically. It took many years for Parisi's solution to be proven mathematically correct. Since then, his method became a cornerstone of the theory of complex systems and has been used in many disordered systems.

Like spin glass, granular materials and many other systems are examples of frustrated systems, in which various constituents must arrange themselves in a manner that is a compromise between counteracting forces. Parisi's fundamental discoveries about the structure of spin glasses were so deep that they not only influenced physics, but also mathematics, biology, neuroscience, machine learning etc., because all these fields include problems that are directly related to frustration. Parisi himself has been involved in applying this in a stunning range of physical systems, such as stochasticity in quantum field theory, the intermittency of turbulence, Euclidean random matrices, non-equilibrium fluctuations in glasses, stochastic interfacial motion, granular matter and the role of random fluctuations in controlling Earth's climate states over long epochs such as appearance of ice ages, collective motion of animals (swarms and flocks) such as murmuration of starlings.

The above ground-breaking contributions have led to our understanding of complex physical systems in their broadest sense, from the microscopic to the global. As summarised in the article on scientific background of this year's Nobel prizes in physics emphasise that no single prediction of anything can be taken as inviolable truth, and that without soberly probing the origins of variability we cannot understand the behaviour of any system. It also underlines that a vast array of the phenomena we

observe in nature emerge from an underlying disorder, and that embracing the noise and uncertainty is an essential step on the road towards predictability.

Chemistry

The Nobel Prize in Chemistry in 2021 was awarded jointly to Benjamin List and David W. C. MacMillan for the development of asymmetric organocatalysis, an ingenious tool for building molecules. **Benjamin List**, born in 1968 in Frankfurt, Germany completed Ph.D. in 1997 from Goethe University Frankfurt, Germany. At present he is Director of the Max-Planck-Institut für Kohlenforschung, Mülheim an der Ruhr, Germany. **David W.C. MacMillan**, born in 1968 in Bellshill, UK, completed Ph.D. in 1996 from University of California, Irvine, USA. He is a Professor at Princeton University, USA. Around 2000, both of them independently developed a new type of catalysis, called organocatalysis that revolutionised synthesis of complex organic molecules. The process is simple, robust, affordable, sustainable, and moreover environmentally friendly, following the principles of green chemistry. Most importantly, organocatalysis allows the preparation of bioactive compounds using simple and metal-free procedures in an inert atmosphere with easy reaction manipulation.

Catalysis is the wonderful process, by which the presence of a material in small amounts make a reaction occur in a desired direction, or make a reaction occur faster and more efficient. Ever since the development of the famous Haber process, where hydrogen and nitrogen combine in the presence of a metal catalyst, catalytic reactions have become very important in all industries, for feeding, healing, energy production, transport etc. According to a 2015 estimate, catalysis contributes 35% of the world's GDP. Mostly metals and enzymes were used as catalysts till recently. Metals need stringent conditions, and sometimes the heavy metals to be used as catalysts are toxic and very costly. Enzymes, the miracle molecules that drive chemical processes in living systems are very specific and efficient but are very big and complex, and they are not very stable under industrial conditions, being inactivated by solvents and heat. List and MacMillan showed that simple amino acids, the building materials of enzymes, or other nitrogen and oxygen containing simple organic molecules also can function as catalysts. Their work also showed these organocatalysts to have high selectivity towards optical isomers or enantiomers. Enantiomers are structurally same molecules, but mirror images of each other. These mirror images have very different properties. In pharmaceuticals, one enantiomer may be active but its mirror image maybe either inactive or harmful for the healing process. So stereoselective synthesis of the active enantiomer of a drug molecule is very important and, in many cases, this used to be either impossible or a very rigorous process using toxic and rare metals. Organocatalysts make it simple, providing an eco-friendly environment to carry out such stereoselective, asymmetric synthetic reactions. For example, the industrial synthetic route to antiviral oseltamivir, commercialised as Tamiflu, has 12 steps, while an alternative organocatalytic route only has five. In the last two decades organocatalysis has led to many new single enantiomer drugs in the market, which offer enhanced therapy and reduced toxicity. Synthesis of Maraviroc, a medicine used for the treatment of HIV, Warfarin, most commonly used anticoagulant, many cancer drugs etc are among them.

<https://www.nobelprize.org/prizes/physics/2021/>, www.kva.se ,

<https://www.nobelprize.org/uploads/2021/10/popular-physicsprize2021-2.pdf>,

<https://www.chemistryworld.com/news/>, <https://www.nobelprize.org/prizes/chemistry/2021/>



Benjamin List



David Macmillan

Chemistry Nobel Laureates



Syukuro Manabe



Klaus Hasselmann

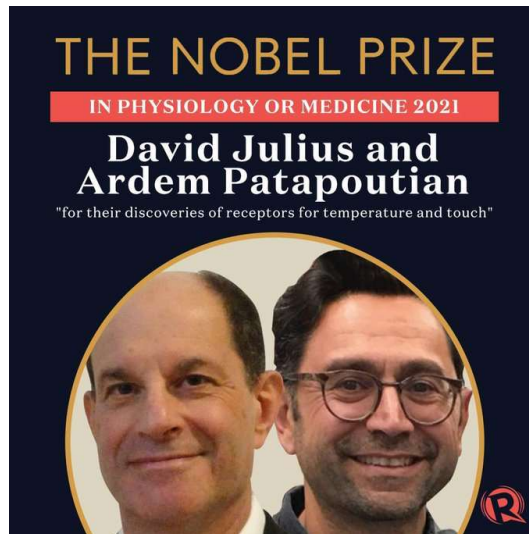


Giorgio Parisi

Physics Nobel Laureates

(Compiled by Dr. Dhanya Suresh, Member, Editorial Committee, IWSA Newsletter)

Physiology or Medicine



For their discoveries of receptors for temperature and touch!

