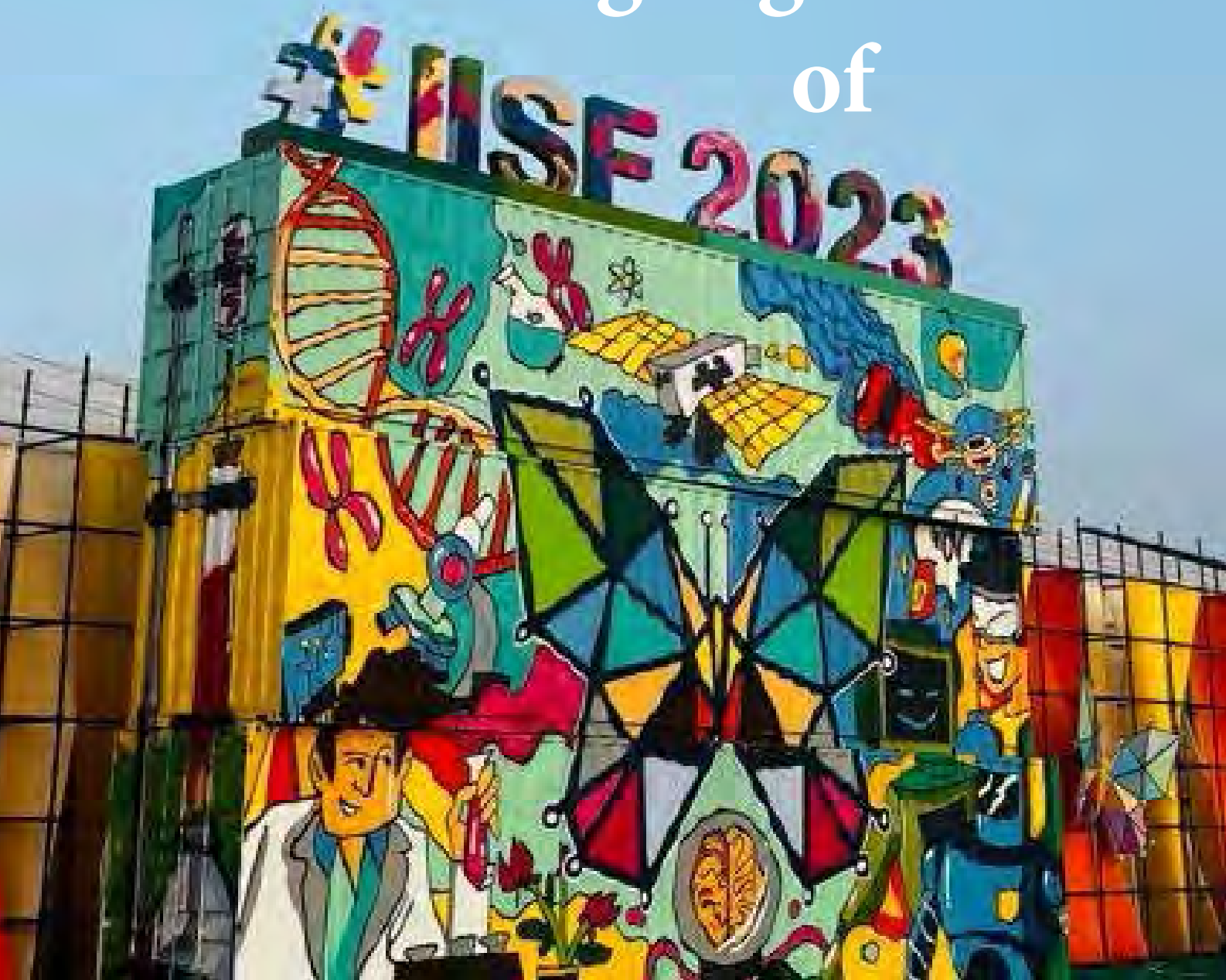


Volume 11 | Issue 126 | January 2024
ISSN: 2454-6968

e-copy - Rs. 50 | Print - Rs. 800

BIOTECH EXPRESS

Highlights
of



7th International Conference on Plant Genetics and Genomics

GM CROPS AND GENOME EDITING

Promoting Agrobiodiversity Use for Sustainable Agricultural Development



CONFERENCE CHAIR

PROF KC BANSAL

Former Director
ICAR-NBPGR
New Delhi, India



CO-CHAIR

DR V CHINNUSAMY

Joint Director (Res.)
IARI (ICAR)
New Delhi, India



FEBRUARY 16-17,
2024



NASC Complex, Pusa,
New Delhi, India

Conveners



KUTUBUDDIN A MOLLA
Scientist
ICAR-NRRI, Cuttack, India



RITA SHARMA
Associate Professor
BITS, Pilani, India



AJAY PANDEY
Scientist-F
DBT-NABI, Mohali, India



GINNY ANTONY
Assistant Professor
CU-Kerala, India

CONFERENCE THEMES

- Genomics of Genebank Accessions
- Efficient Use of Natural Resources: Land, Water, Nitrogen
- Reduced Dependence on Agro-chemicals
- Adaptation to Climate Change
- Multiple Stress Resistance: Biotic and Abiotic stresses
- Genetic Improvement of Millets for Nutrition and Climate Resilience

REGISTER NOW

7696225050
8289015050

Scan for Website



f.zainab@glostem.com
s.kanwar@glostem.com

SUBMIT YOUR ABSTRACTS NOW !

Present your work and get a chance to win **Best Poster Presentation Award**, comprising of Cash Prize & Certificate.





DELIVERING EXCELLENCE TO THE WORLD OF SCIENCE & TECHNOLOGY

About us

We serve the fraternities of science & technology by organizing technical events, providing marketing services, technical consultancy and customer lead generation in various scientific fields for over a decade.

- Pharmaceuticals
- Biotechnology
- Agriculture
- Environment
- Diagnostics
- Clinical Trials

Our Services



Lead Generation

Instruments, Products, and Services - Promotion to Scientific Communities & Lead Generation



Conference Management

Website, Registration, Abstract Management, Exhibition, Event Promotion, Designing & Printing, Conference Aids



Regulatory Affairs

Dossier Preparation, CTD/eCTD Submission, Lifecycle Management, Regulatory Strategies

Contact us



9041725050
8289015050



s.kanwar@glostem.com
f.zainab@glostem.com



www.glostem.in

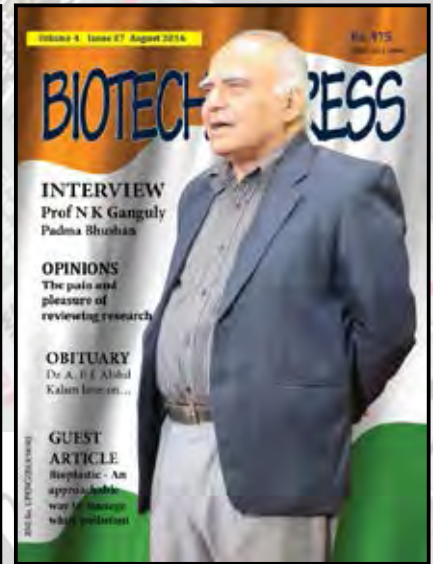
About Biotech Express

Biotech Express the world's only Biotechnology print and digital magazine (other than journal) is periodical that publishes every month since August 2013. It was started by Kamal Pratap Singh, who left PhD (though he had CSIR JRF) because of the prevailing situation of job security. Biotech Express then got attention of many stalwarts of the field like Prof Kambadur Muralidhar who is regarded as pioneer of science communication and science ethics in India, Prof Ashok Pandey, Prof Pallu Reddanna to name a few.

Biotech Express tries to publish facts and figures of the field that are not available anywhere through various headings like Editorials, Guest Articles, Reports, Views and Interviews, Correspondence, Comments, Current News, Research Highlights and Conferences, Events, Jobs, Research Proposals, startup story, retractions in the field of Biotechnology and allied sciences like Plant Biotechnology, Microbiology, Biochemistry, Neurology, Genetics, Medical Sciences etc.

Biotech Express is now managed by team of dedicated research and management professionals of Life Sciences who believe in the promotion of science to general public. All in all Biotech Express is the only magazine that you would find on your desk or in library that can provide you upto date knowledge and skill enhancement techniques which can boost your career. If you are a leader then you can help your peers by recommending this magazine to library and if you are still a student you can always contact us for any kind of support.

We know that magazine is little costly but when it comes to worth you will find that the quality of book and content you get is much more valuable than its cost. For those who cannot afford, it is free for them so contact us for more info at www.biotechexpressmag.com and biotechexpressindia@gmail.com



REGULARIZATION OF RESEARCH FELLOWSHIP | INMAS-DRDO International Partnership Program | Collaborative Research Partnerships (CRP) on Disruptive Technology





BIOTECH EXPRESS

Chief Editor

Dr. Seema P. Upadhye

Managing Editor:

Kamal Pratap Singh

VOLUME 11, ISSUE 126
January 2024

ALL RIGHT RESERVED. No part of this issue can be printed in whole or in part without the written permission of the publisher. Editors, printer and publisher do not take responsibility for any mistake though information are best to assess.

Online and Social Media

www.biotechexpressmag.com
www.facebook.com/BiotechExpressmagazine
www.linkedin.com/in/biotechexpressmagazine
<https://twitter.com/KBiotechexpress>

Subscription: <http://www.biotech-expressmag.com/subscription/>

Contact: Biotech Express, V-31/4, Ext-1, Shalimar Garden, Sahibabad, Ghaziabad, U.P- 201005.
Phone: +91- 9311986177

Article and Ad submission

All queries related to article and ads submission can be sent to biotechexpressindia@gmail.com. For more information kindly visit website: www.biotechexpressmag.com

Publisher : Kamal Pratap Singh

Printed at : Monex offset, B-12 SD complex, near MMG hospital, Ghaziabad- 201005.

The Biotech Express magazine publishes between 10th to 15th of every month. Please report non-delivery of print issue within 15 days of publishing the issue after which no query will be entertain.

CONTENT

Editorial: Post Event report of India's most sought scientific event - IISF 2023 | *p10*

News in Focus: Indian Research watchdog is cleaning up 'mess' in academia— falsification, fabrication & fraud | *p20*

BioMarket Trends: What is in Budget 2024 for Biotech sector? | *p26*

Featured BioNews | *p42*

- ▶ Dr K Anand Kumar, MD, Indian Immunologicals receives prestigious 'Vocational Excellence Award 2023-24'
- ▶ Bayer's AskBio initiates Phase II Gene- PHIT trial in Congestive Heart Failure (CHF)
- ▶ MDPI journal undergoing reevaluation at Scopus, indexing on hold
- ▶ Glenmark becomes first to launch biosimilar of popular anti-diabetic drug, Liraglutide, in India
- ▶ IRRI Develops SpeedFlower, the First Speed Breeding Protocol for Rice
- ▶ Nigeria Approves GM Maize for Commercialization
- ▶ Publisher donating author fees from retracted articles to charity
- ▶ Scientists Uncover Plant Hormone that Boosts Plant Growth by 30%

Latest Research | *p34*

- ▶ Study pinpoints breast cancer 'cells of origin' in high-risk women
- ▶ Resin destroys coronavirus from plastic surfaces
- ▶ Researchers 3D-print functional human brain tissue
- ▶ Researchers improve blood tests' ability to detect and monitor cancer
- ▶ Bioengineered material developed to rapidly stop bleeding in patients on blood thinners
- ▶ Bioengineers on the brink of breaching blood-brain barrier
- ▶ Health researchers develop software to predict diseases
- ▶ New tool helps predict progression of Alzheimer's Disease
- ▶ New statistical tool improves the search for genes that cause diseases

Notifications | *p54*

- ▶ Jobs/Events/ Funding Call for Proposals

Advisory & Editorial Board



Chief Editor:
Dr Seema Pavgi Upadhye
PhD, Biochemistry



Managing Editor:
Kamal Pratap Singh
M.Sc Genetics



Assistant Editor:
Dr Piyush Kumar, PhD

From the very first issue, Biotech Express team has been delivering what's best for Biosciences community. The audience of this magazine includes students, researchers, faculties and executives of highly prestigious organizations of India. In year 2016, BEM has made new editorial Board combining experience of eminent Advisory Board Members who have been into Award winning Research and head of prestigious Administrative positions.

Advisory Board Members

Prof Sopory Sudhir Kumar, Ph.D., FNA., FNASc., FNAAS., FASc., FTWAS
Padma Shri, Shanti Swarup Bhatnagar Awardee, SERB Distinguished Fellow,
DST, ICGEB 2018----, Vice –Chancellor, JNU, Delhi, 2011-16
Director, ICGEB 2014-15



Prof Pandey Ashok, D.Phil., FRSB., FTWAS, FNASc, FNA., FBRs., FIOBB.,
FISEES., FAMI, FICS, FWSSET
Distinguished Scientist, CSIR-Indian Institute of Toxicology Research, Lucknow
Former Dy Director & Chief Scientist, CSIR- National Institute for Interdisciplinary
Science and Technology; Founder, Biotech Research Society of India (BRSI)



Prof Mishra Kaushala Prasad, Ph.D., F.M.A.Sc., FNASc.
Former Head, Radiation Biology Dept., BARC, India; Former Vice-Chancellor,
Nehru Gram Bharati University; Founder, Radiation Biology Society,
Founder President, Society for Radiation Research , India(SRRI),
President, Asian Association for Radiation Research (AARR)2017-2021



Prof Ramareddy V Guntaka, Ph.D
Chairman and Chief Scientist, Sudarshan Biotech Pvt Ltd., India &
Emeritus Professor, University of Tennessee Health Science Center, USA



Prof. Pallu Reddanna, Ph.D
BSR Faculty Fellow, School of Life Sciences, University of Hyderabad, India
Executive President, Federation of Asian Biotech Associations (FABA)



Consulting Editors



Dr. S Venkata Mohan
FNAE, FBRs, FT(AP)AS,
FIEI, FABAP, FISEES
Principal Scientist
Bioengineering and
Environmental Sciences
(BEES), (CSIR-IICT)
Hyderabad, India.



Dr. Dubey K K
Associate Professor &
HOD, School of
Biotechnology
Jawaharlal Nehru
University, New Delhi
(India)



Dr. Sunita Varjani
Scientific Officer
Gujarat Pollution
Control Board
Paryavaran Bhavan,
Gandhinagar, Gujarat,
India.



Dr. Rachna Agarwal
Associate Professor,
Neurochemistry
Institute of Human
Behaviour and Allied
Sciences (IHBAS),
Delhi, India.



