

**SIES COLLEGE OF ARTS, SCIENCE AND COMMERCE (AUTONOMOUS),
SION WEST, MUMBAI - 400 022**

DEPARTMENT OF BIOTECHNOLOGY

A. Title of the Internship:

IWSA-SIES Internship Program for undergraduates

B. Background:

Online Internship Program for college students is an initiative taken up by Indian Women Scientists Association to promote Science Education. The TYBSc Biotechnology practical curriculum has a mandatory skill-based laboratory research project which the Covid-19 pandemic had impacted. To compensate, we approached IWSA for collaboration with SIES to conduct an internship program with biotechnology students.

C. Aims/Objectives:

The main objective of the internship was to enable the students to:

1. Design simple experiments that could be executed even at home
2. Opportunity to interact with current and retired research scientists
3. Introduce them to SnapGene - molecular biology simulation technique
4. Present the internship project data in the form of e-poster
5. Organise various guest lectures
6. Develop soft-skills

D. Location:

IWSA mentors interacted with the students on an online platform (MS Teams & Google meet). Some part of the internship project was also executed in the laboratory at the Department of Biotechnology.

E. Target audience/participants with expected number:

31 undergraduate students (25 TY and 6 SY) participated in the internship programme

F. Details of Sessions: The session was held from 18th November -18th December 2021
The students were divided into 6 groups mentored by IWSA members:

| Gr. No. | Title of Project | Students Name | IWSA Mentors |
|----------------|---|---|---|
| 1. | Carbon footprint and climate change | Aditya Ravi Shetty, Ali Ahmed Tofikh Sheikh, Amatul Rehman Shaukat Pathan, Shilpa Sivadas, Bhagyashree Ramachandra Gubber | Dr. Sheela Donde, Vijaya Tilak, Sweedle Shivkar, Dr. Umashankari |
| 2. | Colouring of Food and Fabric using Plant-based Natural Dyes | Niveditha Narayanan Narayanan, hanisha Pradeep Mohapatra, Diksha Gajanan Shetti, Jyothika Murugan, Kajol Maruti Satale | Dr. Srirupa Mukherjee, Dr. Maitrayee Paul, Ms. Vijaya Chakravarty, Archana Rath |
| 3. | Use of plants to produce ethanol as alternative fuel for petrol | Liza Peter Fernandes, Manali Shailesh Pradhan, Tamanna Timir Mandal, Misba Mohd Farid Shaikh, Sneha Anbalagan Dever | Dr. Niranjana Chavan, Dr. Paramjit Anthappan, Dr. Abhishek Mule |
| 4. | Bioremediation of wastewater by microbes | Chirag Mansukh Kothari, Omkar Vijay Yadav, Pavitra Dinesh Rai, Sanika Prassanna Rai, Manasa Ramalingaiah Avanganti | Dr. Nancharaiah, Dr A Padmavathi, Dr G Kiran Kumar Reddy, Shyamala Bharadwaj |
| 5. | Use of kitchen waste as an alternative media for growth of yeast | Siddharth Kumreshan Mudliyar, Noel Cheriyan, Anushka Anant Padmanabhan, Vignesh Kumreshan Mudliyar, Karina Dilawar Shaikh | Renu Minda, Dr. Suparna Kamath, Dr. Paramjit Anthappan, Darshana Raut, Sunita Singh |
| 6. | Evolution of microscopes with microbiology and biotechnology research | Aditi Prakash Rao, Bhavi Paresch Mashru, Neha Sandeep Gaonkar, Shruti Nilesh Parmar, Vaidehi Arvind Singh, Manika Anil Sawant | Dr. Lalitha Dhareshwar, Dr. Devaki Ramanathan, Dr. Shubhada Nayak, Dr. Suparna Kamath |

