प्रगति प्रतिवेदन

STATUS REPORT

2021-2023

सीएसआईआर
CSIR
भारत का नवाचार इंजन
The Innovation Engine of India
CSIR-IMTECH

सी एस आई आर - सूक्ष्मजीव प्रौद्योगिकी संस्थान

CSIR - INSTITUTE OF MICROBIAL TECHNOLOGY

सीएसआईआर
CSIR
भारत का नवाचार इंजन
The Innovation Engine of India

CSIR-IMTECH

Compilation Committee:

Dr. T.N.C. Ramya, Sr. Principal Scientist (Chairperson)

Dr. Beena Krishnan, Principal Scientist (Member)

Dr. Srinivasan Krishnamurthi, Principal Scientist (Member)

Dr. Anshu Bhardwaj, Senior Scientist (Member)

Dr. Rashmi Kumar, Senior Scientist (Member)

Sh. Manuj Tripathi, Senior Scientist (Member)

Section Officer(G) (Member)

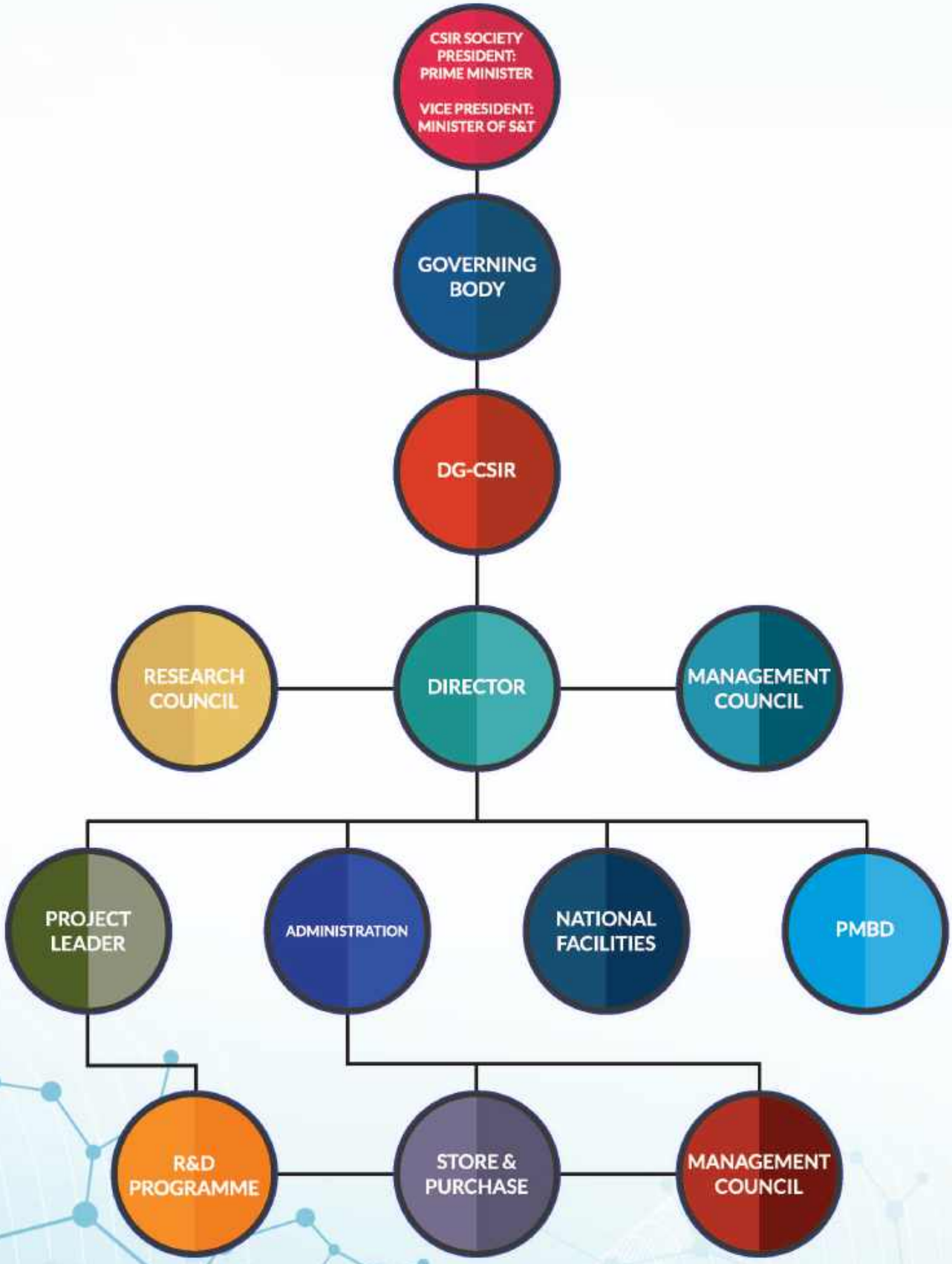
Sh. Garry Bedi, Principal Scientist (Convenor)