Both scientists helped to answer a fundamental question regarding how the nervous system interprets our environment: How are temperature and mechanical stimuli converted into electrical impulses in the nervous system?

These sensations of temperature and touch are essential for our adaptation and interaction with the world around us. *“This really unlocks one of the secrets of nature,” said Thomas Perlmann, Secretary-General for the Nobel Assembly and Nobel Committee. Understanding how, at the molecular level, stimuli can be converted into nerve signals, is “actually something that is crucial for our survival,” he added.*

David Julius was born in 1955 in New York, USA. A 1977 graduate from MIT, he received a Ph.D. in 1984 from University of California, Berkeley and was a postdoctoral fellow at Columbia University, in New York. David Julius was recruited to the University of California, San Francisco in 1989 where he is now Professor. He is the 39th MIT graduate to receive a Nobel.

Ardem Patapoutian was born in 1967 in Beirut, Lebanon. In his youth, he moved from a war-torn Beirut to Los Angeles, USA and received a Ph.D. in 1996 from California Institute of Technology, Pasadena, USA. After a postdoctoral stint at the University of California, San Francisco, he joined as a scientist at Scripps Research, La Jolla, California in 2000, where he is now Professor. He is a Howard Hughes Medical Institute Investigator since 2014.

Using distinctive natural molecules, (including toxins from tarantulas and coral snakes, and “capsaicin” a compound that gives chili peppers their distinctive burning sensation), as stimuli, **Julius** was able to identify a “receptor” in the free nerve endings of skin that responds to noxious stimuli causing a burning or pain sensation. Subsequently he proved that this receptor, which he called **TRPV1 (transient receptor potential V1) was an ion channel activated by painful heat (>40 °C)** and low pH. This seminal paper led to the discovery of an entire class of temperature-sensitive TRP ion channels with very high sensitivity and covering a wide range of temperatures, in the mammalian peripheral nervous system. TRPM8 that responds to cold temperatures, and TRPA1 that responds to pungent compounds like wasabi were soon discovered. Besides inflammatory pain, TRP channels were also found to be involved in maintaining core body temperature, neuropathic pain, visceral pain, and protective reflexes. Mutations in genes encoding TRP channels are the cause of several inherited diseases in humans that affect the cardiovascular, renal, skeletal, and nervous systems. TRP channels are potential targets for a new generation of pain killers / analgesic, and for design of unique biosensors for industrial applications.

Patapoutian focused on ion channels that detect “mechanical force.” Using a cell line that gave off a measurable electric signal when individual cells were poked with a micropipette, Patapoutian discovered a single gene whose silencing rendered the cells insensitive to poking. This gene coded for a **new and entirely unknown mechanosensitive ion channel, Piezo1**. Subsequently, a second gene was discovered and named Piezo2 which was expressed at high levels in the sensory

Merkel cells of the skin of mice. Further studies confirmed that Piezo1 and Piezo2 are ion channels that change their shape when the cell membranes they sit within bend in response to a touch or a poke. The change in shape opens the channels, allowing ions to flow across the membrane and generate a signal. The breakthrough by Patapoutian led to a series of papers from his and other groups, demonstrating that the Piezo2 ion channel is essential for the sense of touch, and is critically important in proprioception (sensing body position and motion), and plays a major role in other physiological processes including blood pressure, respiration and urinary bladder control. Mutations in Piezo channels have been shown to cause multiple hereditary human disorders, such as autosomal recessive congenital lymphatic dysplasia, and respiratory distress.

By discovering the molecular transducers underlying the senses of temperature and touch, the 2021 Nobel laureates in Physiology or Medicine increased greatly our understanding of how the nervous system codes sensory information, and allows us to sense the world around us! These identified ion channels are important for many physiological processes and disease conditions in our body.

What a “warm” and “touching” contribution to Biology!

[Compiled by Dr Sheela Donde, Member, Editorial Committee, IWSA Newsletter]

Key references:

1. <https://www.nobelprize.org/prizes/medicine/2021/press-release/>
2. <https://www.nobelprize.org/prizes/medicine/1944/summary>
3. <https://www.ncbi.nlm.nih.gov/books/NBK539861/>
4. *Nature* 1997, DOI: 10.1038/39807 (<https://www.nature.com/articles/39807>)
5. *Nature* 2002, DOI: [10.1038/nature719](https://doi.org/10.1038/nature719); *Cell* 2002, DOI: [10.1016/s0092-8674\(02\)00652-9](https://doi.org/10.1016/s0092-8674(02)00652-9)
6. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3752436/>
7. <https://www.frontiersin.org/articles/10.3389/fcell.2021.611773/full>
8. *J. Physiol.* 134, 47–87 (1956)
9. *Science* 330, 55–60 (2010)
10. <https://doi.org/10.1073/pnas.2121015119>
11. <https://cen.acs.org/people/nobel-prize/2021-Nobel-Prize-in-Physiology-or-Medicine-goes-to-two-researchers-for-their-discovery-of-receptors-for-temperature-and-touch/99/web/2021/10>
12. <https://doi.org/10.1007/s11224-022-01890-7> Review Article

We Salute these Women Achievers

Neena Gupta, Indian Mathematician

Indian Mathematician, Neena Gupta won the 2021 DST-ICTP-IMU Ramanujan Prize for Young Mathematicians from developing countries. The award is administered by the Abdus Salam International Centre for Theoretical Physics (ICTP) alongside the Department of Science and Technology (DST), Government of India, and International Mathematical Union (IMU) and awarded to mathematicians less than 45 years old.