The internship also had a common project on Snapgene mentored by **Dr. Akhilesh Chaurasia, Bioponics, School of Medicine, Sungkyunkwan University, South Korea**

| Gr. No. | Title of Project | Students Name |
|---------|--|--|
| 1. | <i>Lactococcus lactis</i> integrated expression vector construction for steady and improved synthesis of Short-chain fatty acids | Aditya Ravi Shetty, Ali Ahmed Tofikh Sheikh, Amatul Rehman Shaukat Pathan, Shilpa Sivadas, Bhagyashree Ramachandra Gubber |
| 2. | Identification and Validation of an Antivirulence Agent Targeting SlyA-regulated Virulence in uropathogenic <i>Escherichia coli</i> | Niveditha Narayanan Narayanan, hanisha Pradeep Mohapatra, Diksha Gajanan Shetti, Jyothika Murugan, Kajol Maruti Satale |
| 3. | Rapid and efficient genome editing in <i>Staphylococcus aureus</i> by using an engineered CRISPR/Cas9 system | Liza Peter Fernandes, Manali Shailesh Pradhan, Tamanna Timir Mandal, Misba Mohd Farid Shaikh, Sneha Anbalagan Dever |
| 4. | In-silico design and simulation of genome-integrated orthogonal drug screening platform for the identification of anti-virulence agent by targeting a master virulence regulator in <i>Vibrio vulnificus</i> | Chirag Mansukh Kothari, Omkar Vijay Yadav, Pavitra Dinesh Rai, Sanika Prassanna Rai, Manasa Ramalingaiah Avanganti |
| 5. | Marker-less Deletion of melA gene in <i>Lactobacillus plantarum</i> using Cre-lox system | Siddharth Kumreshan Mudliyar, Noel Cheriyan, Anushka Anant Padmanabhan, Vignesh Kumreshan Mudliyar, Karina Dilawar Shaikh |
| 6. | Construction of Promoter-probe Vector for the Assessment of Divergent Promoters in Bacteria | Aditi Prakash Rao, Bhavi Paresh Mashru, Neha Sandeep Gaonkar, Shruti Nilesh Parmar, Vaidehi Arvind Singh, Manika Anil Sawant |

G. Session and names of Resource Persons:

The internship program also had guest lectures delivered by various eminent speakers:

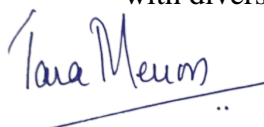
| Sr. No. | Title | Speaker & affiliation |
|---------|--|--|
| 1. | Pathways to Decarbonizing Indian Transportation: Synergies Between Technology and Behavior | Dr. K. Shankari <i>Post-Doctoral Director's Fellow, Center for Integrated Mobility Sciences, National Renewable Energy Laboratory (NREL), USA</i> |
| 2. | Microbes in Waste-water Treatment and Bioremediation | Dr. Y.V. Nancharaiah <i>Scientific officer H, Head, Biofouling and biofilm processes section, WSCD chemistry group, BARC, Kalpakkam, India</i> |
| 3. | Yeasts: An Industrial Perspective | Dr. Anuradha Chitnis <i>Senior Scientist 1, Advanced enzymes technologies Ltd., Mumbai, India</i> |
| 4. | Optical Tweezers: The Force of Light in Making Revolution in Micromanipulation | Dr. Shovan Kumar Majumder <i>Senior Scientist, Raja Ramanna, Center for advanced technology, (RRCAT), Professor at Homi Bhabha National Institute (HBNI)</i> |
| 5. | Fundamentals of GHC Accounting & Reporting | Ms. Janjri Jasani <i>Deputy Director, Centre for Environmental Research and Education (CERE), India</i> |

H. Expected outcome:

The internship program is awaiting the release of booklets on:

- 'Journey into the microscope' - a booklet designed for 9th grade student to introduce them into the world of microscopy
- 'Change the climate change' - a booklet designed for illiterate and pre-school childrens to introduce them to the concept of climate change
- 'Tales of Blossom' - a DIY for entrepreneurs, housewives and students

The feedback of participants stated that they received hands-on experience which they lacked due to the pandemic. Many skills were learnt during the course of this internship such as multitasking, communicating, presenting the data effectively, learning to deal with diversity of opinions, and dealing with deadlines.