Dr. K.P.S. Sengar, Sr. Technical Officer (Co-Convenor)

Hindi translation:

Dr. K.P.S. Sengar

ORGANISATION CHART



सीएसआईआर
CSIR
भारत का नवाचार इंजन
The Innovation Engine of India

CSIR-IMTECH

प्रगति प्रतिवेदन

STATUS REPORT

2021-2023

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्
Council of Scientific & Industrial Research

सी एस आई आर - सूक्ष्मजीव प्रौद्योगिकी संस्थान
CSIR - INSTITUTE OF MICROBIAL TECHNOLOGY

सेक्टर 39 ए, चंडीगढ़
SECTOR 39-A, CHANDIGARH

CONTENTS

CONTENTS

निदेशक के डेस्क से

मैं अत्यंत गर्व और जिम्मेदारी की भावना के साथ सीएसआईआर सूक्ष्मजीव प्रौद्योगिकी संस्थान (सीएसआईआर-आईएमटेक) की 2021-2023 की अवधि के लिए स्थिति रिपोर्ट प्रस्तुत कर रहा हूं।

अपने अस्तित्व के पिछले 40 वर्षों में, CSIR-IMTECH ने माइक्रोबियल जैव प्रौद्योगिकी अनुसंधान में अग्रणी के रूप में अपनी स्थिति को मजबूत किया है और माइक्रोबियल विविधता और वर्गीकरण, आणविक आनुवंशिकी और जीनोमिक्स, माइक्रोबियल बायोएक्टिव खोज, सूक्ष्मजीवों के आणविक, सेलुलर और प्रतिरक्षा-जीवविज्ञान, संक्रामक रोग, किण्वन और जैवप्रक्रिया विकास, प्रोटीन विज्ञान, संरचनात्मक जीव विज्ञान, जैव चिकित्सा, जैव सूचना विज्ञान और बड़े डेटा विश्लेषण सहित माइक्रोबियल प्रौद्योगिकी के कई क्षेत्रों में मजबूती से आगे बढ़ा है। जैसे-जैसे हम वैश्विक स्वास्थ्य और पर्यावरणीय चुनौतियों की जटिलताओं को समझते हैं, हमारी शोध पहलों को ESKAPE रोगजनकों और रोगाणुरोधी प्रतिरोध (AMR), उपेक्षित संक्रामक रोगों और नवीन चिकित्सीय रणनीतियों के विकास जैसी महत्वपूर्ण चिंताओं के साथ तेजी से जोड़ा गया है।

वर्ष 2021-2023 की अवधि में हमारे कार्य के कई क्षेत्रों में महत्वपूर्ण उपलब्धियाँ देखी गईं। CSIR-IMTECH के शोध समूहों ने माइक्रोबियल बायोटेक्नोलॉजी में अनुसंधान की सीमाओं को आगे बढ़ाना जारी रखा है और शीर्ष-स्तरीय अंतरराष्ट्रीय पत्रिकाओं में 328 शोध पत्र प्रकाशित किए हैं। माइक्रोबियल बायोटेक्नोलॉजी के क्षेत्र में हमारे बहुमुखी योगदान को प्रदर्शित करते हुए चौदह अद्वितीय पेटेंट दायर किए गए। हमारे वैज्ञानिक DBT, DBT/वेलकम ट्रस्ट इंडिया अलायंस, DST, SERB, ICMR, आदि सहित विभिन्न फंडिंग एजेंसियों से चालीस अत्यधिक प्रतिस्पर्धी बाह्य अनुदान प्राप्त करने में सक्षम रहे। इस अवधि के दौरान, हमारे कुछ वैज्ञानिकों को उनके शोध योगदान के लिए वैज्ञानिक समुदाय द्वारा मान्यता भी दी गई। डॉ. अश्विनी कुमार को जैविक विज्ञान के क्षेत्र में वर्ष 2022 के लिए प्रतिष्ठित 'डॉ. शांति स्वरूप भटनागर पुरस्कार' से सम्मानित किया गया। डॉ. संजीव खोसला को जेसी बोस फेलोशिप मिली। विकलांग व्यक्तियों को सशक्त बनाने के लिए सेवा में उत्कृष्टता का पुरस्कार डॉ. अलका राव को प्रदान किया गया। डॉ. नीरज खत्री को पशुधन समृद्धि भारत पुरस्कार से सम्मानित किया गया। डॉ. केपीएस सेंगर को एमपी लाइब्रेरी एसोसिएशन द्वारा वर्ष 2023 के सर्वश्रेष्ठ लाइब्रेरियन का पुरस्कार दिया गया। डॉ. अश्विनी कुमार को NASI, भारत का फेलो भी चुना गया। कई छात्रों को राष्ट्रीय और अंतर्राष्ट्रीय सम्मेलनों में सर्वश्रेष्ठ पोस्टर/मौखिक प्रस्तुति पुरस्कार मिले।