Dr. Shailendra K.
Saxena
Professor and Head,
Centre for Advance
Research, King George's
Medical University
(KGMU), Lucknow,
India

Editorial Board Members

Dr. T.N.G. Sharma, Manager,
Federation of Asian Biotech Associations
(FABA)

Dr. Barun Kanta Bhattacharyya
Manager, Research & Development
East India Pharmaceutical Works Ltd

Dr. Dinesh K Gautam
Assistant Professor, Department of
Zoology, Hansraj College, Delhi University.

Dr. Rajni Gupta
Associate Professor, Botany, Kirori Mal
college, Delhi University.

Dr. Darshan Malik
Associate Professor, Biochemistry,
Shivaji College, Delhi University.

Dr. Anand Sonkar
Assistant Professor, Department of Bot-
any, Hansraj College, Delhi University

Dr. Sharvan Sehrawat
Asst Professor, IISER Mohali,
Punjab, India.

Dr. Tathagata Choudhuri
Professor, Dept of Biotechnology,
Visva Bharati University,
Santiniketan, West Bengal.

Dr. Shailesh K Tiwari
Scientist at IIVR, Varanasi.

Dr. Sumit Gandhi
Senior Scientist at CSIR-Indian Institute
of Integrative Medicine (CSIR-IIIM),
Jammu.

Dr. Yogesh Joshi
Assistant Professor at Department of
Bioinformatics Solapur, Maharashtra.

Dr. Deepak Kala
Assistant Professor, Chandigarh Univer-
sity

Dr. Kavita Mehta
Assistant Prof. biotech at Ganpat
University, Ahmedabad, Gujarat, India.

Dr. Seema Amin
Assistant Professor at Charotar
University of Science & Technology
(CHARUSAT), Ahmedabad, India.

Dr. Mukund Bodhankar
Teaching and research at Bharati
Vidyapeeth University, Pune.

Dr. Selvarajan Ethiraj
Research Assistant Professor at SRM
University (Sri Ramaswamy Memorial
University), Kanchipuram, Tamil Nadu,

Dr. Burusa Prasad Rao
Senior Scientist at CLRI, Chennai Area,
India.

Dr. Paramjit S Panesar
SLIET University, Longowala, Punjab.

Dr. Sukanta Majumdar
Gour Banga University.

Dr. Rupesh Chaturvedi
Professor at Jawaharlal Nehru University
New Delhi, Delhi, India.

Dr. Himani Jain
Teaching Associate at Deenbandhu
Chhotu Ram University of science &
technology, Murthal, Haryana.

Dr. Baskar Gurunathan
St. Joseph's College of Engineering,
Chennai.

Pratyush Kumar Das
Ph.D Scholar, Centre for Biotechnology,
Siksha 'O' Anusandhan Odisha, India.

Biometra Thermal Cycler Family

Analytik Jena's Biometra thermal cycler family provides outstanding PCR technology.

The Biometra thermal cycler family offers a range of high-quality models to meet individual user needs.

The **Biometra TOne** is a high-performance system with a 96-well block, also available with a gradient function. The combination of excellent technical data and an attractive price makes it the right choice for many research and routine laboratories.

Users looking for a premium system will find their desired device in the **Biometra TAdvanced**. Its features include the combination of ultra-fast heating and cooling rates, the wide range of exchangeable block modules and the professional user management system.

The **Biometra TRIO** thermal cycler includes three independent blocks in one instrument. Both multiuser environments as well as users with lower sample numbers but different samples will enjoy this model. The three-block design and the specific Temperature Optimization Step function support the fast optimization of ideal annealing temperatures.

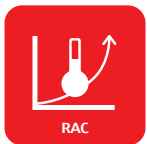


Biometra TRIO

Biometra TAdvanced Twin

Unique features of the Biometra thermal cycler family:

- **Fast Ramping, Best Accuracy, Block Control (RAC):**
What you set is what you get
- **High-performance Smart Lid (HPSL):** Defined pressure control for highly reproducible results
- **Whisper Quiet:** Low noise emission of max. 45 dB
- **Linear Gradient Tool:** For easy gradient programming to identify the ideal annealing temperature



RAC



HPSL



Whisper Quiet



LGT

Subscription Biotech Express

The Monthly magazine of Biotechnology



Subscription packages

RNI No. UPENG/2013/54102

ISSN: 2454-6968

| Period | Print | | | | Digital | | | |
|--------|---------------------|------------|-----------------|------------|---------------------|------------|-----------------|------------|
| | Indian Subcontinent | | Other countries | | Indian Subcontinent | | Other countries | |
| | Institutional | Individual | Institutional | Individual | Institutional | Individual | Institutional | Individual |
| Single | ₹1000 | ₹1000 | USD 150 | USD 50 | 600 | ₹ 100 | USD 50 | USD 15 |
| 1 Year | ₹10,000 | ₹ 5,000 | USD 1000 | USD 500 | 5000 | ₹ 600 | USD 500 | USD 100 |
| 2 Year | ₹19,000 | ₹ 9,000 | USD 1900 | USD 900 | 9000 | ₹ 1000 | USD 900 | USD 180 |
| 3 Year | ₹28,000 | ₹ 14,000 | USD 2800 | USD 1400 | 13000 | ₹ 1500 | USD 1300 | USD 250 |
| 5 Year | ₹45,000 | ₹ 14,000 | USD 2800 | USD 1400 | 20,000 | ₹ 2200 | USD 2000 | USD 400 |

Note: Print subscription includes digital subscription as gratis (no extra cost) for the subscribed period.

Terms and Conditions:

1. Please fill the form in CAPITAL letters.
2. Print Subscription is valid in India only.
3. Print Subscription cost includes first class courier charges.
4. Print subscription includes digital subscription as gratis (no extra cost) for the subscribed period.
4. The mode of payment should be cheque/DD/NEFT favouring "Biotech Express". Please write your name and contact details on the back side of cheque/DD.
5. Your subscription will commence from the next available Issue OR within four weeks.

6. For Multiple Subscriptions/error use separate forms (Photocopies allowed).
7. Biotech Express will not entertain cancellation of subscription after commencement of the same. No request for refund will be entertained.
8. In case of changing address, kindly send us in writing one month in advance.
9. Non delivery should be reported within 20 days of publishing of monthly issue to consider repost by us. After which no request will be entertained under any circumstances.
10. Annual Subscription can be avail throughout the year.
11. Previous Volumes are available on request.

Annual Sponsorship

| | | |
|----------|---------|--------------|
| Title | 25 Lakh | 40,000 US \$ |
| Platinum | 18 Lakh | 27,000 US \$ |
| Gold | 15 Lakh | 23,000 US \$ |
| Silver | 8 Lakh | 12,500 US \$ |

Mode of communication: Cover Article, Other Pages Ads, Back Articles, Email Newsletter, Website Linking, Events etc.

Online/NEFT Payment

Account Name: BIOTECH EXPRESS
Account No: 65183799804
Bank Name: SBI, Dilshad Garden,
Bank Address: 7, Local Shopping Centre,
B-block, Dilshad Garden, Delhi, India.
Pin – 110095.
Branch code : 009370
IFSC: SBIN009370,
MICR code: 110002183
Digital Payment: 9311986177@ybl

Note: BEM Sponsorship will be valid for a period of one year from booking of the same.

Contact: biotechexpressindia@gmail.com, Phone: +91-9311986177



Post Event report of India's most sought scientific event - IISF 2023

BY Kamal Pratap Singh

The ninth edition of the India International Science Festival (IISF), four-day-long festival kickstarted at the Translational Health Science and Technology Institute (THSTI)-Regional Centre for Biotechnology (RCB) joint campus in Faridabad, Haryana on January 17th 2024. The eighth edition of IISF held in Bhopal, Madhya Pradesh.

The ninth edition of the India International Science Festival (IISF) was inaugurated by Union minister of science and technology Dr Jitendra Singh. He said, India's achievements in the fields of science, technology and space over the last decade have helped gain global recognition and respect, ninth edition of the India International Science Festival (IISF) in Faridabad, Haryana.



Other dignitaries of the inaugural ceremony were Shri Moolchand Sharma, Cabinet Minister of Higher Education, Transport, Mines and Geology, and Elections, Government of Haryana; Prof. Ajay Kumar Sood, PSA to the Govt. of India; Prof. Abhay Karandikar, Secretary, DST; Dr. M. Ravichandran, Secretary, MoES; Dr. N. Kalaiselvi, Secretary, DSIR & DG, CSIR, Dr. Rajesh S. Gokhale, Secretary, DBT; Ms. A. Dhanalakshami, Joint Secretary, DST and Shri Shivkumar Sharma, National Organising Secretary, Vijnana Bharati (VIBHA).

While addressing the event, DST Secretary, Prof. Abhay Karandikar welcomed all the National and International guests coming from 23 countries to the India International Science Festival (IISF) 2023. He said that the festival has become the beacon for the scientific achievements from all over the country. He also explained the importance of IISF 2023 along with the brief introduction of the events scheduled on the four days from 17-20 January 2024 to the audience. He also added that our young students and researchers gets inspired and motivated by the scientific progress our country has made and contribute to make India the global leader.

Prof. Ajay Sood, Principal Scientific Advisor (PSA) to the Govt. of India said that the vision of IISF 2023 is to ensure science not only in the books but accessible to the public in many interesting and intellectual ways. He added that IISF provides extensive opportunities to get a deeper understanding of scientific disciplines through its events and programmes with many verticals of science and technology.

Dr. Shivkumar ji, National Organising Secretary, Vijnana Bharati (VIBHA) India greeted the audience and the other dignitaries present. He emphasised on our Indian tradition and values that has science embedded in them and said that science is a festival. He further stated that the science festival is organised with an aim to think and implement on how science in the labs should reach or become available to the society and be useful to the general public.

Shri Moolchand Sharma, Cabinet Minister, Government of Haryana said that country gets progress through the exchange of knowledge and innovative ideas. The India International Science Festival is the right platform for S&T based knowledge sharing.

During the inaugural session, the IISF Programme Guide and IISF News Bulletin's Regional Languages Special Editions were released by the dignitaries. These language

“First, we landed Chandrayaan-3 near the south pole of the Moon, a feat that has not been achieved by any country in the world, then we made an identity in developing and administering COVID-19 vaccines to such a large population and we have also successfully achieved the Aroma Mission, benefitting thousands of farmers,” Dr Singh said. “Our government has made some revolutionary decisions over the last few years—the space reforms through the public-private partnerships, National Quantum Mission, Anusandhan-National Research Foundation (NRF), National Geospatial Policy, and National Education Policy (NEP),” he said.

Dr. Singh also added in his address during the inaugural ceremony of IISF 2023 that for the national development by science and technology, we are now focusing on the Indian Solutions to Indian Problems, Indian Data for Indian Research, Indian Doctors for Indian People, and Public-Private Participation.



Photo: Hon'ble Union Minister Dr. Jitendra Singh inaugurated the DBTIndia pavilion at IISF2023

editions were brought out in seven Indian languages (Malayalam, Bangla, Haryanvi, Bhojpuri, Hindi, Marathi and Urdu). The Science Media Communication Cell (SMCC) of CSIR-National Institute of Science Communication & Policy Research (NIScPR) has prepared, designed and published these language editions of the IISF News Bulletin.

All the dignitaries on the dias were presented by the Dr. P.S. Goel, Chairman, Programme Committee, IISF 2023, the cow dung pot and mitti cool water bottle invented by a grassroot innovator justifying one of the mega science event's objective of taking science grassroots innovations to society.

The inauguration ceremony concluded with a vote of thanks by Dr. Arvind C. Ranade, Director, National Innovation Foundation (NIF) India and Chief Coordinator, IISF 2023. The NIF-India, an autonomous organisation of the Department of Science and Technology (DST), Govt. of India was the coordinating and implementing organisation of IISF 2023.

The events scheduled for the IISF 2023 included Stu-

dent Science Village, Face to Face with New Frontiers of Science & Technology, Science through Games & Toys, Students Innovation Festival – Space Hackathon 2023, State S&T Ministers and Centre and State S&T Secretaries and Officials Conclave, Education for Aspiring India – National Science Teachers Workshop, Young Scientists' Conference, New Age Technology Show, National Social Organisations and Institutions Meet (NSOIM), Science, Technology and Innovation Exhibition, and India International Collaboration followed by a Cultural programme.

During the second day of this science festival on 18 Jan 2024, the Know-How Technology on "Bamboo Composites" was transferred to a well-known materials manufacturing company, M/s Asili Bamboo Products, Meerut, in the presence of Dr. Avanish Kumar Srivastava, Director, CSIR-AMPRI, Bhopal, and Mr Akshay Joshi, Director, M/s Asili Bamboo Products, Meerut. On this occasion various other dignitaries were also present, namely Mr Md. Ali Shah, Sadhana; Dr. C. Anandharamakrishnan, Director, CSIR-NIIST Trivandrum; Prof. Manoranjan Parida, Director, CSIR-CRRI, New Delhi; Dr. B. Chandrasekaran, Former Director, CSIR-CLRI; Prof. Sudhir Singh Bhadau-



Photo: Dr Arvind Ranade, Director, NIF & Member Convener, Program Committee, IISF2023, highlighted the uniqueness of the **IISF** Challenge, which is being introduced for the first time.

ria, Director, UIT RGPV Bhopal; Shri Mayank Mathur, RC Member from CSIR-Headquarter; Dr. J.P. Shukla, Chief Scientist; Mr. Somnath Mazumder, CoA; Dr. J.P. Chourasia, Head PPD, CSIR-AMPRI; Dr. Sandeep Singhai, Head Business Development; Dr. Sarika Verma, PI and Principal Scientist; Dr. Neeta V.M. Khalkho, Sr. Principal Scientist, CSIR-AMPRI; and Dr. Satanand Mishra, Principal Scientist, CSIR-AMPRI, Bhopal.

Prof. Ashutosh Sharma, President, Indian National Science Academy addressed young researchers, introducing the concept of “Vigyan Karmayogi” and various fellowships to support and recognize young scientists. The conference delved into the realm of scientific journals and publications, encouraging young researchers to publish in Indian scientific journals.

On Day-3, the Student Science Village event caters to active engagement between students and esteemed scientists like Professor Narinder Mehra, Vice President of the Indian National Science Academy (INSA). Prof. Mehra shed light on organ transplantation, providing valuable insights into life-saving medical procedures. The day also featured

activities like Foldscope making, hands-on experiments in Physics, Chemistry, and Biology, Inspire Manak Expo, and Mega Science Expo, creating a dynamic learning environment for students.