Dr. Tara Menon
Co-ordinator
Department of Biotechnology

18.12.2021

Annexures 1: Detail of the Resource persons for guest lectures

- **Dr. K. Shankari** has done B.E. in computer Engineering from VESIT, University Of Bombay. She completed her Masters in computer science from the University of California, Santa cruz. She completed her PhD in electrical engineering and computer science from University of California Berkeley. She started off her career as a software engineer And she is now a Postdoctoral director's fellow at National renewable energy laboratory (NREL), USA. She has published many papers in various different fields like transportation, tackling climate change, energy efficient buildings, cities and many more. She has influenced the science community by delivering talks on topics like Energy Efficiency, Green transportation, Urban planning, and others. She has mentored UG students through programs like SULI, SUPERB-ITS, URAP and others. She is the creator and primary maintainer of OpenPATH- An open source, extensible platform that empowers communities to collect their own travel data. She has been the Team leader and service delivery manager at VMware and Open Harbor. With the objective of giving back to the society she is involved in Community services and currently is a member of City of Mountain view's bicycle pedestrian advisory committee which was established to address a variety of issues associated with promoting a safe and positive environment for bicyclists and pedestrians in Mountain view including transportation safety and access.
- **Dr. Y.V. Nancharaiiah** is a Scientific Officer H at WSCD, BARC. He joined BARC through 38th batch training school after completing M.Sc in biochemistry. Sir obtained Ph.D. in biochemistry from Madras University. He did his post-doctoral fellowship at UNESCO-IHE, Netherlands, using the Marie Curie Experienced Research fellowship (2014). He was a visiting researcher at the Technical University of Munich, Germany (2001-2002), Brookhaven National Laboratory (2009), and Arizona State University (2010). He was awarded the Coveted DAE Homi Bhabha Science & Technology Award (2017), the ASM visiting professorship award (2009), and Indo-US Science and technology fellow award (2009). He has authored more than 100 research papers in peer-reviewed journals with about 4200 citations and H-Index of 37. His research interests include biofilms, biofouling control, microbial granules, wastewater treatment, and bioremediation.
- **Dr. Anuradha Chitnis**, a Senior Scientist at Advanced Enzyme Technologies Ltd. completed her bachelors and masters degree in life science from Ramnarian Ruia college, Mumbai and PhD in biotech from Institute of Chemical Technology, Matunga, Mumbai. She embarked her career as a research scientist at advanced enzyme technologies ltd. Mumbai and successfully developed Immobilized Lipase products and generated extensive application data for various products. She provided R&D support for grain processing and ethanol production applications and established the 'Chromatography lab' and team for HPLC and GC analysis of biomolecules. She then continued as a team leader and led the team for projects on enzyme formulations for food processing, characterization of the enzymes, application development and transfer of methods and technology to industrial partners and the team for screening 'enzyme candidates for scale-up' from variant libraries developed by protein engineering team and lastly Led the team for analysis of biocatalytical reactions in API synthesis. Dr.

Anuradha was also a part of core team for regulatory fillings of enzymes as processing aid for FSSAI (India), GRAS (US), EFSA (Europe), FSANZ (Australia, New Zealand) and Technical expert to the marketing team for providing inputs for customer value proposition, new business opportunities, competitor intelligence. Provided training to internal and customer teams for enzyme deployment in industrial processes.