अपनी बढ़ती शोध आवश्यकताओं का समर्थन करने के लिए, हम संस्थान के बुनियादी ढांचे को बनाए रखने और उन्नत करने में महत्वपूर्ण निवेश करने के लिए प्रतिबद्ध हैं। इन उन्नयनों ने उच्च-थ्रूपुट, बहु-विषयक अनुसंधान करने की हमारी क्षमता को महत्वपूर्ण रूप से मजबूत किया है और हमारी चल रही परियोजनाओं की दक्षता और दायरे में योगदान दिया है। इस अवधि के दौरान, संस्थान ने राष्ट्र को बायोफार्मास्युटिकल्स उत्पादों के लिए जीएमपी माइक्रोबियल सेल बैंकों का एक राष्ट्रीय भंडार (NRGCBIO) समर्पित किया।

सीएसआईआर-आईएमटेक ने 19 से 24 जून 2023 तक आयोजित वन वीक वन लैब (ओडब्ल्यूओएल) कार्यक्रमों के दौरान अपने वैज्ञानिक कार्य, विरासत, नवाचारों और तकनीकी सफलताओं को प्रदर्शित किया। इन कार्यक्रमों में एक अकादमिक-उद्योग बैठक, छात्र-वैज्ञानिक संपर्क, कौशल विकास प्रशिक्षण आदि शामिल थे। प्रोफेसर बीके बछावत स्मारक व्याख्यान डीएसआईआर के पूर्व सचिव और सीएसआईआर के महानिदेशक डॉ शेखर सी मांडे ने 30 जनवरी 2023 को दिया। क्रिस्टलोग्राफी पर 50वीं राष्ट्रीय संगोष्ठी (एनएससी50) सीएसआईआर-आईएमटेक में 22-24 नवंबर, 2023 के दौरान आयोजित की गई। एनएससी50 का आयोजन सीएसआईआर-आईएमटेक और इंडियन क्रिस्टलोग्राफिक एसोसिएशन (आईसीए) द्वारा संयुक्त रूप से किया गया।

CSIR-IMTECH का एक प्रमुख लक्ष्य संस्थानों और जैव प्रौद्योगिकी उद्योग को सेवाएँ और समाधान प्रदान करके अनुसंधान और वास्तविक दुनिया के अनुप्रयोग के बीच की खाई को पाटना है। इस अवधि में, CSIR-IMTECH ने ISRO को खर्च किए गए रॉकेट ईंधन में मौजूद अमोनियम परक्लोरेट के बायोरेमेडिएशन के लिए पर्यावरण के अनुकूल टिकाऊ स्वदेशी समाधान प्रदान किया। तपेदिक अनुसंधान पर काम कर रहे वैज्ञानिकों के एक समूह ने भारतीय बहुराष्ट्रीय दवा कंपनी, ज़ाइडस लाइफसाइंसेस लिमिटेड को नए एंटी-ट्यूबरकुलोसिस यौगिकों की पहचान, अनुकूलन और उम्मीदवार चयन प्रदान किया। COVID महामारी के दौरान, CSIR-IMTECH COVID-19 और SARS-CoV-2 के शमन की दिशा