Around 2000 students from Palwal district of Haryana, attended the Face to Face with New Frontier of Science and Technology event. Dr. D K Singh from ISRO discussed “Stellar Odyssey: Human Presence in Space,” while Prof. Nagata Kyosuke, President of Tsukuba University, shared advancements in pharma through virology and molecular biology.

The second day of the S&T Media and Communicators Conclave began with a panel discussion on “Enhancing S&T Representation in Media,” chaired by Prof. K.G Suresh. Dignitaries were honored by Prof. Ranjana Aggarwal, setting a ceremonial tone. The discussion, featuring insights from Archita Bhatta, Dr. Pallav Bagla, Shri Vijay Joshi, and Shri Raj Chengappa, highlighted the importance of simplicity in science communication. The event also included a panel on “Science through Cinema,” exploring the intersection of science and film, emphasizing



Photo: Deep dive into innovation at IISF! INSA President shared a Special Address, followed by a dynamic panel discussion on “Our problems, Our solutions: Strengthening the TechNeev.” Empowering discussions paving the way for a tech-savvy future!

the creative role of AI in filmmaking. The event affirmed its role as a vital platform for cross-disciplinary dialogue.

The Day 4 of the India International Science Festival (IISF) 2023 was marked with the gracious presence of Shri Manohar Lal Khattar, Chief Minister of Haryana. Dr Abhay Karandikar (Secretary, DST), Shri Shivkumar Sharma (National Organizing Secretary, Vijnana Bharati), Dr. Arvind C Ranade (Chief Coordinator, IISF 2023), Dr. PS Goel (Chairman, National Innovation Foundation) was also present in the closing ceremony of IISF 2023.

In his special address, Shri Manohar Lal Khattar emphasized the boundless benefits that science offers to society without any discrimination. Recognizing the importance of science in shaping the future, he expressed his commitment to further integrate science with society through various initiatives of the state S&T council. Shri Khattar announces the plans of the state government for the development of a state-of-the-art Science City in Faridabad (Haryana) spanning across 50 acres. This ambitious project aims to create a dedicated space for scientific exploration, learning, and engagement, fostering a culture of curiosity and discovery among the public, especially children.

The mega science festival, which is being organized from January 17 to 20, 2024, has brought together the brightest minds in science and innovation, fostering a spirit of exploration and collaboration. It continues to receive over-

whelming response, providing a platform for scientific exchanges and learning, Shri Khattar said.

In his announcement, Shri Manohar Lal Khattar highlighted the importance of nurturing a scientific temperament among the youth and creating an ecosystem that encourages innovation and research. The Science City is envisioned as a dynamic center that will play a pivotal role in promoting scientific awareness, fostering a love for learning, and inspiring the next generation of scientists. He said that the country is marching ahead under the leadership of our Prime Minister Shri Narendra Modi in all walks of life including science and technology.

Shri Khattar highlighted the crucial role that the public engagement platforms like IISF play in fostering a scientific temperament among citizens. He emphasized that the festival serves as a bridge between the scientific community and the general public, demystifying complex concepts and showcasing the transformative power of science.

Highlights of the events

Vigyanika

The Science Literature Festival “Vigyanika” was held as a part of India International Science Festival 2023. The



Photo: Executive Director, INSA interacted with students, his interaction not only imparted knowledge but also sparked curiosity among the students at IISF 2023-Student Science Village.

inaugural ceremony on 18th January 2024 began with the Welcome address by Prof. Ranjana Aggarwal, Director, CSIR-National Institute of Science Communication and Policy Research (CSIR-NIScPR), New Delhi. Prof. Aggarwal highlighted the importance of scientific temper and CSIR-NIScPR's commitment to foster scientific awareness. Emphasising the importance of science communication in Indian languages through diverse mediums like puppetry and poems, she underscored Vigyanika's role as a platform for networking among scientists and science enthusiasts.

Dr. Dinakar M. Salunke, Former Director, ICGEB and DBT-RCB, Dr. Subhra Chakraborty, Director, National Institute for Plant Genome Research, New Delhi, and Shri. A Jayakumar, Vijnana Bharati, were the distinguished guests of the inaugural ceremony.

Prof. Salunke emphasised the importance of increasing scientific temper and acknowledged that the gap between common masses and scientists should be bridged through various inclusive efforts such as Vigyanika. Dr. Subhra Chakraborty, underscored Vigyanika's role in fostering discussions on science, aligning with the goals of the New Education Policy 2020 to integrate varying fields such as science and literature in education. She also highlighted development of new innovative technologies that are capable of making India a technologically competent country and the need to take these technologies to the public through science communication channels.

Along with the scientific sessions, there was an exhibition by CSIR-NIScPR showcasing its publications and by SVASTIK, a CSIR initiative to disseminate scientifically validated Indian traditional knowledge.

Face To Face With New Frontiers Of Science & Technology

In this event, interactive sessions with students were organised. International experiences were shared by H.E. Madam Ruziah Binti Shafei, Deputy Secretary General, Ministry of Science, Technology and Innovation (MOSTI), Government of Malaysia on Malaysia's S&T Development: Pioneering Advancements and Global Opportunities; and on One Health Approach: An Integrated Approach on Sustainable Ecosystems by Dr. Omosa Ochwang'i, University of Nairobi, Kenya.

Education For Aspiring India - National Science Teachers Workshop

Teachers Workshop provided an insightful panel discussion chaired by Prof. Nomes Bolia from the Indian Institute of Technology (IIT), Delhi. The discussion, titled "Indian Knowledge System: Ancient to Aspiring India. Dr. Venkatnarayan Ramanathan emphasized the importance of sustainable science in the contemporary world and advocated for a reduction in consumerism. He highlighted the two fundamental components of science, namely observation and experience, citing examples like predicting groundwater levels through tree observation as a hands-on learning experience for children.



Photo: 25 National Award Winners of INSPIRE MANAK Scheme of DST showcased their innovative technologies at Student Science Village event of IISF 2023. The young students also interacted with eminent scientists & officials.

Additionally, a plenary talk on the “Role of Government Institutions: Strengthening Science Education through Schemes” was organized, chaired by Dr. Abhay Jere, Vice Chairman of the All India Council for Technical Education. Dr. Namita Gupta, Head of the INSPIRE Programme at DST, discussed the work undertaken to unravel the mysteries behind various results embedded in ancient teachings.

Young Scientists Conference

In the Young scientists conference (YSC), in the Interactive Session on Science Technology and Innovation in North East, Jammu & Kashmir, Leh and Ladakh, various prospects for making Samridh Bharat in Amrit Kal were explored. Prof Surendra K Mehta, VC, University of Ladakh informed the audience that the university of Ladakh is the only university of Ladakh and is a very unique place for research especially climate change, biodiversity, etc. He also talked about the upcoming government solar energy facility in Ladakh region. Prof Bolin K Konwar Nagaland, former VC of Nagaland Central University talked about how research is helping in developing the urban economy. Prof. Gowhar Basheer Waqil, Director, Institute

of Technology, University of Kashmir and Dr. Shweta Yadav, University of Jammu were also present as panellists.

New Age Technology Show

During this event, Students from the Bengaluru-based Jawaharlal Nehru Centre for Advanced Scientific Research displayed a ‘cost-effective’ method to reduce carbon dioxide emissions in the atmosphere. The team, led by their professor Sebastian C Peter, came up with a way to convert carbon dioxide to methanol, which is categorised as a low-carbon fuel. The NITI Aayog calls it the ‘best pathway’ for meeting India’s global carbon emissions reduction targets.

In New Age Technology Show, a panel discussion on quantum technologies was also organised and moderated by Dr Akhilesh Gupta, Secretary, SERB and Senior Advisor, DST. Dr. Sudhir Ranjan Jain, Adjunct Professor, UMDAE Centre for Excellence in Basic Sciences, Mumbai; Prof. Urbasi Sinha, Raman Research Institute, Bangalore; Mr. Manish Modani, Principal Solution Architect, NVIDIA, Bangalore and Dr. A Robert J Ravi, DDG, DoT, GoI (TBC) participated as panellists. In another session an

Valedictory session

The India International Science Festival (IISF) 2023 concluded with a significant valedictory session on January 20, 2024. Dr. P S Goel, Chairman of NIF – India, expressed appreciation for all contributors, highlighting the integration of innovation. Prof. Sudhir Bhaduria, Secretary General of Vijnana Bharati (VIBHA) India, delineated the vision for this year's event. Noteworthy moments encompassed Dr. Arvind C Ranade, Chief Coordinator's presentation, revealing a record-breaking turnout with more than 13,000 delegates and 25,000 students. The ceremony also solidified international collaborations through the signing of MoUs.

During the valedictory session, winners of the Student Innovation Festival-Space Hackathon 2023 were announced, achieving remarkable feats in the world record category. Awards were conferred upon exceptional pavilions, acknowledging excellence in conceptualization, technology, interactivity, and special mentions.

Dr. Akhilesh Gupta, Senior Advisor, DST, and Dr. Rajesh S. Gokhale, Secretary, DBT were also the gathering. Ms. A. Dhanalakshmi, Joint Secretary, DST proposed he vote of thanks. Ms. Dhanalakshmi appreciated the Science Media Communication Cell (SMCC) of CSIR-NIScPR to actively coordinate and ensure media publicity and visibility of the whole IISF2023.

Industrial Growth discussion at IISF

At one end of the vast exhibition hall was a section dedicated to the Council of Scientific and Industrial Research, which emphasised initiatives such as the 'steel slag' roads constructed in Arunachal Pradesh, Gujarat, Maharashtra, and Jharkhand. These roads are made by re-using slag, an industrial waste from steel plants.

CSIR's Director General Dr N Kalaiselvi also spoke about the 'purple revolution' heralded by the organisation. Started under CSIR's 'Aroma Mission', this movement aims to encourage lavender growth in the Jammu region, giving incentive to the home-grown cultivation, processing and marketing of lavender scents, oils, and products.



interactive talk on Cyber Security was organised. In the valedictory session of the event, Prof Abhay Karandikar, Secretary DST announced that the pre proposal has been invited from academia institutions/ R&D Labs to submit innovative pre-proposals in consortia mode aligned with objectives of National Quantum Mission (NQM) to setup T-Hubs in Quantum Computing, Quantum Communication, Quantum Sensing & Metrology and Quantum Materials & Devices.

Startup, Technology and Innovation B To B Meet

Startup, Technology and Innovation B To B Meet invited a distinguished Panel of Investors on to the stage for Start Up - Investors Meet. It was an excellent opportunity for the Start ups to pitch their novel ideas and Innovations to the Investors. Startups like Arc Robotics, MyWays.ai pitched their Start Up ideas. The Meet was succeeded by the arrival of the Distinguished Chief Guest ,Prof. Abhay Karandikar(Secretary, Department of Science and Technology) and his facilitation. Addressing the Startup B2B Meet, Mr. Karandikar remarked that he's hopeful for the future of young innovators that they'll be able to Create Jobs and contribute to the economy. He also announced that 10% of the funds to be allotted to the upcoming ANRF would be dedicated to innovation and startups.



Photo: Day 4 of the #IISF2023 was marked with the presence of Chief Minister of Haryana, Manohar Lal Khattar



Photo: "Science for fun has been the USP of IISF" - Prof. Ajay Sood, Principal Scientific Advisor to the Government of India

BOX: Bamboo composites, developed by CSIR-AMPRI at IISF

The technology has sequential steps like cutting of bamboo poles to desired sizes, splitting to strips, removal of knots, chemical treatment for protection against microbial/natural degradation, its conversion to fibrous form without damaging the natural strength of bamboo fibers, coating of adequate pre-polymer, which is followed by compaction under appropriate heat and pressure to obtain a composite sample of the desired shape. The final shape may be a moulded article, plain sheet, thick boards, beams, etc. These shapes can be further machined for the final finished product.

After the successful trials at industrial level, panel boards, beams, pillars, partitions, doors, window frames, roof, floorings etc., were developed, and a “Demonstration Structure (AMPRI’s Bamboo Composite Committee Room “Baithak”),” made up of bamboo composites has been erected in the campus of CSIR-AMPRI Bhopal in January 2022. Due to its unique characteristics, the developed bamboo composite can also be used in various other sectors, especially in Aerospace. Therefore, bamboo can create future products similar to wood with a ten times faster harvest cycle, and with the growth in farming and cultivation of bamboo, the generation of employment, especially in rural areas will be improved. The technology has the potential to attract and encourage micro, small and medium enterprises, start-ups, etc., and thus, supports in achieving sustainable goals by contributing to Aatmanirbhar Bharat, Swasth Bharat Abhiyaan, Swachh Bharat Abhiyaan.



Natural bamboo culm



Bamboo mat board



Laminated bamboo



Bamboo scrimber



Bamboo fiber



Bamboo fiber-reinforced polymer



News in Focus

Indian Research watchdog is cleaning up ‘mess’ in academia—falsification, fabrication & fraud

irw.co.in

In 2022, a Dutch scientist flagged duplication of text and signs of manipulation in images presented in a 2004 research paper co-authored by one of India's leading virologists, Nivedita Gupta. On 26 May 2022, the peer-reviewed journal, *Mycopathologia*, retracted the paper, though at the time, Gupta denied the accusations, reiterating that her research was path-breaking. It was one of the first in India to document the spread of *Candida* infections in a burn ward, she said. The national and international science community waited to see what action would be taken. A day later, Nivedita Gupta was made head of virology at the Indian Council of Medical Research.

In the two years since Elizabeth Bik— a Dutch scientist who specialises in finding published research papers with integrity issues—called out Gupta's work, ICMR issued no statement on whether any inquiry was initiated or if action was taken against Gupta. But since then, scientific research from India has come

under increased scrutiny—not from ‘foreigners’ with access to unlimited resources but a small army of academic watchdogs within the country.

By day, members of India Research Watchdog are scientists, researchers, students and data analysts at private and public institutes. By night, they are sleuths, pouring through published papers, acting on anonymous tips and sharing information on Discord—a popular instant messaging and VoIP platform. Their mission is to investigate authors of research papers who are suspected of scientific misconduct. The subject of their investigation may not be heinous crimes—but it is a question of protecting the research integrity in India.

“No hero or fairy is going to clean up the mess in Indian Academia in an instant. Indian academia needs to seek a transformation from within,” IRW declares in its X bio.