Neena Gupta (born in 1984) is a professor at the Statistics and Mathematics Unit of Indian Statistical Institute (ISI), Kolkata. She graduated with honours in mathematics from Bethune College in 2006 and earned her post-graduation in mathematics from the Indian Statistical Institute (ISI) in 2008. She received her PhD degree also from ISI in 2011 under the guidance of Amartya Kumar Dutta. Her primary fields of interest are commutative algebra and affine algebraic geometry. She received the INSA young scientist award in 2014 for the solution she proposed to the Zariski Cancellation Problem. She received the prestigious Shanti Swarup Bhatnagar Prize for Science and Technology in 2019 in the category of mathematical sciences.

The perception of mathematics as a male domain remains strong and women continue to be underrepresented in not just mathematics, but in other fields of science and engineering also. Hence this award to Prof. Neena Gupta is a significant achievement, and makes us proud.

Since 2012, **National Mathematics Day** is celebrated on **22nd December** every year, on the birth anniversary of one of the greatest Indian mathematicians, **Srinivasa Ramanujan (1887-1920)**. So, this is the best time to bring out some more shining examples of women mathematicians from India, like Professor Neena Gupta, who have carried out ground-breaking research in mathematics and made their mark internationally.

Parimala Raman: Prof. Parimala Raman is known globally for her contribution in the field of algebra and is a recipient of multiple national and international awards, including the Shanti Swarup Bhatnagar Prize for Science and Technology (1987), an honorary doctorate from the University of Lausanne in 1999, and the Srinivasa Ramanujan Birth Centenary Award in 2003, to name a few. She is a fellow of all three Indian academies of science. Well-recognised for her solution to the second Serre conjecture, Parimala's area of research includes algebra with connections to algebraic geometry and number theory. In 2010, she received one of the highest global honours in mathematics when she was chosen as the plenary speaker at the International Congress of Mathematicians. In 2020, the Government of India announced the establishment of 11 Chairs in the names of Indian women scientists at institutes across the country. She is the only living person on the list.

Parimala Raman was born in 1948 and raised in Tamilnadu. She studied at the Saradha Vidyalaya Girls' High School and Stella Maris College at Chennai. She received her M.Sc. from Madras University (1970) and her Ph.D. from Bombay University (1976). For many years, she was a professor at the Tata Institute of Fundamental Research in Mumbai, and she has held visiting positions at the Swiss Federal Institute of Technology (ETH) in Zürich, the University of Lausanne, University of California-Berkeley, University of Chicago, Ohio State, and the University of Paris at Orsay. In 2005 Parimala was appointed the Asa Griggs Candler Professor of Mathematics at Emory University in Atlanta, Georgia. "She has been credited for achieving many firsts in the field, including publishing the first example of a nontrivial quadratic space over an affine plane at a young age — an achievement that is said to have surprised even the experts in the field. She is also credited for several elegant publications often supporting or overturning long-standing conjectures in algebra.

Prof. Parimala Raman enjoys teaching, especially undergraduates who according to her are very enthusiastic. She also looks forward to new research challenges, primarily in algebraic groups, and quadratic forms. "There are many interesting questions that keep my attention," she says. "Math is dynamic, not only internally dynamic, but across disciplines. "She attends conferences aimed at inspiring more female students to focus on math which offers a challenging and rewarding profession.

Sujatha Ramdorai: Prof. Sujatha Ramdorai is an algebraic number theorist, known for her work on Iwasawa theory, a theory developed by Canada Research Chair at University of British Columbia, Canada. She was previously a professor of mathematics at the School of Mathematics, at Tata Institute of Fundamental Research. She is a recipient of the Shanti Swarup Bhatnagar Award (2004) and the ICTP Ramanujan Award in 2006 (the first Indian to win this award) as well. She is also the recipient of the 2020 Krieger-Nelson Prize for her exceptional contributions to mathematics research.

Sujatha Ramdorai was born in 1962, and her attitude towards academics was shaped by her grandmother, who instilled discipline and perfection and also the love for reading. She completed her B.Sc. in 1982 at St. Joseph's college, Bangalore. And her MSc in Mathematics from Annamalai University in 1985. After that she went for PhD at TIFR and was awarded her PhD under supervision of Prof. Parimala Raman in 1992.

She holds an adjunct professorship position at Indian Institute of Science Education and Research, Pune. She is a member of the Scientific Committee of several international research agencies, was a member of National Knowledge Mission, the Prime Minister's Scientific Advisory Council and the National Innovation Council. Working with her husband Srinivasan Ramdorai and Indian mathematics writer V.S. Sastry, Sujatha Ramdorai conceived of and partially funded the Ramanujan Math Park in Chittoor, Andhra Pradesh, which was inaugurated at the end of 2017. The park is dedicated to mathematics education and honours the great Indian mathematician, Srinivasa Ramanujan. She encourages more and more women to pursue science and emphasises the importance of a mentor. In an interview, as a message to young women in India, wanting to start a career in mathematics, she says "For women, a

scientific career perhaps offers more flexibility in combining a career with a family life. I truly feel that there is a whole new world in science waiting to be discovered and claimed by women.”

Considering that she got married before graduation, pursued her Master's degree through correspondence and chanced upon doing PhD because her family moved to Mumbai, the inspiring achievements of Prof. Sujatha really demonstrate this statement.

Mangala Narlikar: A bigwig in the field of mathematics, her interests in the subject range from real and complex analysis, analytic geometry, number theory to algebra and topology. Born in 1943, Narlikar studied from the University of Bombay and received degrees of B. A. (Maths) in 1962 and MA in 1964. She worked in different roles in School of Mathematics, TIFR and abroad. She obtained her PhD from Bombay University in 1981, and after that worked in the University of Mumbai and Pune.