में राष्ट्रीय प्रयासों में सबसे आगे था, जिसमें सीवेज और हवा में SARS-CoV-2 संचरण की निगरानी से लेकर COVID-19 निदान के लिए बायोसेंसर विकास, SARS-CoV2 यौगिकों और उत्पादों का एंटी-वायरल परीक्षण, बहु-केंद्रित जीनोम निगरानी और COVID-19 वैक्सीन इम्युनोजेन्स और प्रोटीन-आधारित वैक्सीन का विकास शामिल था। इस अवधि के दौरान विभिन्न उद्योगों एवं संगठनों के साथ 10 समझौता ज्ञापन एवं 35 समझौते निष्पादित किये गये।

उच्च स्तरीय कौशल विकास पर जोर हमारे प्रशिक्षण कार्यक्रमों, कार्यशालाओं और क्षमता निर्माण पहलों का आधार बना हुआ है, जिसने सैकड़ों युवा वैज्ञानिकों, छात्रों और पेशेवरों को अत्याधुनिक माइक्रोबियल प्रौद्योगिकियों में प्रशिक्षित किया है। सीएसआईआर-आईएमटेक ने सीएसआईआर-एकीकृत कौशल पहल के तहत 7 कार्यशालाओं और 26 विशेष वैज्ञानिक व्याख्यानों के साथ-साथ विभिन्न प्रशिक्षण कार्यक्रमों के तहत 2171 प्रतिभागियों को प्रशिक्षित किया, जिससे भारत सरकार के "कौशल मिशन" में महत्वपूर्ण योगदान मिला। सीएसआईआर-आईएमटेक के पीएचडी कार्यक्रम और पोस्टडॉक्टरल फेलोशिप पहलों में वृद्धि हुई है, जिसने देश भर और विदेशों से प्रतिभाशाली व्यक्तियों को आकर्षित किया है। इस अवधि के दौरान 74 छात्रों को पीएचडी की डिग्री प्रदान की गई।

जैसा कि हम अपने अस्तित्व के पांचवें दशक में प्रवेश कर रहे हैं, हम अपने अधिदेश के प्रति अटूट समर्पण के साथ आगे बढ़ रहे हैं, अपनी अपेक्षाओं के स्तर को बढ़ा रहे हैं और अधिक उत्कृष्टता के लिए प्रयास कर रहे हैं, साथ ही अपनी शक्तियों का लाभ उठा रहे हैं और सूक्ष्मजीव अनुसंधान के विशिष्ट क्षेत्रों में आगे बढ़ रहे हैं।

यह माइक्रोबायोलॉजिस्ट के लिए एक रोमांचक समय है, क्योंकि हम व्यक्तिगत माइक्रोब्स का अध्ययन करने से लेकर माइक्रोबियल समुदायों और मनुष्यों, जानवरों और पौधों के साथ उनके संबंधों में गहराई से उतरने की ओर बढ़ रहे हैं। 'वन हेल्थ' की यह अवधारणा उन चुनौतियों का रोडमैप प्रदान करती है जिनका सामना समाज को आने वाले वर्षों में करना होगा। जैसा कि हम भविष्य की इन चुनौतियों को देखते हैं, हम अपने शोध उत्कृष्टता को मजबूत करने, नवाचार को बढ़ावा देने और समाज की अपूर्ण आवश्यकताओं को पूरा करने के लिए प्रतिबद्ध हैं। मैं अपने वैज्ञानिकों, कर्मचारियों, छात्रों, सहयोगियों और वित्त पोषण एजेंसियों को उनके अटूट समर्पण और योगदान के लिए अपनी गहरी कृतज्ञता व्यक्त करना चाहता हूँ। CSIR-IMTECH की टीम की उपलब्धियाँ उनकी कड़ी मेहनत और अभिनव विचार प्रक्रिया का प्रमाण हैं। हम खोज, नवाचार और सामाजिक प्रभाव के इस मार्ग को जारी रखने के लिए तत्पर हैं।

संजीव

संजीव खोसला
निदेशक, सीएसआईआर सूक्ष्मजीव प्रौद्योगिकी संस्थान
चंडीगढ़

From the Director's Desk

It is with immense pride and a deep sense of responsibility that I present the Status Report for the CSIR Institute of Microbial Technology (CSIR-IMTech) for the period of 2021-2023.