Indian scholarship is coming under increased scrutiny at a time when a plagiarism controversy has engulfed American academia after the controversial exit of Claudia Gay, the first black woman president of Harvard University. In the last two decades, groups such as Retraction Watch and Center for Open Science and Data Colada have been calling out bad research, according to a New York Times article. But Indian academic publishing has existed in a grey zone of lax rigour and a cottage industry of fake journals. For too long this has gone unchallenged.

By 2022, India had become the third largest producer of scientific research, overtaking the UK. At the same time, the number of retractions also rose dramatically. According to IRW founder, Achal Agrawal, retractions from India increased 2.5 times between 2020-2022 over the number recorded between 2017 and 2019. Fifty-eight papers by 12 top Indian Institutes of Technology were retracted between 2006 and 2023 for plagiarism and duplication.

But the new watchdog is set to change the business-as-usual. And its members are not afraid to get their hands dirty. Their goal is an academia that is held accountable for plagiarism, data manipulation, bogus publications, and fudged citation metrics among other academic 'sins'. Since it was founded in 2022, the group has been actively calling out researchers and top scientific institutes on X and LinkedIn.

It flags dubious studies, names and shames researchers who churn out hundreds of bogus papers every year and calls out universities that it alleges encourage unethical means to increase their overall rankings.

Plagiarism, image manipulation, paid publishing, pa-

per mills and ghostwriting in academia is an open secret, yet there is silence from within the community. Indian universities are nowhere near the panic situation that has been sweeping American campuses in the past month. Not just Harvard; MIT and Stanford were also under scrutiny.

"It is risky for professors and academics to speak up about it because then there might be harm to your career," said Agrawal. His analysis also revealed that top research institutes are among those with the most number of plagiarised research papers.

Analysis revealed that top research institutes are among those with the most number of plagiarised research papers

Last year saw the highest number of retractions globally, with more than 100,000 retractions. Sleuths around the world have found instances of papers that have been written with rewriting tools like 'Quillbot' that generate nonsensical phrases in an attempt to skirt plagiarism detection software. And there's a thriving paper mill industry even in India where academic research papers are ghostwritten and published for a price.

Agrawal realised that Indian academia was in dire need of a watchdog when he learnt that one of his first-year undergraduate students had published a research paper that was com-

pletely plagiarised.

"This student told me that he had published a research paper. I was surprised—because he could not even solve my assignments. I asked him how he wrote a paper," said Agrawal. Much to his surprise, the student said that publishing was easy – he had simply taken another research paper, paraphrased it and submitted it.

"I asked him if he knew this was plagiarism. He said, 'No, no it isn't plagiarism, it passed the plagiarism test

software,” he said. This conversation helped him realise how deep-rooted the problem was. The lack of transparency means that researchers with several dubious publications are often appointed to prestigious institutions because they are evaluated on publication metrics and citation indices.

“It is actually affecting the education system,” said Agrawal.

This war against unethical research is also playing out on Pubpeer, a US-based platform that allows people to flag issues with research papers after they have been published. Through the platform, several papers by Dhanraj Gopi, a chemistry professor at Periyar University in Tamil Nadu, were flagged starting in 2019 for image duplications. Of these seven were retracted by the Royal Society of Chemistry (RSC) in the UK.

In some cases, the retractions are not prompted by watchdogs, but by researchers whose work has been stolen. In 2019, Amit Kapoor* found that his paper—published in 2016 as a master’s student at IIT-BHU—had been plagiarised and published in 15 papers by another researcher.

“They had picked up parts of the graphics in my paper [and used it] in their own research papers,” said Kapoor, who specialises in tribology—an interdisciplinary field which studies the science of friction, wear, and lubrication.

After much back and forth with the journals, Kapoor was able to get nine papers retracted. Two others had been published in the reputed Elsevier journal, Fuel. Kapoor approached then-principal editor Jillian

Goldfarb in an attempt to get the papers retracted.

“Goldfarb was very helpful. But even after six months of trying to follow up with the editor-in-chief of Fuel to take those articles down, nothing worked,” he said.

Incidentally, in October last year, Goldfarb resigned from her post citing, among other things, the journal’s ethics team not taking any action on ‘dozens of papers’ with ‘serious concerns about paper milling’. Despite all this, Kapoor said that the researcher who plagiarised his paper is now working at a reputed Indian university.

In some cases, the retractions are not prompted by watchdogs, but by researchers whose work has been stolen

Most top institutions in India have outlined research ethics guidelines. At the Indian Institute of Science, an inquiry committee can be set up to take action in cases of research misconduct. However, the institute declined to comment on its process and cases when ThePrint reached out. Similarly, the Council of Scientific & Industrial Research, in 2019, issued a notification on ethics of research—a 22-page list of guidelines on falsification, fabrication, fraud and other forms of misconduct.

A senior CISR official, who did not wish to be named, told ThePrint that when cases of misconduct at the institute were highlighted, action was

taken against the researcher through an internal enquiry. However, such information is not publicly shared. Those within the close-knit circle of academia are often aware of the black sheep. But the public in general, and potential future employers, are often in the dark.

There are exceptions—the rare occasion when an institute steps up to accept responsibility and seek accountability. In 2021, the National Centre for Biological Sciences ensured that the developments regarding a case of research misconduct were promptly relayed to the public. The paper, ‘Discovery of iron-sensing

bacterial riboswitches' drew the attention of many readers on PubPeer. The academic ethics committee of the Tata Institute of Fundamental Research (TIFR) launched an inquiry and found evidence of image manipulation and result falsification. But such transparency is rare, which is what compelled Agrawal to create IRW.

Agrawal didn't always set out to be an academic vigilante. He began by informing institutions and following due process. But it did not go far. The response just did not have the sense of alarm that he had expected.

"Initially, when we started we would first inform the author and the university before posting publicly. We would give them a deadline to respond," Agrawal said.

But that process would take two to three months with rarely any tangible outcome. "Sometimes we have to flag on social media because without doing that, there is no response," he said.

IRW has a public portal, where anyone can act as a whistleblower—exposing papers that may have been published by unethical means. "We also have a Discord group where researchers and academics actively consult each other and act on these tips," he added. The organisation has over a hundred members, with new volunteers regularly joining in. But everyone has a pseudonym.

Members discuss the merits of cases of misconduct and launch coordinated efforts to identify repeat offenders. The group is regularly buzzing with new ideas and projects. The team is now working on creating a graphic dashboard on their website that can help anyone track retraction data. Some share screenshots of ads on social media that put papers up for sale so that

everyone can track when such papers appear in journals.

Most of the group members are from academia and are driven by a shared frustration of having to compete for jobs and promotions with people who follow unethical means to get published.

"We judge the tips on the merit and verifiability of the claims," said Agrawal. But in the absence of transparency and communication by the institutes themselves,

the worry is that platforms like IRW can be used by fellow academics to settle personal scores.

Anindita Bhadra, a researcher at the Indian Institute of Science Education and Research (IISER) Kolkata draws attention to how competitive the academic world can get where the emphasis is on publishing first.

"If one gets called out for their work, they need to prove the allegations wrong. That takes time, and they lose out," said Bhadra. This makes it very necessary for platforms like IRW to make sure they have enough proof before posting allegations.

As a safeguard, IRW is careful not to name anyone who may be at the start of their academic career. "We name people and universities who are publishing dubious articles to win awards and rankings," said Agrawal.

What Agrawal wants is to raise awareness to lead to an overhaul in the National Institutional Ranking Framework (NIRF) rankings. It was adopted by the Ministry of Education in 2015 to rank universities and colleges and enable students to compare them. But over the

IRW has a public portal, where anyone can act as a whistleblower—exposing papers that may have been published by unethical means

years it has been criticised as flawed and prone to data fudging.

It also triggered a race among institutes to increase the number of publications. In this publish-or-perish listing race, many university administrators are pushing their faculty to bring out more papers.

“Most people agree that the pressure to publish is because of NIRF rankings,” said Agrawal. IRW alleges that since NIRF was introduced in 2015, retractions from India have gone up fourfold.

In 2023, Saveetha Institute of Medical and Technical Sciences, Chennai, was ranked first under NIFR’s dental college category, but the same year, it also came under the scrutiny of Retraction Watch for an alleged mass-scale self-citation scheme. ‘Did a ‘nasty’ publishing scheme help an Indian dental school win high rankings?’ was the investigative report, published in Science magazine.

“While the National Assessment and Accreditation Council gives due weightage to publications in UGC-Care listed journals, the NIRF uses publication data only from Scopus and Web of Science,” read an op-ed piece in The Hindu by GS Bajpai, vice-chancellor of the Rajiv Gandhi National University of Law, Punjab.

Often, NIRF rankings of the top 50 state universities are not in keeping with NAAC scores. Bajpai concluded that “severe methodological and structural issues” undermine the ranking system.

The frustration regarding the sheer volume of bogus papers from India has been brewing for years, but now academics agree that the time has come to name and shame researchers on social media.

“Right now, this will fill a gap in the Indian research environment, where it is often the case that unethical behaviour is not called out or acted upon,” said Gautam Menon, professor of physics and biology at Ashoka University. But transparency even among self-appointed watchdogs is important.

“To be credible, they should be willing to feature re-

sponses to allegations from those accused and also set high standards for publicising potential ethical issues in research,” he added.

Many scientists are hesitant to openly point out flaws in a peer’s published paper, for fear that it will invite retribution when their research comes out.

“I think many are uncomfortable with this,” said Bhadra, referring to the idea of platforms calling out people on social media over the integrity of their research. “They feel that someone can be targeted by rivals. The way I see it is, if you are honest, you don’t need to worry.”

The exercise of peer review itself is a highly subjective exercise. Every research paper is reviewed by two or three researchers from the same field before it gets published. When scrutinising published papers, especially those that came out more than a decade ago, it’s important to be sensitive to the technology timeline, says Alka Rao, a researcher at CSIR—Institute Of Microbial Technology (IMTECH).

“We must not apply high-resolution technology of today in retrospect to hang people for data concluded in the past using low-resolution tools,” she said.

That said, Rao agrees that factual errors must still be highlighted to safeguard against persisting and systematic errors originating in past faulty data sets.

Ayan Banerjee from IISER Kolkata is far more sceptical about what is plaguing the academia currently. He sees a massive difference between the perception of the community by those within it and by the political or bureaucratic ‘leadership’ of the country.

“Several scientists who have been called out by PubPeer have obtained directorial appointments in top academic institutions during the last five to six years,” Banerjee said.

“So does it really matter what the academic community feels about unethical work in this country of ours?”

Biotech Express

Go Green



Starting from @ Rs. 600 yearly and Rs. 6000 Lifetime only

Subscribe Digital

Email delivery

UPI: **9871531377@ybl**

BioBudget 2024

What is in Budget 2024 for Biotech sector?



In her speech for the 2024-2025 Budget, Finance Minister Nirmala Sitharaman spoke of “a new scheme of bio-manufacturing and bio-foundry” to provide “environment-friendly alternatives such as biodegradable polymers, bio-plastics, bio-pharmaceuticals and

bio-agri-inputs”.

The announcement is part of a bid to have the bio-economy contribute \$300 billion to the Indian economy by 2030, representing a jump of around ₹18



lakh crore in value from current levels, and \$1 trillion by 2047. The products of the bio-economy also play key roles in India's sustainability and 'green' economy targets.

"The way to upskill India's bio-science sector is to put money into bio-manufacturing and not only prioritise research," Shambhavi Naik, a researcher at The Takshashila Institution, said.

The Biotechnology Industry Research Assistance Council (BIRAC), a public-sector enterprise under the DBT that interfaces between academia and industry, has also been allocated what it was in 2023-2024 — ₹40 crore — even though its actual expenditure was higher.

The bio-economy refers to all economic activities that use biotechnologies to produce value, and includes vaccines, diagnostics, bio-ethanol, bio-plastics, ge-

netically modified crops, etc. According to the latest Indian BioEconomy Report (IBER), published by BIRAC in 2023, "The [Indian] innovation ecosystem continues to flourish, and we aspire to become one of the top 5 global bio-manufacturing hubs and among the top 10 biotechnology destinations globally."

The new bio-manufacturing scheme "will also help in transforming today's consumptive manufacturing paradigm to the one based on regenerative principles," Ms. Sitharaman added.

"Apart from the faux connection that increased supply will change consumption, the initiative is much needed," Ms. Naik said. "As with any initiative, it will depend on what the initiative will do. It is not only about the money and tax breaks, but we need to focus on two pivotal things: creating appropriately trained workforce for bio-manufacturing and accessing the appropriate raw materials."

Considering the existing gap in vocational training, the country currently has “highly paid Ph.Ds or low skilled BSc/MSc” graduates, Ms. Naik said. “We have for a long time now recommended an accreditation course for bio-manufacturing.”

The 2023 IBER report identified many opportunities to boost bio-manufacturing in the country, including a \$2 billion investment to help start-ups transition to “large-scale manufacturing”, introducing a production-linked incentive scheme to improve production, and instituting a single-window clearance system for bio-manufacturers.

Among the significant steps taken by the Science Ministry in 2023 was clearing the National Research Foundation Bill. To be piloted by the Department of Science and Technology (DST), this envisages an autonomous body with a corpus of ₹50,000 crore, of which nearly ₹36,000 crore will come from the private sector and non-governmental sources. A major long-standing concern of the government has been in getting private sector enterprises to invest in core research and development, with nearly three-fourth of such R&D expense now borne by the government. The DST has provisioned ₹2,000 crore in 2024-25 towards the NRF.

Whether the new corpus has a connection to the NRF is unclear. Allocations to civilian science departments, namely the DST, the Department of Biotechnology, the Council of Scientific and Industrial Research and the Ministry of Earth Sciences (MoES), were modest with the CSIR getting a 10% raise from the ₹5,746 crore allocated in 2023-24 to ₹6,323 crore and the DST a 1% raise over the ₹7,931 crore in 2023-24 to ₹8,029 crore.

The Department of Biotechnology has seen allocations cut to ₹2,251 crore this year from ₹2,683 crore (2023-24) and MoES a cut from ₹3,319 crore to ₹2,521 crore. A senior official explained the cuts as occurring due to budgets for major programmes often being spread out over 3-5 years and the inability of ministries to spend budgeted amounts within the prescribed financial

years. The Finance Ministry, in its overall assessment of ‘Research and Development’ spending (spanning multiple ministries), has allotted ₹13,208 crore for 2024-25, up from the ₹12,850 crore in 2023-24. The actual spending during 2023-24 (till December) was ₹12,943 crore.