She has contributed immensely to generating interest among laypeople in mathematics through various articles in publications like the Scientific Age, where she would break down concepts in a language everyone could understand. This created an interest in the subject amongst her readers. Her calibre to make children understand Math in a simple yet fun way, led to her involvement in to Balbharti, the Maharashtra State Bureau of Textbook Production & Curriculum Research centre. Not only did she go on to write books but also made concrete changes to the way textbooks are published. The books that she wrote were sold for just Rs 10 so that every child could afford them. As for textbooks, there were more pictures and interactive problems. Appointed chairperson of Balbharti, she made several significant changes in the state vernacular curriculum.

Kavita Ramanan: Kavita Ramanan, a probability theorist, is a professor of Applied Mathematics at Brown University. Born in Chennai, she has a BTech in chemical engineering from IIT Bombay followed by an MSc in Math from the American varsity. She completed her Ph.D. in applied mathematics at Brown University in 1996. Prof Ramanan's academic career has taken her from technical staff at Mathematical Sciences Centre at Bell Laboratories to Associate Professor at the Mathematical Sciences Department of Carnegie Mellon University. She was made the Roland Dwight George Richardson University Professor of Applied Mathematics at Brown University in 2018.

“Prof Ramanan's research interest lies in the field of probability theory, stochastic processes and their applications. She has pioneered new mathematical techniques for the study of networks of randomly evolving interacting processes and the development of tractable approximations that provides insight into a range of random phenomena arising in wireless communications, chemical reaction networks, the spread of diseases, neuronal networks and phase transitions in statistical physics. She has also made fundamental contributions to the theory of large deviations, which allows one to estimate probabilities of rare events and its applications to high-dimensional data analysis and asymptotic convex geometry,” notes the IIT-Bombay Alumni page.

Kavita Ramanan founded the Math CoOp, an outreach group that develops open-access math presentations for students from elementary school to undergraduates. She has been elected as Fellow of many prestigious societies such as American

Mathematical Society, American Association for the Advancement of Science (AAAS), Institute for Operations Research and the Management, the American Academy of Arts and Sciences etc.

There are many more Indian Women Mathematicians who are doing ground breaking research work either in India or abroad. The above-mentioned shining examples will inspire many younger women to discover the exciting limitless world of science waiting for them.

Reference:

<https://en.wikipedia.org/wiki/>

<https://www.thebetterindia.com/269982/national-mathematics-day-srinivasa-ramanujan-trail-blazing-women-neena-gupta-parimala-raman/>

<https://mathwomen.agnesscott.org/women/>

https://www.emory.edu/EMORY_REPORT/erarchive/2009/November/Nov16/r_parimala.htm

<https://www.europeanwomeninmaths.org/sujatha-ramdorai/>



Neena Gupta, Parimala Raman, Sujatha Ramadorai, Mangala Narlikar and Kavita Ramanan

Women Achievers from IWSA

Dr Hameeda Bee, Associate Professor in the Microbiology Department, Osmania University, Hyderabad received the best teacher award from Telengana Government.



Dr. Varsha Dilip Jadhav awarded National Distinguished Researcher Award, 2021 by the International Multidisciplinary Research Foundation




IWSA- BRNS Lectures

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
Smt Chandibai Himathmal Mansukhani College, Ulhasnagar,

Webinar on
Viruses - Our Foes and our Friends too !!

Guest Speaker

Dr. Hemant Dhamne
Head, Vector and CAR-T Process Development & Manufacturing
Immunel Therapeutics Pvt Ltd, Bengaluru

Date & Time
Saturday, 30th Oct 2021
11:00 am
Please join by 10:55 am


Registration link-
<https://forms.gle/3J86Vn2n6aR/817>

Platform - ZOOM
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
Janardan Bhaget Shikshan Prasarak Sanstha's
Changu Kana Thakur
Arts, Commerce and Science College, New Panvel (Autonomous)
Department of Microbiology

Webinar on
Gut Microbiome and its Implication on Human Health

Guest Speaker

Dr. Sahayog N. Jamdar
Senior Scientific Officer,
Food Technology Division, FIPPLY
Bhabha Atomic Research Centre,
Mumbai

Date and Time
Saturday, 30th Oct. 2021
3:00 pm
Please join by 2:55 pm


Link for Webinar
<https://bit.ly/3nz2a7h>

Meeting Platform
Microsoft Teams
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
Department of Microbiology
Gokhale Education Society's N.B.Mehta Science College
Bordi, Palghar

Webinar on
Career Opportunities for Microbiologists in the New Era

Speaker

Dr. Yogesh Shouche
Emeritus Scientist,
National Center for Cell Science (NCCS)
& Principal Investigator,
National Center for Microbial Resources,
Pune

Date & Time
Saturday, 13th Nov. 2021
5:00 pm
Please join by 2:55 am

Webinar link
<https://meet.google.com/mzq-gzpwf-mzxc>

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
Department of Biotechnology
SIES College of Arts, Science and Commerce, (Autonomous)
Sion (W) Mumbai

Webinar on
Global Profiling using Microarrays

Speaker

Dr. Manoj Mahimkar
Associate Professor, HBNI
& Principal Investigator
Cancer Research Institute,
ACTREC, Tata Memorial Centre,
Kharghar, Navi Mumbai

Date & Time
16th Nov. 2021
3:00 pm
Please join by 2:55 pm

Link for Webinar
<https://tinyurl.com/4x6wnhr8>

Microsoft Teams
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
Department of Botany
Ramnarain Ruia Autonomous College, Mumbai

Lecture on
"Strategies to augment plant secondary metabolite production to develop processes and products of commercial value"

by

Dr. G.A. Ravishankar
Vice President & Professor of Biotechnology,
Dayananda Sagar Institutions, Bengaluru.