In the past 40 years of its existence, CSIR-IMTECH has reinforced its position as a leader in microbial biotechnology research and has gone from strength to strength in multiple areas of microbial technology including microbial diversity and taxonomy, molecular genetics and genomics, microbial bioactive discovery, molecular, cellular and immuno-biology of microbes, infectious diseases, fermentation and bioprocess development, protein science, structural biology, biotherapeutics, bioinformatics, and big data analytics. As we navigate the complexities of global health and environmental challenges, our research initiatives have been increasingly aligned with pressing concerns such as ESKAPE pathogens and antimicrobial resistance (AMR), neglected infectious diseases, and the development of novel therapeutic strategies.

The period 2021-2023 saw significant achievements across several domains of our work. The research groups in CSIR-IMTECH have continued to push the boundaries of research in microbial biotechnology and have published 328 research papers in top-tier international journals. Fourteen unique patents were filed showcasing our multifaceted contributions to the fields of microbial biotechnology. Our scientists were able to secure forty highly competitive extramural grants from various funding agencies including DBT, DBT/Wellcome Trust India Alliance, DST, SERB, ICMR, etc. During this period, some of our scientists were also recognized by the scientific community for their research contributions. Dr. Ashwani Kumar was conferred with the prestigious 'Dr. Shanti Swaroop Bhatnagar Award' for the year 2022 in the area of Biological Sciences. Dr. Sanjeev Khosla received the JC Bose Fellowship. An Award of Excellence in Service for Empowering Persons with Disabilities was conferred on Dr. Alka Rao. Dr. Neeraj Khatri received the Pashudhan Samridhi India Award. Dr. KPS Sengar was awarded the best Librarian of the Year-2023 Award by MP Library Association. Dr Ashwani Kumar was also elected Fellow of NASI, India. Several students received best poster/oral presentation awards at national and international conferences.

To support our growing research needs, we are committed to investing significantly in maintaining and upgrading the Institute's infrastructure. These upgrades have significantly bolstered our ability to conduct high-throughput, multi-disciplinary research and have contributed to the efficiency and scope of our ongoing projects. During the period, the institute dedicated to the nation a National Repository of GMP Microbial Cell Banks for Biopharmaceuticals Products (NRGCBIO).

CSIR-IMTECH showcased its scientific work, legacy, innovations, and technological breakthroughs during the One Week One Lab (OWOL) events held from 19th to 24th June 2023. These events included an Academia-Industry meet, student-scientist connect, skill development training, etc. The Professor BK Bachhawat Memorial lecture was delivered by Dr. Shekhar C. Mande, Former Secretary of DSIR and DG-CSIR, on 30th January 2023. The 50th National Seminar on Crystallography (NSC50) was organized at CSIR-IMTECH during 22nd-24th November, 2023. The NSC50 was jointly organized by CSIR-IMTECH and the Indian Crystallographic Association (ICA) and served as an excellent platform for

crystallographers nationwide to meet and discuss their latest research findings.

One of the key goals of CSIR-IMTECH is to bridge the gap between research and real-world application by providing services and solutions to institutions and the biotech industry. In this period, CSIR-IMTECH provided an environmentally friendly sustainable indigenous solution for the bioremediation of ammonium perchlorate, present in spent rocket fuel, to ISRO. A group of scientists working on tuberculosis research provided lead identification, optimization, and candidate selection of novel anti-tuberculosis compounds to the Indian multinational pharmaceutical company, Zydus Lifesciences Limited. During the COVID pandemic, CSIR-IMTECH was at the forefront of the national efforts towards mitigation of COVID-19, and SARS-CoV-2 research ranging from monitoring SARS-CoV-2 transmission in sewage and air to biosensor development for COVID-19 diagnosis, anti-viral testing of anti-SARS-CoV2 compounds and products, multi-centric genome surveillance, and the development of COVID-19 vaccine immunogens and protein-based vaccine. During this period, 10 MOUs and 35 agreements were executed with various industries and organizations.

Emphasis on high-end skill development continues to be a bedrock for our training programs, workshops, and capacity-building initiatives that have trained hundreds of young scientists, students, and professionals in cutting-edge microbial technologies. Along with 7 workshops and 26 special scientific lectures, CSIR-IMTECH, under the CSIR-Integrated Skill Initiative, trained 2171 participants under various training programs, thereby contributing significantly to the "Skill Mission" of the Government of India. The Ph.D. program and postdoctoral fellowship initiatives of CSIR-IMTECH have grown, attracting talented individuals from across the country and abroad. During this period, 74 students were awarded Ph.D. degrees.