Biotech Express

World's only Biotechnology "Magazine"



Follow the Path which lead to Success

Visit for more info: <http://www.biotechexpressmag.com>

Featured News

Dr K Anand Kumar, MD, Indian Immunologicals receives prestigious ‘Vocational Excellence Award 2023-24’



January 5, 2024

Dr K Anand Kumar, Managing Director of Indian Immunologicals Limited (IIL) has been conferred with the “Vocational Excellence Award 2023-24” at a grand function organized by the Rotary Club of Pollachi in Tamil Nadu.

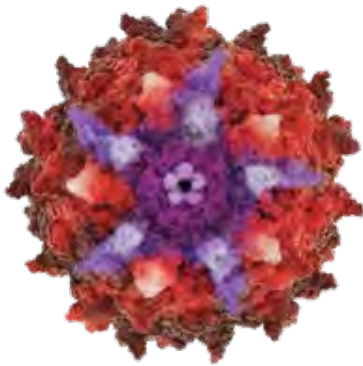
Kumar has joined some legendary personalities such as Dr. K. Sivan, ISRO and Dr. M. Annadurai, ISRO,

who were the previous recipients of this prestigious award.

Dr. K Anand Kumar has played a crucial role in advancing India’s expertise in producing vaccines and biosimilars, ensuring that critical biologic treatments are more accessible to patients, both within the country and overseas. Dr. Kumar-led IIL has created a “One Health” organization, that championed disease control through

affordable and accessible vaccination for both humans and animals. Engaged in vaccine development in the past thirty years, he has been influential in providing accessibility of affordable animal and human vaccines to 60+ developing nations. He has relentlessly worked towards “Make in India”, safeguarding lives against deadly diseases, and advancing research and development efforts.

Bayer's AskBio initiates Phase II GenePHIT trial in Congestive Heart Failure (CHF)



AskBio

A Bayer Cell & Gene Therapy Platform Company



12 January 2024

Bayer AG and Asklepios BioPharmaceutical, Inc. (AskBio), a gene therapy company wholly owned and independently operated as a subsidiary of Bayer AG, have announced the initiation of GenePHIT (Gene PHosphate Inhibition Therapy), a Phase II trial of AB-1002 (also known as NAN-101) for the treatment of congestive heart failure (CHF). GenePHIT is an adaptive, double-blind, placebo-controlled, randomized, multicenter trial to evaluate the safety and efficacy of a single intracoronary infusion of AB-1002 in adults with non-ischemic cardiomyopathy classified as New York Heart Association (NYHA) Class III Heart Failure who have been medically stable for at least 4 weeks.

The advancement of AB-1002 into Phase II marks a significant milestone for the development of this novel in-

vestigational gene therapy for patients with CHF who have high unmet medical need.

GenePHIT will include between 90 and 150 adults with left ventricle ejection fraction between 15 and 35%, who continue to suffer from heart failure symptoms despite guideline recommended therapy. The primary efficacy endpoint at 52 weeks is a modified win ratio of several clinically meaningful assessments.(1)

“AskBio is excited to initiate GenePHIT under the leadership of Roger Hajjar, MD, Scientific Chair CHF, and Lothar Roessig, MD, Integrated Product Team Lead CHF,” said Jude Samulski, PhD, Co-Founder and Chief Scientific Officer, AskBio. “We believe this trial will help determine the potential of AB-1002 as a treatment for one of the world’s most devastating diseases, and we look forward

to learning more about this important investigational cardiac gene therapy. Our hope is that one day AB-1002 will potentially help patients suffering from congestive heart failure.”

The GenePHIT trial, which includes 52-week safety and primary efficacy and four-year long-term follow-up periods, is currently recruiting. AskBio plans to conduct the trial in the U.S. and multiple countries in Europe. (1) For more information, please visit clinicaltrials.gov (NCT#05598333) or visit askbio.com.

AB-1002 is an investigational gene therapy that has not been approved by any regulatory authority, and its efficacy and safety have not been established or fully evaluated. AB-1002 is manufactured by Viralgen Vector Core, a wholly owned and independently operated subsidiary of AskBio.

MDPI journal undergoing reevaluation at Scopus, indexing on hold



January 2, 2024

Elsevier's Scopus database has paused indexing content from Sustainability, an MDPI journal, while it reevaluates whether to include the title, Retraction Watch has learned.

Other MDPI titles were reevaluated in 2023, and its mathematics journal *Axioms* is no longer included in Scopus' nearly 30,000 titles. Clarivate also delisted two MDPI journals, including the *International Journal of Environmental Research and Public Health*, from its Web of Science index earlier this year, meaning those journals will no longer receive impact factors.

Universities and funders use Scopus to create "whitelists" of journals in which authors are encouraged to publish, so removal from the index can influence submissions.

In 2022, Norway removed Sustainability from its list of journals that researchers get credit for publishing in, and Finland followed suit at the beginning of 2023.

The number of articles from Sustainability indexed in Scopus has increased nearly every year since 2009, its first year of coverage, when 78 articles were indexed. In 2022, the journal published over

17,000 articles. Scopus indexed about 13,500 in 2023, before the pause.

According to Scopus' title reevaluation policy, the index identifies "outlier and underperforming journals" for scrutiny based on citation metrics and benchmarks compared to other titles in the same field, when "legitimate" concerns are raised about the journal or publisher, or if Scopus' algorithm flags outlier behavior. The CSAB can also decide the journal should be evaluated again.

Glenmark becomes first to launch biosimilar of popular anti-diabetic drug, Liraglutide, in India



January 5, 2024

Glenmark Pharmaceuticals has launched a biosimilar of the popular anti-diabetic drug, Liraglutide, for the first time in India.

The drug is being marketed under the brand name Lirafit™ following the approval from the Drug Controller General of India (DCGI). Priced at around INR 100 for a standard dose of 1.2 mg (per day), this will lower the cost of therapy by approximately 70%, and will be available only under prescription.

Liraglutide belongs to the class of glucagon-like peptide 1 receptor agonist (GLP-1 RA) drugs, which increase glucose-dependent insulin secretion and decrease in appropriate glucagon secretion.^{12,13} It has been approved globally for the management of type

2 diabetes mellitus in adult patients in the United States and the European Union.

Liraglutide and its role in the treatment of type 2 diabetes Liraglutide has a proven efficacy in improving glycemic control in patients with type 2 diabetes mellitus. Clinical trials on Indian adult patients with type 2 diabetes mellitus over a 24-week period have demonstrated Lirafit™ to be effective, safe and well-tolerated. The trials also revealed non-inferior efficacy and a safety profile with that of the reference liraglutide.

Additional benefits of liraglutide include effectively lowering glycemic parameters, weight reduction,

and cardiovascular safety in patients with type 2 diabetes mellitus.

GLP-1 RAs mechanism of action involves the release of insulin, in the presence of elevated glucose concentrations, thus decreasing glucagon secretion. GLP-1 RAs are recommended in the treatment guidelines by the American Diabetes Association as well as the American Association of Clinical Endocrinology (AACE) Consensus Statement & European Society of Cardiology for type 2 diabetes mellitus patients with co-morbidities, like established atherosclerotic cardiovascular disease and obesity.

IRRI Develops SpeedFlower, the First Speed Breeding Protocol for Rice



The SpeedBreed multiplication chamber in the SpeedBreed facility at the IRRI South Asia Regional Centre (ISARC) in Varanasi, India. Photo Source: IRRI

January 10, 2024

Scientists from the International Rice Research Institute (IRRI) have developed SpeedFlower, a robust, first-ever speed breeding protocol for rice that will achieve 4 to 5 crops of rice in one year, which is almost double of what has been possible in current breeding programs.

SpeedFlower focuses on optimizing light spectrum, intensity, photoperiod, temperature, humidity, nutrient levels, and hormonal regulation to expedite growth, flowering, and

maturity in rice. It has demonstrated flowering within just 60 days for tested rice varieties and achieved a 50% reduction in seed maturity time, irrespective of their natural flowering durations. The protocol is suitable for the vast majority of rice grown globally, including for indica and japonica.

A subset of 198 genotypes from 12 diverse sub-groups of *Oryza sativa* L. from the 3,000 Rice Genomes Project (3K RGP) was selected to validate SpeedFlower in the speed breeding facility at the IRRI South Asia Regional Centre (ISARC) in Varanasi, India. In

field conditions, the flowering time of these genotypes ranged from 58 to 127 days. However, when grown under the optimized SpeedFlower, all 198 genotypes successfully flowered within 58 days.

“SpeedFlower demonstrates a remarkable impact of speed breeding on crop research. With this protocol, we can expedite crossing and inbreeding activities, completing them within 1.5–2 years instead of the usual 6–7 years required in the field,” said ISARC Director Dr. Sudhanshu Singh.

Nigeria Approves GM Maize for Commercialization



January 17, 2024

The Federal Government of Nigeria has approved the commercial release of genetically modified insect-resistant and drought-tolerant maize varieties, known as TELA maize. With this latest development, GM maize becomes the second food crop, after Bt cowpea, to be commercialized in the country.

The approval was granted by the National Committee on Naming, Registration, and Release of Crop Varieties, Livestock Breeds/Fisheries (Ncnrrcvlf) on January 11, 2024, in Ibadan. The varieties approved are SAMMAZ 72T, SAMMAZ 73T, SAMMAZ 74T, and SAMMAZ 75T.

The new varieties are drought tolerant and are resistant to stem-borer and

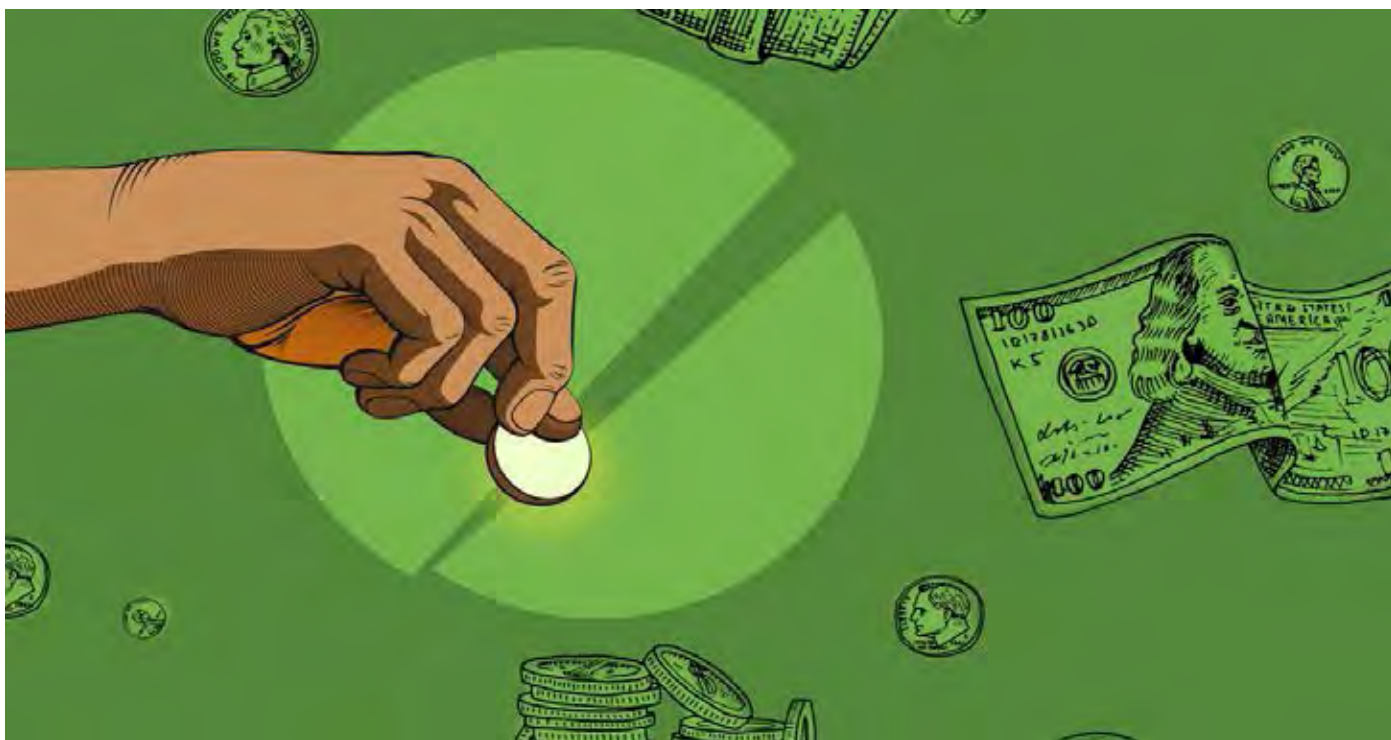
fall armyworm, resulting in a yield advantage of up to 10 tonnes per hectare under good agronomic practices. The national average for similar hybrids is 6 tonnes per hectare. The varieties are suitable for Rain Forest, Guinea, and Sudan Savannas. Stem borers reduce maize production in several African countries, while fall armyworms can destroy up to 20 million metric tons of maize in Africa each year, enough to feed 100 million people.

The release and registration of the four varieties followed environmental release approval in October 2021, granted by the National Biosafety Management Agency (NBMA). Development of the improved varieties was led by the Institute for Agricultural Research (IAR) Samaru, Ahmadu Bello University Zaria through the TELA Maize Public-Private Partner-

ship coordinated by the African Agricultural Technology Foundation (AATF). The TELA Maize Project is being implemented in 5 countries – Ethiopia, Kenya, Mozambique, Nigeria, and South Africa.

Dr. Sylvester Oikeh, the TELA Maize Project Manager, celebrated the decision by Nigeria by calling on other African countries to act for farmers. ‘I am encouraged by this decision by the Federal Government of Nigeria that reflects their commitment to the needs of farmers. ‘I congratulate the scientists for their hard work and dedication that has seen the product getting closer to farmers and look forward to other countries making similar decisions for the good of the farmer,’ he said.

Publisher donating author fees from retracted articles to charity



January 1, 2024

What should happen to the millions of dollars publishers rake in from authors whose work is later retracted?

Guillaume Cabanac, one of the developers of the Problematic Paper Screener, has repeatedly suggested publishers donate such revenue to charity.

And now one is doing just that.

Recently, IOP Publishing took Cabanac up on his suggestion, and has begun sending the article processing fees (APCs) from articles it retracts to Research4Life, an organization

that “provides institutions in low-and middle-income countries with online access to academic and professional peer-reviewed content,” according to its website.

Cabanac told us:

APCs of retracted papers should not be kept by publishers (this would hinder incentives to correct the record).

They should not be returned to authors (especially when they are pay-permill customers).

Transferring APCs to a charity (or the CSI [Center for Scientific In-

tegrity, Retraction Watch’s parent nonprofit]) will support a good cause (or integrity endeavours).