- **Dr. Shovan Kumar Majumder** is a senior Scientist at Raja Ramanna Centre for Advanced Technology (RRCAT), a unit of Department of Atomic Energy and Professor at Homi Bhabha National Institute (HBNI), a deemed to be university of Department of Atomic Energy. Presently, he heads the Laser Biomedical Applications Division at RRCAT. Dr. Majumder received his graduate and postgraduate degrees in Physics from Jadavpur University, Kolkata. After successful completion of a one-year Orientation Course from the Bhabha Atomic Research Centre (BARC) Training School, Mumbai, he joined RRCAT in 1992. Dr. Majumder received his Ph.D. degree from the Devi Ahilya Vishwavidyalaya (DAVV), Indore for his work on the use of *Optical Spectroscopy for Cancer Diagnosis*. He worked as a Visiting Scientist at Vanderbilt University, USA where he did his post doctoral work. Dr. Majumder's research interest primarily is in the area of bio-photonics i.e. development and evaluation of photonics based techniques for solving the problems of biology and medicine. His extensive research not only led to the development of a variety of new techniques required for advancing the applications of optical spectroscopy for biomedical diagnosis, but also made it possible to perform non-invasive screening of oral neoplasia and automated diagnosis of tuberculosis in resource-limited clinical settings using photonics-based point-of-care instruments developed in his group. Dr. Majumder has over 100 papers in peer reviewed journals and edited volumes and more than 150 papers in conferences and symposia. He has delivered innumerable invited talks both home and abroad. Dr. Majumder is the recipient of several awards which include "*Homi Bhabha Science and Technology Award*" of the Department of Atomic Energy, "*Raman Bhagat Memorial Award of Excellence*" of Cancer Care India, "*Swargiya Dadasaheb Kalmegh Smruti Award*" of Indian Dental Association, two "*Group Achievement Awards*" of Department of Atomic Energy, "*Young Physicist Award*" of the Indian Physical Society, "*IPG Eminent Scientist Award*" of the IPG Innovative Pharmacist Group, "*The Excellence Award*" of the Rotary Club among others.
- **Ms. Janjri Jasani** graduated from the University of Edinburgh with an MSc. in Environmental Protection and Management and is currently working with the Centre for Environmental Research and Education (CERE) as the organisation's Deputy Director. Her interests centre on Climate Change science, sustainable development & urban solutions to environmental issues and she developed CERE's Carbon Map & Cap TM program to help companies facilitate a green transition and develop a climate mitigation strategy. She is also interested in the role environmental education and systems thinking can play in facilitating solutions to local and global environmental issues. Since leaving school she has been a collegiate level fencer, programmed her own radio show – Lotus Beat, and has co-authored several books related to environmental education. Janjri has also attended DISHA, a UK-India

program on leadership and is in the LEAD India fellowship program. Apart from being an active environmentalist, she also loves to teach and has been a regular guest lecturer at St. Xavier's college in Mumbai and a part of the Youth Leading Environmental Change (YLEC) program. In her free time, she loves to read, hang out with her pet Beagle – Lenny and watch educational YouTube videos on science, physics and astronomy. She is also an avid traveller and adventurer and has been certified as a PADI open water diver.