As we begin the fifth decade of our existence, we continue with unwavering dedication toward our mandate, raising the bar of our expectations and striving for greater excellence, while leveraging our strengths and embarking on tangential niche areas of microbial research.

This is an exciting time for microbiologists, as we move from studying individual microbes to delving deeper into microbial communities and their relationship with humans, animals, and plants. This concept of 'One Health' provides a roadmap of challenges that society will be confronted with in the coming years. As we look to these future challenges, we remain committed to strengthening our research excellence, fostering innovation, and providing for the unmet needs of society. I would like to extend my deepest gratitude to our scientists, staff, students, collaborators, and funding agencies for their unwavering dedication and contributions. The accomplishments of team CSIR-IMTECH are a testament to their hard work and innovative thought process. We look forward to continuing this path of discovery, innovation, and societal impact.

SANJEEV KHOSLA
Director, CSIR-Institute of Microbial Technology,
Chandigarh

RESEARCH & DEVELOPMENT

Alka Rao, Ph.D

Protein Science and Engineering lab

Understanding bacterial post-translational modification and their applications

Our lab focuses on studying post-translational modifications, particularly glycosylation and N-terminal acetylation, in microbes. Through genome mining and manual curation, we recently identified 220 new putative glycocin biosynthesis gene clusters (PGBCs) in 153 bacterial species across seven phyla. This effort led to the discovery of rare O/S glycosyltransferases involved in glycocin biosynthesis and we found an inverting S/O-HexNAc-transferase (SvGT) and its substrate (SvC) in *Streptomyces venezuelae* ATCC 15439, marking the first experimental evidence of S-glycosylation in Actinobacteria. Additionally, we updated and launched Proglycprot V3.0, a comprehensive web repository of experimentally characterized glycoproteins and glycosyltransferases in prokaryotes. Using CRISPR interference (CRISPRi), we silenced riml/rimJ genes involved in N-terminal acetylation, revealing a potential link between N-terminal acetylation and antibiotic resistance against isoniazid. Moreover, we're exploring the application of glycocin-coated biodegradable nanocrystal films for preventing *Listeria monocytogenes* and investigating the glycoprofile of SARS-CoV-2 using lectin arrays. Additionally, we're studying the impact of glycosylation on wound healing and hydrogel-forming peptides. Concurrently, we're engineering Bacillus subtilis strains for food-grade glycocin production using a tailored integrative plasmid vector system.

CSIR-ISLEVL Lab

ISLEVL is a one-of-its-kind project, which aims at making STEM education accessible for deaf people. We conducted the Yusuf Hamied chemistry camp in collaboration with RSC. The team also attended many conferences nationally and internationally to spread awareness about STEM through Indian Sign Language. we created a special vertical known as ISL ISL-enabled STEM dictionary which is included in the national Indian Sign Language dictionary of ISLRTC.

Selected Publications:

1. Sharma Y, Ahlawat S, Ashish n, Rao A (2023). Global shape of SvGT, a metal-dependent bacteriocin modifying S/O-HexNActransferase from actinobacteria: c -terminal dimerization modulates the function of this GT. *Journal of Biomolecular Structure and Dynamics*.42(19), 10150-10164.
2. Sran KS, Sharma Y, Kaur T, Rao A (2022). Post-translational modifications and glycoprofiling of palivizumab by UHPLC–RPLC/HILIC and mass spectrometry. *Journal of proteins and proteomics*.13:95-108.
3. Singh V, Rao A (2021). Distribution and diversity of glycocin biosynthesis gene clusters beyond Firmicutes. *Glycobiology*. 31:89-102.

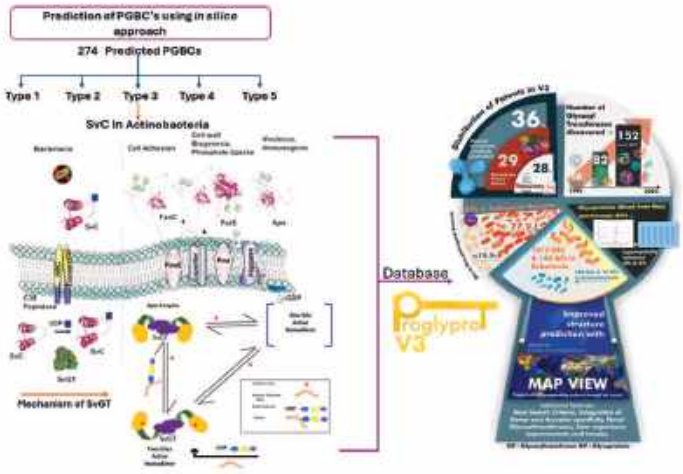


Figure: In silico prediction of PGBCs, experimental characterization of SvGT and its substrate SvC, and development database for experimentally validated prokaryotic glycoproteins.