IOP Publishing donated 100% of the money it received from retracted papers this year, and plans to do the same each year, a spokesperson said. The publisher declined to give a specific amount for the donation.

As “a way to support research integrity even further,” Cabanac said, “sleuths should unite in a kind of nonprofit association funded by the APCs of retracted papers!”

Scientists Uncover Plant Hormone that Boosts Plant Growth by 30%



January 10, 2024

(From left to right) Dr. Omkar Kulkarni, currently a research scientist at the L'Oréal – SCELSE joint lab; Samantha Phua, PhD student at NUS and SCELSE; and Associate Professor Sanjay Swarup, Principal Investigator at the Research Centre on Sustainable Urban Farming (SURF) under the NUS Faculty of Science and Deputy Research Director at SCELSE. Photo Source: SCELSE

Scientists from the National University of Singapore (NUS) and the Singapore Centre for Environmental Life Sciences Engineering (SCELSE) have uncovered agro-microbials that can enhance the synergy between crops and microbes, and ultimately improve

crop yield and productivity.

In the study conducted over five years since 2018, the scientists discovered that the plant hormone methyl jasmonate (MeJA), a volatile organic compound typically released by plants above ground during periods of stress – served as a shared, possibly secret, language that allows the plant to communicate with the surrounding layers of microorganisms embedded in the soil.

The research team discovered that MeJA is released underground by the plant roots in a volatile form; volatile MeJA triggers and enhances the formation of biofilms in bacteria at a distance from the plant roots; and these bacteria in the biofilm release a differ-

ent set of volatile compounds that can boost plant growth by up to 30%.

Agro-microbials encompass microbial communities associated with crops that serve critical functions of plant growth promotion, disease prevention, and nitrogen fixation. They also help to keep the soil fertile by breaking down organic matter, recycling nutrients, and creating humus to retain moisture. As a follow-up to their initial findings, the team will further investigate the exact chemical nature of the compounds released by the soil microbial environment that stimulates plant growth.

Latest Research

Study pinpoints breast cancer 'cells of origin' in high-risk women

January 17, 2024

Australian scientists have pinpointed likely 'cells-of-origin', the source cells that can grow into breast cancer, in women carrying a faulty BRCA2 gene who are at high risk of developing the disease.

The WEHI-led study also showed these cells have potential to be targeted with an existing cancer drug to delay tumour growth, in findings that may lead to future preventive treatments for the disease.

Women who inherit and carry a faulty BRCA2 gene have a substantially increased risk of developing breast cancer -- approximately 70% of carriers will develop the disease over their lifetime.

These cancers often occur at a young age and can be clinically aggressive. Early screening is encouraged and some women undertake



preventive breast surgery (mastectomy) to reduce their breast cancer risk.

In a milestone finding published in *Nature Cell Biology*, researchers have discovered the likely 'cells-of-origin' of cancer in BRCA2 carriers. By comparing cancer-free tissue samples from both carriers and non-carriers, they identified an aberrant population of cells that divide more quickly.

Study joint first author Dr Rachel Joyce said this perturbed cell population was found in the majority of tissue samples from women with a faulty BRCA2 gene.

"Given they were found in most of the BRCA2 tissue samples from healthy females, we believe these

may be the cells-of-origin that lead to future breast cancers in women that carry the BRCA2 mutation," Dr Joyce said.

Lead author Professor Jane Visvader said the team developed a pre-clinical BRCA2 model that showed similar alterations in the ductal cells, and targeted them with the existing cancer drug everolimus, which is approved to treat patients with relapsed breast cancer.

"Through pinpointing this vulnerability in protein production, we were able to show that pre-treatment with this drug delayed the formation of tumours in the pre-clinical model," said Prof Visvader, joint head of the ACRF Cancer Biology and Stem Cells Di-

vision and the Breast Cancer Laboratory at WEHI.

“This raises the possibility that targeting specific aspects of protein production in this way could represent a new breast cancer prevention strategy for women with a faulty BRCA2 gene.”

Resin destroys coronavirus from plastic surfaces

January 30, 2024

Researchers at the University of Jyväskylä, Finland, are currently developing anti-viral surfaces to decrease the spread of infectious diseases. A recent study found that a resin ingredient is effective against coronaviruses and strongly decreases their infectivity on plastic surfaces.

Viruses may persist on solid surfaces for long periods, which may contribute to an increased risk for infection. The research group of the Professor of Cell and Molecular Biology Varpu Marjomäki from the University of Jyväskylä, is investigating how different surfaces and materials could decrease the spread of viral diseases. For example, they are studying how long corona viruses survive on different surfaces when humidity and temperature are varying.

“This information would be of direct benefit to both consumers and industry. Antiviral functionality could be used, for example, in restaurants, kindergartens, public transport and stores, on different surfaces, where viruses can potentially stay infective for a long time and spread easily,” says Professor Varpu Marjomäki from the University of Jyväskylä.

The researchers of the Nanoscience Center of the University of Jyväskylä studied resin-embedded

plastic surfaces against both the seasonal human coronavirus and the SARS-CoV-2 virus.

“In our recent study, we found that the viruses stayed infective for more than two days on plastic surfaces that were not treated at all. In contrast, a plastic surface containing resin showed good antiviral activity within fifteen minutes of contact and excellent efficacy after thirty minutes. Plastic treated with resin is therefore a promising candidate for an antiviral surface,” says Marjomäki.

Researchers 3D-print functional human brain tissue

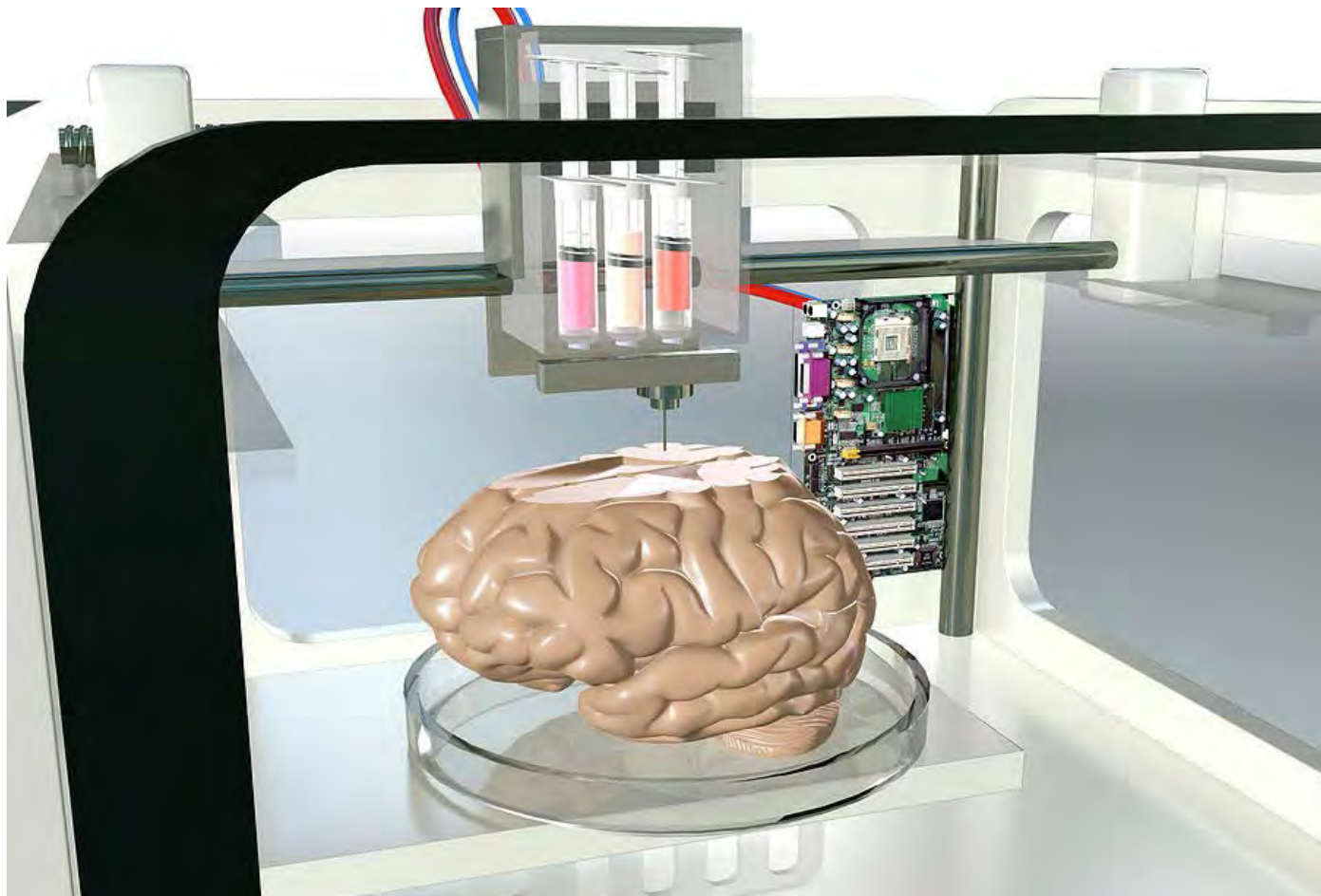
February 1, 2024

A team of University of Wisconsin-Madison scientists has developed the first 3D-printed brain tissue that can grow and function like typical brain tissue.

It’s an achievement with important implications for scientists studying the brain and working on treatments for a broad range of neurological and neurodevelopmental disorders, such as Alzheimer’s and Parkinson’s disease.

“This could be a hugely powerful model to help us understand





how brain cells and parts of the brain communicate in humans,” says Su-Chun Zhang, professor of neuroscience and neurology at UW-Madison’s Waisman Center. “It could change the way we look at stem cell biology, neuroscience, and the pathogenesis of many neurological and psychiatric disorders.”

Printing methods have limited the success of previous attempts to print brain tissue, according to Zhang and Yuanwei Yan, a scientist in Zhang’s lab. The group behind the new 3D-printing process described their method today in the journal *Cell Stem Cell*.

Instead of using the traditional 3D-printing approach, stacking layers vertically, the researchers went horizontally. They situated brain cells, neurons grown from induced pluripotent stem cells, in a softer “bio-ink” gel than previous attempts had employed.

“The tissue still has enough structure to hold together but it is soft enough to allow the neurons to grow into each other and start talking to each other,” Zhang says.

The cells are laid next to each other like pencils laid next to each other on a tabletop.

“Our tissue stays relatively thin and

this makes it easy for the neurons to get enough oxygen and enough nutrients from the growth media,” Yan says.

The results speak for themselves -- which is to say, the cells can speak to each other. The printed cells reach through the medium to form connections inside each printed layer as well as across layers, forming networks comparable to human brains. The neurons communicate, send signals, interact with each other through neurotransmitters, and even form proper networks with support cells that were added to the printed tissue.

“We printed the cerebral cortex

and the striatum and what we found was quite striking,” Zhang says. “Even when we printed different cells belonging to different parts of the brain, they were still able to talk to each other in a very special and specific way.”

The printing technique offers precision -- control over the types and arrangement of cells -- not found in brain organoids, miniature organs used to study brains. The organoids grow with less organization and control.

“Our lab is very special in that we are able to produce pretty much any type of neurons at any time. Then we can piece them together at almost any time and in whatever way we like,” Zhang says. “Because we can print the tissue by design, we can have a defined system to look at how our human brain network operates. We can look very specifically at how the nerve cells talk to each other under certain conditions because we can print exactly what we want.”

That specificity provides flexibility. The printed brain tissue could be used to study signaling between cells in Down syndrome, interactions between healthy tissue and neighboring tissue affected by Alzheimer’s, testing new drug candidates, or even watching the brain grow.

“In the past, we have often looked at one thing at a time, which means we often miss some critical components. Our brain operates in networks. We want to print brain

tissue this way because cells do not operate by themselves. They talk to each other. This is how our brain works and it has to be studied all together like this to truly understand it,” Zhang says. “Our brain tissue could be used to study almost every major aspect of what many people at the Waisman Center are working on. It can be used to look at the molecular mechanisms underlying brain development, human development, developmental disabilities, neurodegenerative disorders, and more.”

The new printing technique should also be accessible to many labs. It does not require special bio-printing equipment or culturing methods to keep the tissue healthy, and can be studied in depth with microscopes, standard imaging techniques and electrodes already common in the field.

The researchers would like to explore the potential of specialization, though, further improving their bio-ink and refining their

equipment to allow for specific orientations of cells within their printed tissue..

“Right now, our printer is a benchtop commercialized one,” Yan says. “We can make some specialized improvements to help us print specific types of brain tissue on-demand.”

Researchers improve blood tests’ ability to detect and monitor cancer

January 18, 2024

Tumors constantly shed DNA from dying cells, which briefly circulates in the patient’s bloodstream before it is quickly broken down. Many companies have created blood tests



that can pick out this tumor DNA, potentially helping doctors diagnose or monitor cancer or choose a treatment.

The amount of tumor DNA circulating at any given time, however, is extremely small, so it has been challenging to develop tests sensitive enough to pick up that tiny signal. A team of researchers from MIT and the Broad Institute of MIT and Harvard has now come up with a way to significantly boost that signal, by temporarily slowing the clearance of tumor DNA circulating in the bloodstream.

The researchers developed two different types of injectable molecules that they call “priming agents,” which can transiently interfere with the body’s ability to remove circulating tumor DNA from the bloodstream. In a study of mice, they showed that these agents could boost DNA levels enough that the percentage of detectable early-stage lung metastases leapt from less than 10 percent to above 75 percent.

This approach could enable not only earlier diagnosis of cancer, but also more sensitive detection of tumor mutations that could be used to guide treatment. It could also help improve detection of cancer recurrence.

“You can give one of these agents an hour before the blood draw, and it makes things visible that previously wouldn’t have been. The implication is that we should be able to give everybody who’s doing liq-

uid biopsies, for any purpose, more molecules to work with,” says Sanjeeta Bhatia, the John and Dorothy Wilson Professor of Health Sciences and Technology and of Electrical Engineering and Computer Science at MIT, and a member of MIT’s Koch Institute for Integrative Cancer Research and the Institute for Medical Engineering and Science.”

The body uses two primary strategies to remove circulating DNA from the bloodstream. Enzymes called DNases circulate in the blood and break down DNA that they encounter, while immune cells known as macrophages take up cell-free DNA as blood is filtered through the liver.

The researchers decided to target each of these processes separately. To prevent DNases from breaking down DNA, they designed a monoclonal antibody that binds to circulating DNA and protects it from the enzymes.