Day - 15th November 2021, Thursday
Time - 09:00-10:30 AM IST


The session will be held through **Zoom** Registration Details: <https://forms.gle/3J86Vn2n6aR/817>

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
Dept. of Botany
Telangana University,
Dichhapal, Nizamabad, Telangana

Webinar on
Proteomics: Where we are and where we are going

Speaker

Dr. Surekha Zingde
Member, IWSA Board of Trustees,
Vashi, Navi Mumbai
Former Dy. Director, Cancer Research Institute
ACTREC, Navi Mumbai

Date & Time
Wednesday, 24th Nov. 2021
2:00 pm
Please join by 1:55 pm


Link for Webinar
<https://meet.google.com/tpq-wtww-wdf>

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
Department of Microbiology
PTVA's Sathaye College (Autonomous),
Vile Parle (E) Dosti Road, Mumbai

Webinar on
Extraction and Isolation of Commercially Important Phytochemicals

Speaker

Dr. Kirti S. Laddha
Professor of Pharmacognosy and Phytochemistry
Dept. Pharmaceutical Sciences and Technology,
Institute of Chemical Technology, Mumbai

Date & Time
Saturday, 4th Dec. 2021
4:00 pm
Please join by 2:55 pm
Link for Webinar


Join Zoom Meeting
<https://us02web.zoom.us/j/98419640056?pwd=QzR3aWw6TGpRZnZlbnZlc0p0aUo0ZDZkdz09>
Meeting ID: 844 1964 0056
Passcode: 237690

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
Departments of Biotechnology, Biochemistry and Microbiology
R. P. Gogate College of Arts & Science and
R. V. Jogalekar College of Commerce, Ratnagiri

Webinar on
Ageing: Promoting Health and functioning in older persons

Speaker

Dr. Radhika Patil
Head, Department of Physiotherapy,
Jeebhari Hospital, Pune

Date & Time
Monday, 6th Dec. 2021
3:00 pm
Please join by 2:55 pm

Link for Webinar
<https://meet.google.com/wee-tyxj-eeq>

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
Department of Microbiology,
Royal College of Arts, Science and Commerce,
Mira Road, Dist. Thane
Webinar on
Cut, Copy and Paste Genes for Crop Improvement

Speaker
Dr. Ashok Giri
Senior Principal Scientist
Division of Biochemical Sciences
CSIR- National Chemical Laboratory,
Pune.

Date & Time
Tuesday, 7th Dec. 2021
11:00 am
Please join by 10.55 am

Link for Webinar
<https://us06web.zoom.us/j/8881499393>
0070edM1BM28J0g2UW9msh9ST
tYVDRZ209

Meeting ID: 880 1499 7005
Passcode: KKD3P

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
Department of Microbiology,
Jai Hind College of Arts, Science and Commerce,
Churchgate, Mumbai
Webinar on
Cryogenic Electron Microscopy (CryoEM): A Structural Biology Revolution

Speaker
Dr. Janesh Kumar
Scientist E,
Macromolecular Structure & Function
National Centre for Cell Science,
Pune

Date & Time
Thursday, 9th Dec. 2021
3:00 pm
Please join by 2.55 pm

Link for webinar
<https://meet.google.com/vf-sfvc-uff>

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
Department of Engineering Sciences and Humanities,
Thakur College of Engineering and Technology,
Kandivali East, Mumbai
Webinar on
An Overview of Green Hydrogen Economy

Speaker
Prof. Prakash C. Ghosh
Associate Professor
Department of Energy Science and Engineering,
Indian Institute of Technology Bombay, Mumbai, India

Date & Time
Friday: 24th Dec 2021
Reporting Time: 1.45 pm
Session will be held through
Zoom Link

Link for Webinar
<https://bit.ly/3eN1W0V>

Meeting ID: 870 3540 6467
Passcode: 12345

All are cordially invited **Free Registration**

Lasers in Service of Nation

Bhabha Atomic Research Centre
In collaboration with
Indian Women Scientists' Association
Organizes a webinar
Date: 13 Oct 2021

Lectures for School Students

Science Lectures for School Students
Organized by
INDIAN WOMEN SCIENTISTS' ASSOCIATION
Vashi, Navi Mumbai
Supported by Board of Research in Nuclear Sciences (BRNS)-DAE
In association with
St. Mary's High School (S.S.C.)
Sardar Balwant Singh (Dhody Marg, Mazgaon Mumbai)
Webinar on
Introduction to Space Missions
By
Shri. Chintamani Pai
Co-founder Space Geeks, Research Scholar from University of Mumbai in Magnetism and
Photonics with special interest in aerospace and allied technologies

Date & Time
On 8th October 2021 at 2 PM

On Zoom- Meeting ID-820 1959 8496 Passcode- 684333

Science Lectures for School Students
Organized by
INDIAN WOMEN SCIENTISTS' ASSOCIATION
Vashi, Navi Mumbai
Supported by Board of Research in Nuclear Sciences (BRNS)-DAE
In association with
Dr. Pillai Global Academy
Sector-7, Khanda Colony, New Panvel
Webinar on
Between Wastewater to Water
By
Shri. Alok Singh
Wastewater service engineer at A.T.E. Huber Envirotech Ltd., Mumbai