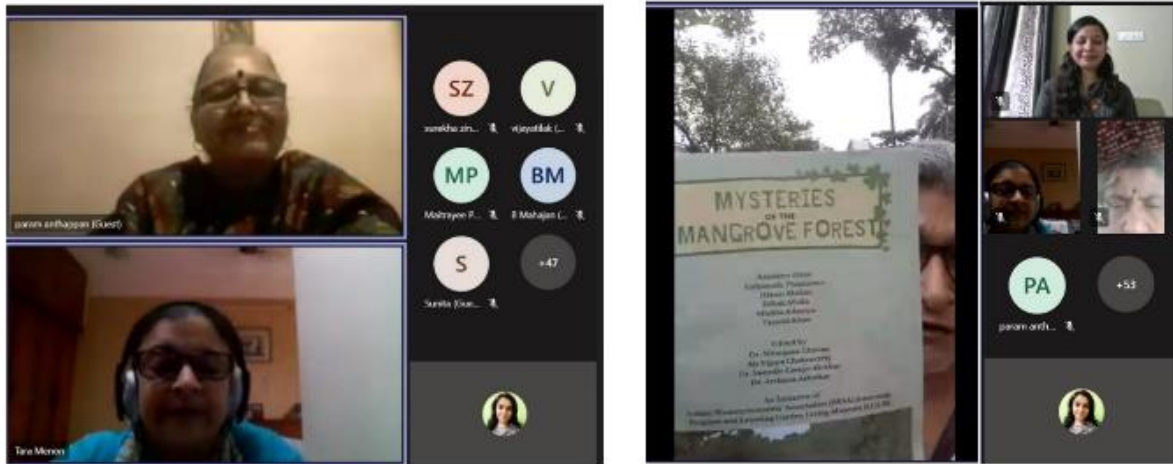
Annexures 2: List of Participants

| Sr. No. | Student Name |
|----------------|--------------------------------|
| 1 | Aditya Ravi Shetty |
| 2 | Ali Ahmed Tofikh Sheikh |
| 3 | Amatul Rehman Shaukat Pathan |
| 4 | Anushka Anant Padmanabhan |
| 5 | Bhagyashree Ramachandra Gubber |
| 6 | Chirag Mansukh Kothari |
| 7 | Dhanisha Pradeep Mohapatra |
| 8 | Diksha Gajanan Shetti |
| 9 | Jyothika Murugan |
| 10 | Kajol Maruti Satale |
| 11 | Karina Dilawar Shaikh |
| 12 | Liza Peter Fernandes |
| 13 | Manali Shailesh Pradhan |
| 14 | Manasa Ramalingaiah Avanganti |
| 15 | Misba Mohd Farid Shaikh |
| 16 | Niveditha Narayanan Narayanan |
| 17 | Noel Cheriyan Cheriyan |
| 18 | Omkar Vijay Yadav |
| 19 | Pavitra Dinesh Rai |
| 20 | Sanika Prassanna Rai |

| | |
|----|------------------------------|
| 21 | Shilpa Sivadas |
| 22 | Siddharth Kumreshan Mudliyar |
| 23 | Sneha Anbalagan Dever |
| 24 | Tamanna Timir Mandal |
| 25 | Vignesh Kumreshan Mudliyar |
| 26 | Aditi Prakash Rao |
| 27 | Bhavi Paresh Mashru |
| 28 | Neha Sandeep Gaonkar |
| 29 | Shruti Nilesh Parmar |
| 30 | Vaidehi Arvind Singh |
| 31 | Manika Anil Sawant |

Annexures 3: Photographs of Seminar/Workshop

- Orientation Program held on 17th November 2021 over MS Teams



- Peer-review held on 14th December 2021

There Are No Passengers On Spaceship Earth. We Are All Crew.

CLIMATE CHANGE AND CARBON FOOTPRINT

TWSA Mentors
 Dr. Shirela Dandekar
 Dr. Sweedle Shivkar
 Ms. Vijaya Tilak
 Dr. Umashankari
Faculty Mentor
 Dr. Subi Yousaf

Students
 •Aditya Shetty
 •Ali Ahmed
 •Amatul Pathan
 •Bhagyashree Gubber
 •Shilpa Srivadas

WEEK 2
Carbon footprint calculation

ONLINE CALCULATORS
<https://www.carbonfootprint.com/calculator.aspx>
<https://depts.washington.edu/lizsa/iscl/cfpcalc.php?version=full>
 Many more.....

MANUAL CALCULATIONS
 We manually calculated our personal carbon footprints by adding carbon emissions of daily activities

CALCULATION:

For electricity consumption,
 $CO_2e = 0.82\text{kg of } CO_2e \text{ per kWh of electricity}$

Electricity consumption = 150 units
 Therefore, carbon footprint of electricity consumption =
 $\text{Units of electricity consumed} \times CO_2e$
 $= 150 \times 0.82$
 $= 123\text{kg of } CO_2e \text{ per month.}$
 $= 1476 \text{ kg of } CO_2e \text{ per year.}$
 $= 37 \text{ trees}$
 (Approx. 25 trees can offset 1 tonne CO_2e)

Colouring of food & fabric using plant-based natural dyes

GROUP 2

Mentors
 Mr. Dhanashri Mohapatra
 Ms. Divisha Shetti
 Ms. Jyoti Manjappa
 Ms. Kapsi Sakale
 Ms. Nivedita Narayanan