“Antibodies are well-established biopharmaceutical modalities, and they’re safe in a number of different disease contexts, including cancer and autoimmune treatments,” Love says. “The idea was, could we use this kind of antibody to help shield the DNA temporarily from degradation by the nucleases that are in circulation? And by doing so, we shift the balance to where the tumor is generating DNA slightly faster than is being degraded, increasing the concentration in a blood draw.”

The other priming agent they developed is a nanoparticle designed to block macrophages from taking up cell-free DNA. These cells have a well-known tendency to eat up synthetic nanoparticles.

The researchers tested their priming agents in mice that received transplants of cancer cells that tend to form tumors in the lungs. Two weeks after the cells were transplanted, the researchers showed that these priming agents could boost the amount of circulating tumor DNA recovered in a blood sample by up to 60-fold.

The researchers have launched a company called Amplifyer Bio that plans to further develop the technology, in hopes of advancing to clinical trials.

“A tube of blood is a much more accessible diagnostic than colonoscopy screening or even mammography,” Bhatia says. “Ultimately, if these tools really are predictive, then we should be able to get many more patients into the system who could benefit from cancer interception or better therapy.”

Bioengineered material developed to rapidly stop bleeding in patients on

blood thinners

January 22, 2024

More than 11 million people in the United States take anticoagulation or antiplatelet medications, such as heparin or aspirin, to treat serious conditions like heart attack and stroke. However, these medications also put patients at risk of life-threatening bleeding in the case of injury or during surgery. To improve strategies for reducing blood loss, a team led by investigators from Brigham and Women's Hospital, a founding member of the Mass General Brigham health-care system, developed a porous material that maximizes blood absorption and effectively activates clotting mechanisms, even in patients on anticoagulation or antiplatelet medication. Findings, published in PNAS, show that the bleed-stopping material, or "hemostat," halted bleeding within an average of about five minutes in patients on anticoagulants who underwent cardiac catheterization, a dramatic reduction from tradi-

tional compression methods that can take over two hours.

"This is a next-generation hemostat that effectively stops bleeding, even in patients who take anticoagulation or antiplatelet medications," said corresponding author Hae Lin Jang, Ph.D., of the Center for Engineered Therapeutics. "We used an exciting, interdisciplinary approach that combines engineering principles, materials science, and understandings of molecular biology to overcome the limitations of existing therapies and address a real clinical need."

Over 5 million people globally die each year due to trauma, with over a third of these deaths attributed to uncontrolled bleeding. The researchers used what is known as a "rational engineering" approach to develop a more effective hemostat. They began by simulating blood flow through pores to determine what microscopic design would optimize absorption. They drew inspiration from the architecture of the human lungs, which contain spherical "air sacs" called alveoli

that enable a high interaction rate with blood within a short time. Alveoli have a large surface area based on their tortuous porous structure, which led the researchers to engineer a highly interconnected, spherical microporous structure in their material to rapidly absorb blood and accumulate clotting components like platelets in a highly concentrated manner, which facilitate blood clotting.

The researchers developed the alveoli-like structure using chitosan, which can be extracted from shellfish. Chitosan is already used in some hemostats: its positively charged surface is known to strongly attract negatively charged platelets and fibrinogen, the two major components of a blood clot. However, contrary to previous assumptions, the researchers discovered that chitosan also directly stimulates blood clotting by activating the TLR-2 clotting pathway, making it a viable mechanism for increasing blood clotting even in patients on anticoagulants.

The researchers demonstrated the efficacy of the material in 70 patients who underwent cardiovascular catheterization procedures while on the anticoagulant heparin, with bleeding observed to stop after a mean time of about five minutes for patients on low-dose heparin and in under about nine minutes in patients on heparin doses of up to 12,500 IU.

Other advantages of the hemostatic material included its easy application and removal. The chitosan



pad eliminated the need for strong and prolonged compression, which can take several hours and requires extensive nursing. Furthermore, gauze removal can cause severe pain to patients and is frequently associated with a reoccurrence of bleeding; in contrast, the more absorptive chitosan hemostat was removed relatively cleanly from wounds and received high patient comfort scores.

The researchers are continuing to study the wound-healing process after application of the chitosan hemostat. Moreover, they are investigating other next-generation wound dressings, which may be able to deliver drugs or improve the cleanliness of the wound environment, thus reducing the need for frequent changes.

“This hemostat can save valuable time in emergency situations,” said first author Vivian K. Lee, Ph.D., of the Center for Engineered Therapeutics. “In emergencies, it can be extremely challenging to screen the prescription information of a patient to provide appropriate anticoagulation reversal therapy to patients on anticoagulants. If a hemostat can bypass a medication’s anticoagulating mechanisms, it can be used in a wide range of patients, saving time, and potentially saving lives.”

Bioengineers on the brink

of breaching blood-brain barrier

December 18, 2023

Now, researchers led by Michael Mitchell of the University of Pennsylvania are broaching this long-standing boundary in biology, known as the blood-brain barrier, by developing a method akin to providing this mechanic with a special keycard to bypass security. Their findings, published in the journal *Nano Letters*, present a model that uses lipid nanoparticles (LNPs) to deliver mRNA, offering new hope for treating conditions like Alzheimer’s disease and seizures -- not unlike fixing the control tower’s glitches without compromising its security.

“Our model performed better at crossing the blood-brain barrier than others and helped us identify

organ-specific particles that we later validated in future models,” says Mitchell, associate professor of bioengineering at Penn’s School of Engineering and Applied Science, and senior author on the study. “It’s an exciting proof of concept that will no doubt inform novel approaches to treating conditions like traumatic brain injury, stroke, and Alzheimer’s.”

To develop the model, Emily Han, a Ph.D. candidate and NSF Graduate Research Fellow in the Mitchell Lab and first author of the paper, explains that it started with a search for the right in vitro screening platform, saying, “I was combing through the literature, most of the platforms I found were limited to a regular 96-well plate, a two-dimensional array that can’t represent both the upper and lower parts of the blood-brain barrier, which correspond to the blood and brain, respectively.”

Han then explored high-throughput transwell systems with both



compartments but found they didn't account for mRNA transfection of the cells, revealing a gap in the development process. This led her to create a platform capable of measuring mRNA transport from the blood compartment to the brain, as well as transfection of various brain cell types including endothelial cells and neurons.

"I spent months figuring out the optimal conditions for this new in vitro system, including which cell growth conditions and fluorescent reporters to use," Han explains. "Once robust, we screened our library of LNPs and tested them on animal models. Seeing the brains express protein as a result of the mRNA we delivered was thrilling and confirmed we were on the right track."

The team's platform is poised to significantly advance treatments for neurological disorders. It's currently tailored for testing a range of LNPs with brain-targeted peptides, antibodies, and various lipid compositions. However, it could also deliver other therapeutic agents like siRNA, DNA, proteins, or small molecule drugs directly to the brain after intravenous administration.

What's more, this approach isn't limited to the blood-brain barrier as it shows promise for exploring treatments for pregnancy-related diseases by targeting the blood-placental barrier, and for retinal diseases focusing on the blood-retinal barrier.

The team is eager to use this platform to screen new designs and test their effectiveness in different animal models. They are particularly interested in working with collaborators with advanced animal models of neurological disorders.

"We're collaborating with researchers at Penn to establish brain disease models," Han says. "We're examining how these LNPs impact mice with various brain conditions, ranging from glioblastoma to traumatic brain injuries. We hope to make inroads towards repairing the blood-brain barrier or target neurons damaged post-injury."

Health researchers develop software to predict diseases

January 23, 2024

IntelliGenes, a first of its kind software created at Rutgers Health, combines artificial intelligence (AI) and machine-learning approaches to measure the significance of specific genomic biomarkers to help predict diseases in individuals, according to its developers.

A study published in *Bioinformatics* explains how IntelliGenes can be utilized by a wide range of users to analyze multigenomic and clinical data.

Zeeshan Ahmed, lead author of the study and a faculty member at Rutgers Institute for Health, Health Care Policy and Aging Research (IFH), said there currently are no AI or machine-learning tools available to investigate and interpret the complete human genome, especially for nonexperts. Ahmed and members of his Rutgers lab designed IntelliGenes so anyone can use the platform, including students or those without strong



knowledge of bioinformatics techniques or access to high-performing computers.

The software combines conventional statistical methods with cutting-edge machine learning algorithms to produce personalized patient predictions and a visual representation of the biomarkers significant to disease prediction.

In another study, published in *Scientific Reports*, the researchers applied IntelliGenes to discover novel biomarkers and predict cardiovascular disease with high accuracy.

“There is huge potential in the convergence of datasets and the staggering developments in artificial intelligence and machine learning,” said Ahmed, who also is an assistant professor of medicine at Robert Wood Johnson Medical School.

“IntelliGenes can support personalized early detection of common and rare diseases in individuals, as well as open avenues for broader research ultimately leading to new interventions and treatments.”

Researchers tested the software using Amarel, the high-performance computing cluster managed by the Rutgers Office of Advanced Research Computing. The office provides a research computing and data environment for Rutgers researchers engaged in complex computational and data-intensive projects..

New tool helps predict progression of Alzheimer’s Disease

January 26, 2024

About 55 million people worldwide are living with dementia, according to the World Health Organization. The most common form is Alzheimer’s disease, an incurable condition that causes brain function to deteriorate.

In addition to its physical effects, Alzheimer’s causes psychological, social and economic ramifications not only for the people living with the disease, but also for those who love and care for them. Because its symptoms worsen over time,

it is important for both patients and their caregivers to prepare for the eventual need to increase the amount of support as the disease progresses.

To that end, researchers at The University of Texas at Arlington have created a novel learning-based framework that will help Alzheimer’s patients accurately pinpoint where they are within the disease-development spectrum. This will allow them to best predict the timing of the later stages, making it easier to plan for future care as the disease advances.

“For decades, a variety of predictive approaches have been proposed and evaluated in terms of the predictive capability for Alzheimer’s disease and its precursor, mild cognitive impairment,” said Dajiang Zhu, an associate professor in computer science and engineering at UTA. He is lead author on a new peer-reviewed paper



published open access in *Pharmacological Research*. “Many of these earlier prediction tools overlooked the continuous nature of how Alzheimer’s disease develops and the transition stages of the disease.”

In work supported by more than \$2 million in grants from the National Institutes of Health and the National Institute on Aging, Zhu’s Medical Imaging and Neuroscientific Discovery research lab and Li Wang, UTA associate professor in mathematics, developed a new learning-based embedding framework that codes the various stages of Alzheimer’s disease development in a process they call a “disease-embedding tree,” or DETree. Using this framework, the DETree can not only predict any of the five fine-grained clinical groups of Alzheimer’s disease development efficiently and accurately but can also provide more in-depth status information by projecting where within it the patient will be as the disease progresses.

To test their DETree framework, the researchers used data from 266 individuals with Alzheimer’s disease from the multicenter Alzheimer’s Disease Neuroimaging Initiative. The DETree strategy results were compared with other widely used methods for predicting Alzheimer’s disease progression, and the experiment was repeated several times using machine learning-methods to validate the technique.

“We know individuals living with Alzheimer’s disease often devel-

op worsening symptoms at very different rates,” Zhu said. “We’re heartened that our new framework is more accurate than the other prediction models available, which we hope will help patients and their families better plan for the uncertainties of this complicated and devastating disease.”

He and his team believe that the DETree framework has the potential to help predict the progression of other diseases that have multiple clinical stages of development, such as Parkinson’s disease, Huntington’s disease, and Creutzfeldt-Jakob disease.

New statistical tool improves the search for genes that cause diseases

January 26, 2024

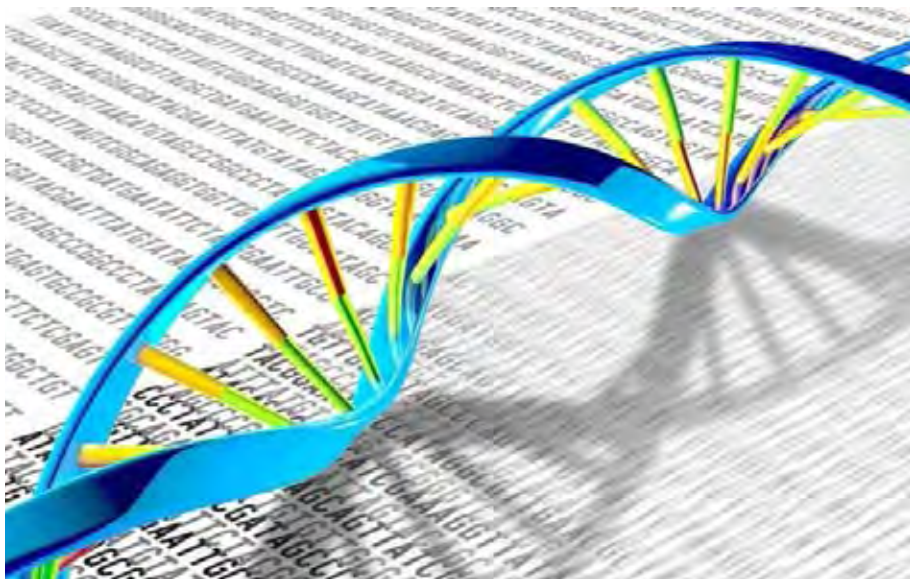
A new statistical tool developed by researchers at the University of Chicago improves the ability to find genetic variants that cause disease. The tool, described in a new paper published January 26, 2024, in *Nature Genetics*, combines data from genome wide association studies (GWAS) and predictions of genetic expression to limit the number of false positives and more accurately identify causal genes and variants

for a disease.

GWAS is a commonly used approach to try to identify genes associated with a range of human traits, including most common diseases. Researchers compare genome sequences of a large group of people with a specific disease, for example, with another set of sequences from healthy individuals. The differences identified in the disease group could point to genetic variants that increase risk for that disease and warrant further study.

Most human diseases are not caused by a single genetic variation, however. Instead, they are the result of a complex interaction of multiple genes, environmental factors, and host of other variables. As a result, GWAS often identifies many variants across many regions in the genome that are associated with a disease. The limitation of GWAS, however, is that it only identifies association, not causality. In a typical genomic region, many variants are highly correlated with each other, due to a phenomenon called linkage disequilibrium. This is because DNA is passed from one generation to next in entire blocks, not individual genes, so variants nearby each other tend to be correlated.

“You may have many genetic variants in a block that are all correlated with disease risk, but you don’t know which one is actually the causal variant,” said Xin He, PhD, Associate Professor of Human Genetics, and senior author of the new study. “That’s the fundamental



challenge of GWAS, that is, how we go from association to causality.”