Date & Time
On 12th November 2021 at 10AM

On Zoom- Meeting ID- 635 202 3290

Garden Based Workshops

INDIAN WOMEN SCIENTISTS' ASSOCIATION
&
VIGYAN PRASAR

WASA's Multidisciplinary 'Garden Based Learning' organizes a series of Capacity (Skill) building Workshops

INSECT LIFE: A PEEP INTO THEIR BUSY ROUTINES
Witnessing the busy lives of insects, learning the plant-insect interactions and understanding the art in science

Keynote address by
Dr. Shubhasmita V.
Dramatist & Designer
WASA's Co-ordinator

Ms. Kabe Bagu
Nurturer & Insect Artist
WASA's Project Director

Ms. Ashvini Maron
Creative Designer & Illustrator
WASA's Project Director

Date: Sunday, 17th October 2021
Time: 11am onwards

Registration link:
<https://forms.gle/3333333333333333>

Next: Back to Roots: Biofertilisers and Biopesticides

INDIAN WOMEN SCIENTISTS' ASSOCIATION (WASA)
in collaboration with
VIGYAN PRASAR (VP)

WASA's Multidisciplinary 'Garden Based Learning' organizes a series of Capacity (Skill) building Workshops

Back to Roots: Biofertilisers and Biopesticides

Keynote address by
Dr. Shweta Dande
Reel. You-Principal, St. Xavier's College, Mumbai
Organic Farming: Is it the solution for achieving food security?

Dr. Priyanka Bhatnagar
Postgraduate Scholar
Biofertilisers: Role of bacteria in Farming and Gardening

Dr. Chanshi Patel
Assoc. Professor, Botany
Dr. Babasaheb Ambedkar College, Vashi
Biofertilisers: Biopesticides for Gardens and safety

Date: Sunday, 14th November 2021
Time: 11am onwards

Free Registration link: <https://forms.gle/3333333333333333>

E-certificate on successful participation <https://wasa.net>

Next: Conservation of Seed diversity

INDIAN WOMEN SCIENTISTS' ASSOCIATION (WASA)
in collaboration with
VIGYAN PRASAR (VP)

WASA's Multidisciplinary 'Garden Based Learning' organizes a series of Capacity (Skill) building Workshops

Seeds - the Generation Next
Conserving the diversity
Learn the techniques of harvesting and preserving seeds and technique of video documentation

Keynote address on Biodiversity Conservation
by
Dr. Vipul Kumar Parikh
Asst. Professor, Biotechnology
College of Forestry, Navsari

Traditional methods of Seed selection, propagation, harvesting and conservation

Ms. Vaishali Godgil
Founder - Shaubhat Organics

Documentation through Video

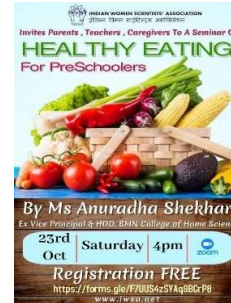
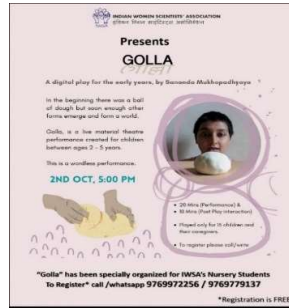
Ms. Farida Pacha
Award winning Documentary Filmmaker
Co-founder, Leaflet Films, Netherlands

Date: Sunday, 28th November 2021
Time: 11am onwards

Free Registration link: <https://forms.gle/3333333333333333>

E-certificate on successful participation <https://wasa.net>

Our Nursery Activities



Christmas creativity



Hostel and Day Care Activities



Independence Day Celebrations
On 15th August 2021



Old Hostellites visit IWSA
Hostel on 14 December, 2021

Science Awareness Activities

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

ACTIVITY NO 3
IWSA - VIPNET CLUB (UID - VP-MH0248)
with
TechShiksha Labs

Title of the activity- Mechanical Robotic Arm

PROGRAM:

- Understanding the mechanics of Robotic Arm
- Children will build Robotic Arm using Cardboard, Screws, Rubber-band and tape.
- They will learn about mechanics and design

Prateek Phadtare
R&D Engineer
TechShiksha Labs

On 12th Oct, 2021
at 3 pm

On Zoom platform-
Meeting ID- 834 6333 8258
Passcode - IWSA/VIP




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

ACTIVITY NO 4
IWSA - VIPNET CLUB (UID - VP-MH0248)

PROGRAM:

1. Preparation of Hand Sanitizer and Room Freshener by Students of New Horizon Public School, Panvel
2. Checking for food adulterants using simple home testing methods
3. Modern methods using hand held spectrophotometers by IWSA members

On 1st Nov, 2021
at 3 pm

On Zoom platform-
Meeting ID- 834 6333 8258
Passcode - IWSA/VIP

Health Care Centre Activities

MLC HEALTH CARE CENTRE
COMMITTED TO
WELLNESS, HEALTH & HAPPINESS

PRESENTS

**Ear Nose Throat-
Our Natural Doorways to Wellness**
By
**Dr. Nalini Bhat (MS ENT)
Head & Neck Surgeon**

On 3rd SEPTEMBER, 2021;
From 4-5 pm

<https://meet.google.com/mec-hyak-ecg>

INDIAN WOMEN SCIENTISTS' ASSOCIATION
MLC HEALTH CARE CENTRE

Workshop on Bone Health
Screening for Osteoporosis

Purpose

- Assess Bone Mineral Density
- Evaluate risk of osteoporosis
- Prevent fractures

Who are at risk ?