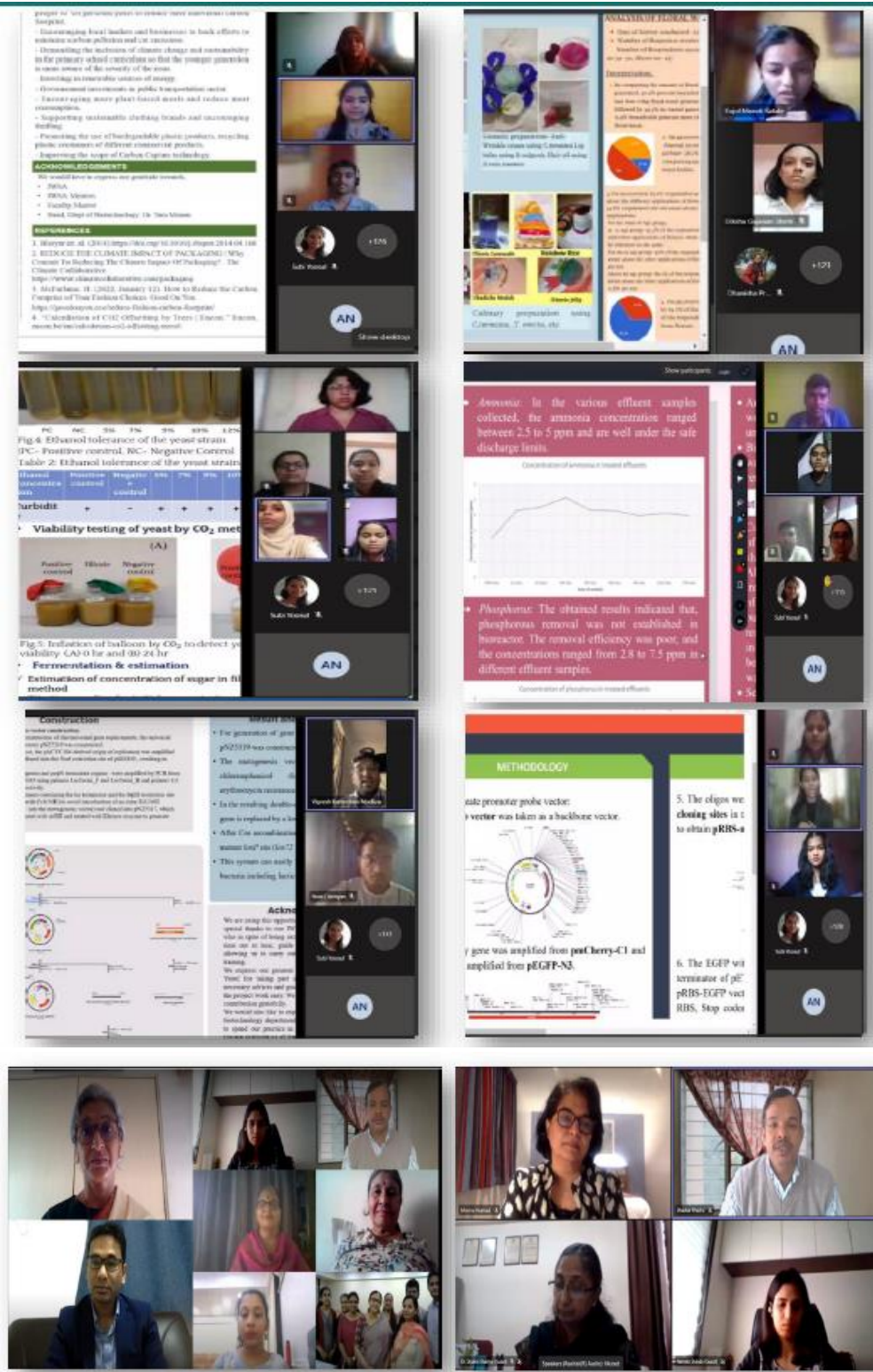
Teacher in-charge
 Mrs. Anu Anand Junes

The healing power of flowers:

| Marigold | Hibiscus | Clitoria |
|---|--|---|
| <ul style="list-style-type: none"> Can cure venous & varicose veins Anti-inflammatory & promotes wound healing for stabwounds | <ul style="list-style-type: none"> Strengthens hair roots Lowers body temperature, treat heat & nerve diseases | <ul style="list-style-type: none"> Memory enhancer, nootropic. Tranquilizing and sedative agent |

A grid of four video feeds showing participants in a Zoom meeting. The participants are identified by names: Kapil Anand Gunde, Bhavika Manjappa, Bhavika Pathan Mahapatra, and Subi Yousaf. There are also icons for AS, JM, and DR.

- E-poster presentation held on 22nd January 2021





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18.12.2021