Team (L to R):

Kulwinder Sran, Vivekanand Jaiswal, Muhammad Aquib, Shimona, Bhupendra Nath Shukla, Alka Rao, Navjot Singh, Sakshi Sharma, Hoshiyar Singh, E. Theresa Arulvathy

(Not in the photograph: Digvijay Singh, Ved Prakash Giri)

Amit Kumar, Ph.D.

Genome Instability & Cell Integrity lab

Dissecting the mechanistic insights of how are distinct cellular processes coordinated in time to guard genome integrity

My lab's research focuses on investigating the canonical and non-canonical functions of DNA damage checkpoint proteins in the maintenance of cell physiology. We determine how these proteins coordinate with other cell processes, including phosphoinositide signaling and oncogenes-induced cell stress pathways. This involves studying their roles in distributing mechanical cues, maintaining stem cell potency and stem cell lineage commitment, and coordinating DNA damage with transcriptional response and autophagy. in response to changes in chromatin dynamics through various unknown mechanisms.

We have recently identified the roles of nuclear phosphoinositide kinases in coordinating non-conventional ATM kinase activation to regulate RNA splicing following UV-irradiation-induced DNA damage. PI-kinases are deregulated in tumors with poor prognosis, and pharmacological inhibition of these is considered promising. We show a kinase-independent role of PIP4K2A/PIP4K2B in gene expression regulation (mRNA quantity and alternative splicing patterns) under genotoxic stress conditions. Mechanistically, PIP4K2A under-expression or PIP4K2B over-expression induces PIP42B enhanced interaction with RNA processing factors, including RNA polymerase II, and affects the UV-induced gene expression response that enhances cell sensitivity to genotoxic stress. We suggest that genotoxic stress exposure is deleterious to tumors with reduced PIP4K2A or elevated PIP4K2B expression levels.

Oncogene Constitutively active K-Ras oncogene mutation at G12V changes the proteome of cells and influences macroautophagy to its advantage. We have recently shown that K-Ras G12V cells' dependency on macroautophagy and CMA partly compensates for its loss of survival but not hyperproliferation; which implies that targeting both macroautophagy and CMA as a promising therapeutic target in G12V mutation-associated K-Ras cancers.

Selected Publications:

1. Awasthi, P., Srivastava, A. K., Yadav, V. K., Singh, R., Yadav, S.S., Kidiyoor, G.R. and Kumar, A. (2022) Proteome profiling of phosphatidylinositol-5-phosphate 4-kinase type 2A and 2B knockdown cells identify modifications in key regulators involved in cell homeostasis and genome integrity. *Genome Instability & Disease* **3**, 88-107.
2. Yadav, V., Awasthi P., Behl, R. and Kumar, A. (2022) HSc70 interactome reveal major role of macroautophagy and minor role of chaperone mediated autophagy in K-Ras G12V cell proliferation and survival. *Journal of Proteomics* **264**, 104614.
3. Kosar M. et al. (2021). Human nucleoporin Tpr coordinates mRNA processing with chromosome replication. *Nature Communications* **12**, 3937.

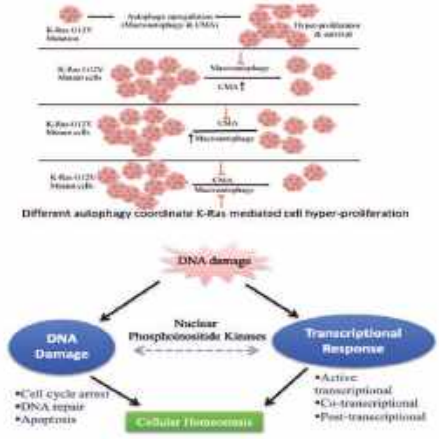


Figure: PIP4K2A & PIP4K2B are critical for chemosensitivity of tumor cell hyperproliferation

Team (L to R):
Radhika Singh, Amit Kumar, Amit Kumar, Kishan Gupta
(Standing L to R): Sonu Kumar, Anuja Gautam, Charu Rastogi

Amit Tuli Ph.D.