To make the problem even harder, most of the genetic variants are located in non-coding genomes, making their effects difficult to interpret. A common strategy to address these challenges is using gene expression levels. Expression quantitative trait loci, or eQTLs, are genetic variants associated with gene expression.

The rationale of using eQTL data is that if a variant associated with a disease is an eQTL of some gene X, then X is possibly the link between the variant and the disease. The problem with this reasoning, however, is that nearby variants and eQTLs of other genes can be correlated with the eQTL of the gene X while affecting the disease directly, leading to a false positive. Many methods have been developed to nominate risk genes from GWAS using eQTL data, but they all suf-

fer from this fundamental problem of confounding by nearby associations. In fact, existing methods can generate false positive genes more than 50% of the time.

In the new study, Prof. He and Matthew Stephens, PhD, the Ralph W. Gerard Professor and Chair of the Departments of Statistics and Professor of Human Genetics, developed a new method called causal-Transcriptome-wide Association studies, or cTWAS, that uses advanced statistical techniques to reduce false positive rates. Instead of focusing on just one gene at a time, the new cTWAS model accounts for multiple genes and variants. Using a Bayesian multiple regression model, it can weed out confounding genes and variants.

“If you look at one at a time, you’ll have false positives, but if you look at all the nearby genes and variants together, you are much more likely to find the causal gene,” He said.

The paper demonstrates the utility of this new technique by studying genetics of LDL cholesterol levels. As one example, existing eQTL methods nominated a gene involved in DNA repair, but the new cTWAS approach pointed at a different variant in the target gene of statin, a common drug used to treat high cholesterol. In total, cTWAS identified 35 putative causal genes of LDL, more than half of which have not been previously reported. These results point to new biological pathways and potential treatment targets for LDL.

The cTWAS software is now available to download from He’s lab website. He hopes to continue working on it to extend its capabilities to incorporate other types of ‘omics data, such as splicing and epigenetics, as well as using eQTLs from multiple tissue types.

“The software will allow people to do analyses that connect genetic variations to phenotypes. That’s really the key challenge facing the entire field,” He said. “We now have a much better tool to make those connections.”



Biotech Notice

INDIAN COUNCIL OF MEDICAL RESEARCH
V.Ramalingaswami Bhavan, New Delhi

Adv. No.ICMR/Sc-B/VRDL/2023/02-Pers.

**MISSION MODE RECRUITMENT NOTICE FOR SCIENTIFIC POSITIONS AT
ICMR, REGIONAL LEVEL - VIRAL RESEARCH & DIAGNOSTIC LABORATORIES (VRDLs) OR
OTHER ICMR INSTITUTES/ CENTRES**

LAST DATE FOR RECEIPT OF APPLICATIONS: 16.02.2024

Indian Council of Medical Research (ICMR) is an Autonomous Organization, under the Department of Health Research, Ministry of Health & Family Welfare, Govt. of India. ICMR is dealing with biomedical/ health research in various areas, in collaboration with national/ international agencies, through its Headquarters at New Delhi and 27 Institutes / Centres and a large number of field stations, situated across the country.

2. ICMR invites online applications up to **16th February, 2024 till 5:30PM** to fill up 30 vacancies of **Scientist-B(15 Medical & 15 Non-Medical)** in Level 10 (Rs.56100-177500) (7th CPC Scale) from Indian Citizens, for appointment on regular basis under Direct Recruitment, under Mission Mode Initiative. Out of these, 20 vacancies are for **Regional Level - Viral Research & Diagnostic Laboratories (VRDLs)** setup under the scheme of Establishment of Network Laboratories for Managing Epidemics and National Calamities located at Delhi, Jodhpur, Bhopal, Patna, Chandigarh, Puducherry & Kozhikode and 10 vacancies are for other ICMR Institutes/ Centres as per requirement.

3. **ESSENTIAL & DESIRABLE QUALIFICATIONS:**

| Sl. No. | Post / specialization | No. of Vacancies | Essential Qualifications | Desirable experience |
|---------|-----------------------|------------------|--|--|
| 1 | Medical | 15 | MBBS or equivalent degree recognised by MCI/NMC | Experience in Research & Development related to Pandemic Management for 3 years in a Govt/Public sector/Private Institutions |
| 2 | Non-Medical | 15 | Masters from a recognised University in subject as given in Annexure-I | Experience in Research & Development related to Pandemic Management for 3 years in a Govt/Public sector/Private Institutions |



DEPARTMENT OF BIOTECHNOLOGY

Ministry of Science & Technology

Government of India

CALL FOR PROPOSALS FOR BIOTECHNOLOGY BASED PROGRAMME FOR SOCIETAL DEVELOPMENT IN RURAL AREAS AND ASPIRATIONAL DISTRICTS

SPECIAL CALL: Societal Development Projects for (i) Human Health and (ii) Nutrition

Department of Biotechnology invites applications under **'BIOTECHNOLOGY BASED PROGRAMME FOR SOCIETAL DEVELOPMENT'** for implementation of Societal Development Programmes and setting up Rural Bioresource Complex in Rural Areas and Aspirational districts of India. The programme emphasizes dissemination of field-tested and proven biotechnological innovations/technologies already available with DBT AIs, national laboratories, universities, scientific research institutes etc. for immediate benefit of the community (women /SC/ST/rural population).

The initiative provides support for (a) Dissemination of proven biotechnological innovations/technologies through on field demonstration/extension oriented activities for the welfare of society belonging to Rural Areas and Aspirational districts, (b) Creating avenues for income and employment generation in addition to change in their lifestyle in terms of monetary gain or improvement in health and nutrition status, skill development thereby inculcating a spirit of 'rural bio-entrepreneurship', (c) To lead to the creation of an enabling ecosystem for the target population to get relief from drudgery and in turn encourage them to become self-employed, self-dependent and socio-economically empowered, and (d) Activities that facilitate judicious utilization of bio-resources leading to sustainable development.

The programme **does not envisage** supporting of projects that focus entirely on R&D activities that do not translate direct benefits to the population residing in Rural Areas and Aspirational districts of the country. **Aim is to utilize protocols/technologies/interventions which have been proven/developed in the laboratory by setting up Rural Bioresource Complex which shall gradually evolve and serve as a nodal resource centre, not only regarding the technical aspects for the respective technology/ies but also establishing market linkages, formation of self-help groups/co-operatives, public engagement initiatives, training and demonstration activities etc. even after the duration of support.** The budget for a 3 year full project would be limited to a total cost of Rs 60 lakh (with Non-recurring support not exceeding Rs 20 lakh). For a pilot project [in cases where PI has no earlier experience of Societal projects or in cases where the Steering Committee recommends for a pilot stage project] **the project cost would be limited to Rs 30 lakh (with Non-recurring support not exceeding Rs 10 lakh) for a period of 18 months.**

To apply online visit: <https://www.dbtpromis.nic.in>

Duly signed and stamped hardcopy version of the proposal submitted via eProMIS may please be sent to:

Dr. Garima Gupta, Scientist 'F'

Head, Technology and Societal Division,

Department of Biotechnology, Ministry of Science & Technology,
Block-3, 5th Floor, CGO Complex, Lodhi Road, New Delhi - 110003

Email: garima.g@nic.in

For queries contact: Dr. Vandana Prajapati, Scientist 'D'

Programme Officer, Technology and Societal Division

Email: vandana.p@dbt.nic.in

GOVERNMENT OF INDIA
DEPARTMENT OF BIOTECHNOLOGY
MINISTRY OF SCIENCE & TECHNOLOGY

CALL FOR APPLICATIONS FOR TATA INNOVATION FELLOWSHIP: 2023-24

Applications are invited for “**Tata Innovation Fellowship**”, a highly competitive scheme instituted by the Department of Biotechnology, Ministry of Science & Technology, Govt. of India to recognize and reward scientists with outstanding track record in Biological sciences/Biotechnology to find innovative solutions to major problems in health care, agriculture, environment and other allied areas related to life sciences and Biotechnology.

ELIGIBILITY:

- i) The fellowship is open to Indian Nationals residing in India who are below the **age of 55 years** as on the closing date of the application. The fellowship is co-terminus with the superannuation of fellow in his/her organization.
- ii) The applicant should possess a PhD degree in Life Sciences, Agriculture, Veterinary Science or a Master's degree in Medical Sciences, Engineering or an equivalent degree in Biotechnology/ related areas. The applicant must have outstanding contribution and publication in the specific area.
- iii) The candidate must have a regular/ permanent position in a University/Institute/Organization and should be engaged in research and development. If he/she is availing any other fellowship, he/she will have to opt for only one of the fellowships.
- iv) The applicant should have spent at least 5 years in India before applying for the fellowship.
- v) Evidence of outstanding track record and a deep commitment to find innovative solutions to major problems in health care, agriculture and other areas related to life sciences and biotechnology.

NATURE OF SUPPORT:

- i) The amount of the fellowship is **Rs. 25,000/- per month** in addition to regular salary from the host institute. If an awardee is receiving salary from an international organization, he/she will be entitled for research grant i.e. contingency only.
- ii) In addition, each Fellow will receive contingency grant annually for meeting the expenses on consumables, equipment and domestic travel, manpower and other contingent expenditure to be incurred in connection with the implementation of ongoing research project under the fellowship.

HOW TO APPLY:

Please visit the DBT ePromis portal (url: <http://dbtepromis.nic.in>) for online submission of application. For any queries, please contact Dr. Manoj Singh Rohilla, Scientist-'F', Room No 613, Department of Biotechnology, Ministry of Science & Technology, 6th Floor, Block-2, CGO Complex, Lodhi Road, New Delhi -110003, Email: manojrohilla.dbt@nic.in. All candidates are required to keep original copy of documents submitted online in hand; in case of selection at the later stage, the same will be required to be submitted to Department of Biotechnology, GOI, New Delhi.

Important Dates:

| | |
|----------------------------------|--|
| Start Date of Online Application | 21 st December 2023 |
| End Date of Online Application | 5 th February 2024 (IST 11:59 PM) |

Call for Proposals

Honorary Thematic Hubs and Spokes for Gold Standard Datasets in Medical Image Analysis

Introduction

Artificial Intelligence (AI) is emerging as a promising technique for diagnosis, treatment planning, and monitoring the progression of various diseases. Indian Council of Medical Research (ICMR) in collaboration with the Indian Institute of Science (IISc) has initiated a collaborative project – MIDAS India (Medical Imaging/Information DATaSets for India), aimed at establishing reference gold standard datasets for developing and evaluating robust AI based tools. This initiative will overcome the challenges posed by the current fragmented and inconsistent datasets which is critically impacting the development and comparative evaluation of AI/ML based diagnostic tools. This collaboration is creating comprehensive, high-quality medical datasets, which accurately represent the Indian demographic diversity; thus harnessing the immense potential of artificial intelligence and bioinformatics to advance healthcare.

Objectives

The primary goal of this project is to address the challenge of the lack of standardized, curated datasets which hinders the development and comparative evaluation of effective diagnostic tools. By establishing gold standard datasets in various thematic areas, this project will pave the way for advancements in the diagnosis of diseases such as cancer, malaria, skin conditions, and more.

Call for Proposals

We invite proposals from institutes or groups interested in becoming honorary thematic hubs with spokes and associate with ICMR-IISc collaborative initiative. Your contribution to this initiative will play a pivotal role in establishing and advancing AI/ML based health ecosystem in India

Submission Guidelines

- Proposals should be submitted electronically in PDF format in format attached as Annexure-I on suruchia.hq@icmr.gov.in or pnarad.hq@icmr.gov.in.

- The subject line of the email should be “Proposal for ICMR-IISc Thematic Hubs and Spokes”.

- Deadline for submission: 08.02.2024

Contact Information

For further inquiries or submission, please contact Dr. Harpreet Singh at harpreets.hq@icmr.gov.in, +919999496965, +911126588876.



Biotechnology Research and Innovation Council
A Department of Biotechnology Organisation



Ph.D. Admissions at DBT-ILS

Join us for a PhD program in the following areas :

- **Cancer Biology**
- **Infectious Disease Biology**
- **Plant Biotechnology**
- **Interdisciplinary Biology**

• **Last date of online applications:**
13th February 2024

• **Tentative dates of interview:**
14th, 15th March 2024

Details are provided on the institute website (www.ils.res.in)

Interested/eligible candidates may apply **ONLINE**
by scanning the QR code





RAMALINGASWAMI RE-ENTRY FELLOWSHIP

SRM University-AP inviting
applications for the year
2023-2024



About the University

SRM University-AP, is a multi-disciplinary research-intensive institute combining academic rigour, evolving research ecosystem, entrepreneurial heritage, and pioneering faculty. As a leading tertiary education institution, SRM AP has been challenging the conventional learning ecosystem since its inception to create a novel avenue where passion for wisdom meets purpose and excellence.

"Globally Connected, Regionally Transformative and Nationally Relevant"

About the Department

The Department of Biological Sciences at SRM University-AP offers B.Sc. (Hons) Integrative Biology, M.Sc. Molecular Biology and Biotechnology, PhD degree and Postdoctoral Fellowships on various subjects. All programmes are research-intensive covering cutting-edge topics. The Department has outstanding, internationally recognised faculty supported by excellent facilities for both teaching and research. The Department is equipped with state-of-the-art labs with several essential instruments such as high-speed centrifuges, spectrophotometers, PCR machines, real time PCR, FPLC, shakers, incubators, multimode plate reader, fluorescence microscope, BSL2 facility, High performance computing clusters (HPCC) etc. <https://srmap.edu.in/seas/biological-sciences>

Faculty: The department has outstanding, internationally recognised faculty trained from premier institutes of National and International level. Faculty members with publications from the top-most journals including Nature, Science, Nature Microbiology, Plos Biology, PNAS, Green Chemistry, Applied Materials and Interface etc.

Funding: The Department has ongoing projects with a total value of **6 crores** with support from SRM AP, DBT, DST-SERB (SRG, CRG, SURE), DBT-Wellcome Trust.

SECURE SPACE

for as low as @Rs 10K

Visit for more information: <http://www.biotechexpressmag.com/advertise/>

CAN YOU BELIEVE WHAT YOU READ?

**Biotech
Express**

Better. Believe it!

With fake and misleading news leaving most Biotechnology people confused about even the basic facts, Biotech Express keeps it real. Whether in print or digital people trust it to be expertly researched written and fact checked.

Bring real matters. That's a fact.

Believe Biotech | Believe Biotech Express