- Postmenopausal women
- Older adults (Females and Males)
- Sedentary lifestyle

Strengthening Exercises By
Dr. Nabha Deshpande
Physiotherapist
For Details Contact:
91671766 36

Guest of Honour
Dr. Manish Sontakke
Consultant Orthopaedics
Bone & Joint Surgery
Fortis Hospital, Vashi

Date: November 21st, Sunday
Screening: 1:30 pm - 4:00 pm
Venue: IWSA Complex
Sector 10A, Vashi

Spot Registration: 150/-

VACCINATED

Computer Centre Activities

Indian Women Scientists' Association (IWSA), Navi Mumbai
Celebrates 30 years
 OF THE SATISH HAWARE COMPUTER EDUCATION CENTRE (CEC)
Virtual Programme
 International webinar on the theme "Changing Face of Digital Era" followed by a panel discussion on "Women in Computer Science - Then and Now".
20th SEPTEMBER 2021, SUNDAY
 9:00 AM TO 1:00 PM

KEYNOTE SPEAKERS

EMINENT SPEAKERS

Ms. Lalitha Mahajan
 Professor, K. J. Somaiya Institute of Technology, Mumbai

Dr. Aditi Sen De
 Professor, Department of Computer Science, Pimpri Chinchwad Education Trust, Pimpri, Maharashtra

Dr. Rajesh Ingle
 Professor, IIT, Pune

Contact for further details: iwsa.computercentre@gmail.com

INDIAN WOMEN SCIENTISTS' ASSOCIATION
<https://iwsa.net>

Member Enrichment Talk on "Libraries in the Digital Age"
 organised by
 Pirojsha Godrej Public Library, Satish Haware Computer Education Centre and Learning Garden Living Museum

Speaker: Ms Tasneem Gadiwala
Head - KMLC & HiFi Library
 Date: Wednesday, 6th October 2021
 Time: 3.00p.m. to 4.00p.m.
Meeting link:
<https://meet.google.com/mni-corc-eqi>

Activities from our branches

Amravati Branch

विद्याभारती शैक्षणिक मंडळ, अमरावती संमिलित
विद्याभारती महाविद्यालय, कॅम्प, अमरावती
 प्रतिभा विमिन्स स्टडीज सेंटर, राष्ट्रीय छात्र सेना एवं इंडियन विमिन्स साइंटिस्ट असोसिएशन अमरावती शाखा के संव्ययनमे
राष्ट्रीय कव्या दिवस के उपलक्ष में
 आयोजित
ऑनलाईन व्याख्यान
विषय :- स्त्री सशक्तीकरण
दि. 25 सितंबर 2021
समय :- दोपहर 12.30 बजे
कार्यक्रम में बुद्धि हेतु विमिन शक्ति विकसित करके का उपयोग करें -
<https://vhsn.webex.com/vhsn/j.php?MTID=m1720fa91d54a029d4e54a958a3470c5>
मार्गदर्शिका
मेजर संतोष भंडारी (रिट.)

Bengaluru Branch

Popular Science Lecture (for College Students & Faculty)
 Organized by
Indian Women Scientists' Association,
 Supported by Board of Research in Nuclear Sciences (BRNS)-DAE
 In association with
Department of Life Sciences,
Padmashree Institute of Management and Sciences
 #149, Padmashree Campus, Tavarekere- Kengeri Road Kommagatta, Kengeri, Bengaluru, Karnataka 560060

Webinar on
Title: Advances in Glass Science -Technology : Impact on Society and prospects for Women
 by Speaker
Dr. K. Annapurna
 Sr. Principal Scientist,
 CSIR-Central Glass and Ceramic Research Institute, Kolkata
Date: 20th November 2021
Time: 11 Am

Registration is Free. [click here to register.](#)

JOIN US LIVE ON

Website: padmashree.org / WWW.pims.org.in

Hyderabad Branch

IICHE Council Elections 2022-24, South Zone,
Candidate Bio - Mrs. Sheela LMR 10864
<https://www.iiche.org.in/>

Chairperson, Soverniti Committee, CHEMCON 2020
Chairperson, Hyd. Regional Chapter (HRC) 2017-19 & 2014-16
HRC awarded Best Center Award 2018-19
Executed C&M Monthly Memorial Award, CHEMCON-2017
Organized training for Dr. Reddy's Staff
IICHE HRC: Set Industry Standards

First Lady Engineer at NFC
First Lady to be DCE, NFC
Retired as Outstanding Scientist, Designated Dy. Chief Executive, NFC
Headed various sectional groups like
Environment & Special Materials & Economic Complex, Patancheru
Safety Fuel Fabrication
Chairperson, Nickelium Thermal Production Facility (NTPF)
NFC Women's Cell President (Over 10 years)
NUPCOA (Officers Association) President
Over 80 Papers presented nationally & internationally

Kalpakkam branch

Indian Women Scientists' Association
Kalpakkam Branch

Sponsored by: Board of Research in Nuclear Sciences, DAE

APPLICATIONS OF IONISING RADIATIONS
 Dr. M. Manohari
 Senior Secretary
 IGCAR
 Kalpakkam

28 October 2021, Thursday

10:30 a.m. at Hindustan College, Kelambakkam, TN
MS Teams platform: <https://teams.microsoft.com/join/92334044100>
Meeting ID: 92334044100
Meeting Passcode: 92334044100
Meeting Link: <https://teams.microsoft.com/join/92334044100?context=92334044100>

Branch

7th August, 2021



Distribution of food and other essentials to tribals



11th October, 2021



21st November, 2021
Health Awareness Camp

Technical talks

Dr. Padma S Kumar
Convener
Dr. Anita Toppo
Secretary,
Dr. S.C. Vanitha kumari
Joint Secretary
Dr. M. Manohari
Treasurer

Members
Dr. Veena Subramanian
Dr. B Sasi
Dr. Gurpreet Kaur
Smt. Padmapriya Selvakumar
Smt. K. Shivakamy
Smt. Anusha Thati
Dr. P. Vineetha
Smt. Kar Adwitya
Smt. Jemimah Ebenezer
Ms. Annie Jessila
Smt. D. Gomathi
Smt. R.M. Nachammal
Smt. Nibedita Samantha
Dr. S. Kalavathi

**Indian Women Scientists' Association
Kalpakam Branch**

Technical Talk
On The Topic
Development of plasma sprayed Yttria coating with suitable interlayers on High Density Graphite for Uranium melting Applications

Ms. B. Madhura,
Senior Research Fellow
ACPS/CSTD/IGCAR

Date: 29th September, 2021 Time: 14.30 hrs
Vi-meet: Meeting ID: 202109_62
Login Password: Ncrus7dc

All are cordially invited

URL: <https://vimeet.igcar.gov.in/>
Procedure to join the meeting is available at <https://vimeet.igcar.gov.in/inst.html>.
Recommended Browsers: Google Chrome (version 75 and above), Chromium (version 75 and above) or the latest Microsoft Edge

Dr. Padma S Kumar
Convener
Dr. Anita Toppo
Secretary,
Dr. S.C. Vanitha kumari
Joint Secretary
Dr. M. Manohari
Treasurer

**Indian Women Scientists' Association
Kalpakam Branch**

Technical Talk
On The Topic
**Immune Transition in Human Life
Defending with Covid19**

Dr. S. Yamini Sudha Lakshmi,
Assistant Professor, Dept of Medical Biochemistry,
University of Madras, Taramani Campus, Chennai

Date: 29th October, 2021 Friday Time: 14.30 hrs
Vi-meet: 202110_76_3
Login Password: enqrKvpF

All are cordially invited

Kolhapur Branch

WIDYAN MAHAVIDYALAYA, Sangola
WDAE: An Affiliated Institute of WDAE

**Indian Women Scientists' Association
Kolhapur Branch**

Today's Youth & Nutrition !
A Webinar on the occasion of National Nutrition Month.

Date : Thursday, 16th Sept 2021
Time : 11a.m

Guest Speaker
Dr. Suparna Kelkar
Pediatrician

Chief guest - Dr. Raghunath Fule
Acting Principal,
Vidnyan Mahavidyalaya,
Sangola

Link will be shared 15 mins before the program.

Mrs. Deepali Taywade Patil Convener
Dr. Seema Gaikwad Co Convener
Dr. Mrunaini Desai Secretary
IWSA Kolhapur

Floral School
Organizing an Online Certificate Workshop

Flower Festival
Flower Festival invites you to register for Floral School to learn the classical flower arrangements from senior experts and to understand the skills through systematic concepts in different floral designing. This school will guide you to understand flower arrangement styles through online presentations and live demonstrations.

Class I : 28th & 29th October, 2021
Class II : 26th & 27th November, 2021
Time : 02:00 to 04:00 pm IST | Platform : Google Meet

Resource Persons :

- Suniti Deshmukh
- Chand Kejriwal
- Ilita Shinde

Registration fees:
Rs. 300/- (for Participants)
Rs. 200/- (for Club Members)

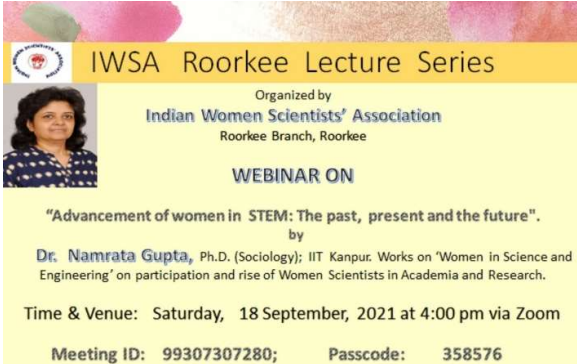
Online payment:
Pay +91 98233 56005

Registration form:
<https://forms.gle/3hT>

Last date of registration:
27th October, 2021 (11:55 pm)

For enquiries Contact on:
+91 9164 24560
Dr. Sharmada Patil
+91 80070 16919
Dr. Pooja Kulkarni

Roorkee Branch



IWSA Roorkee Lecture Series
Organized by
Indian Women Scientists' Association
Roorkee Branch, Roorkee

WEBINAR ON

"Advancement of women in STEM: The past, present and the future".
by
Dr. Namrata Gupta, Ph.D. (Sociology); IIT Kanpur. Works on 'Women in Science and Engineering' on participation and rise of Women Scientists in Academia and Research.

Time & Venue: Saturday, 18 September, 2021 at 4:00 pm via Zoom

Meeting ID: 99307307280; Passcode: 358576



IWSA Roorkee Lecture Series

Organized by

Indian Women Scientists' Association

Roorkee Branch Roorkee

Webinar on

Artificial Intelligence Vs Natural Intelligence

by

Dr. Shilpi Saxena, Postdoctoral Research Scientist, Department of Hydrology, IIT Roorkee.

Date, Time & Venue: 17th December 2021 (Friday) at 3:30pm via Google Meet

To join the meeting on Google Meet, click this link: <https://meet.google.com/cpe-yneb-zoi> Or open Meet and enter this code: [cpe-yneb-zoi](https://meet.google.com/cpe-yneb-zoi)



To

From

IWSA Head Office

Plot No.20, Sector 10A

Dr. Mar Theophilus Road, Vashi

Navi Mumbai: 400703

Tel: 27661806,

Email: iwsahq@gmail.com

Website: www.iwsa.net

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