Membrane Trafficking lab

Understanding the role of small GTP-binding proteins in regulating cellular homeostasis

Membrane and organelle trafficking is critical for normal cell function, as it is required for the internalization and transport of nutrients and cell surface receptors. It is becoming increasingly clear that dysregulation of cellular trafficking pathways is at the root of diseases ranging from atherosclerosis to diabetes and cancer. In order to gain mechanistic insights into various human diseases, my lab research focuses on understanding how cellular trafficking functions at the molecular level. Additionally, we aim to generate knowledge about how various intracellular human pathogens manipulate the cellular trafficking machinery to establish replicative niches within the host cells. In particular, we are trying to mechanistically understand the function of Arf-like (Arl) small GTP-binding proteins in membrane transport and cellular signaling. The human genome encodes over 20 Arl GTPases, with the few characterized Arls implicated in regulating diverse cellular processes. Currently, we are exploring the role of Arl proteins in host-pathogen interaction using *S. typhimurium* and *M. tuberculosis* as model pathogens.

Selected Publications:

1. Rawat, S., Chatterjee, D., Marwaha, R., Charak, G., Kumar, G., Shaw, S., Khatter, D., Sharma, S., de Heus, C., Liv, N., Klumperman, J., Tuli, A., and Sharma, M. (2023) RUFY1 binds Arl8b and mediates endosome-to-TGN CI-M6PR retrieval for cargo sorting to lysosomes. *J Cell Biol* **222**
2. Kumar, G., Chawla, P., Dhiman, N., Chadha, S., Sharma, S., Sethi, K., Sharma, M., and Tuli, A. (2022) RUFY3 links Arl8b and JIP4-Dynein complex to regulate lysosome size and positioning. *Nat Commun* **13**, 1540
3. Sharma, A., Kumar, G., Sharma, S., Walia, K., Chouhan, P., Mandal, B., and Tuli, A. (2021) Methods for binding analysis of small GTP-binding proteins with their effectors. *Methods Cell Biol* **166**, 235-250

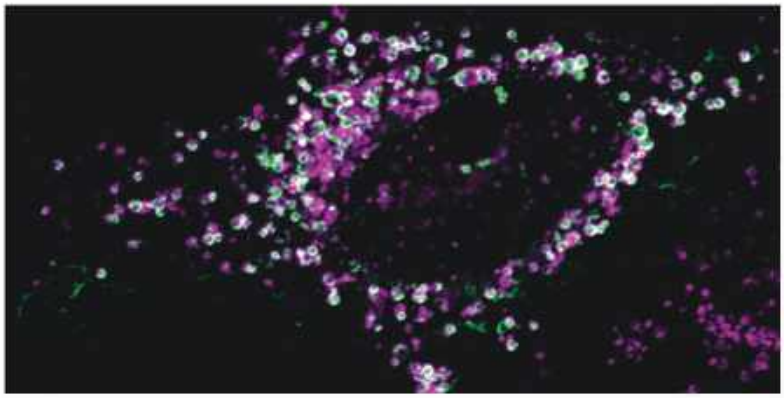


Figure: Expression of SARS-CoV-2 virulence factor ORF3a induces vacuolation of lysosomes. The image displays a representative confocal micrograph of HeLa cells expressing SARS-CoV-2 ORF3a (green signal) and stained for lysosomes/LAMP1-positive compartments (magenta signal).

Team (L to R):
Pramod, Kshitiz, Amit, Priya, Arshdeep, Medha

Anil Kumar Pinnaka, Ph.D.

Microbial Diversity lab

Culturomics and metagenomics-based discovery of microbes and their bioactive molecules

Our laboratory investigates microbial diversity across diverse ecological niches, aiming to harness these microorganisms for industrial and environmental applications. Utilizing both culturomics and metagenomics, we capture the broadest microbial diversity possible. Through culturomics, we isolate microorganisms, including yeast and bacteria, focusing on marine and phototrophic bacteria. These isolates are then examined for the production of bioactive compounds, such as antimicrobial peptides, biosurfactants, pigments, enzymes with agronomic significance, and polyaromatic hydrocarbon-degrading enzymes. We further explore the potential applications of these compounds to develop cost-effective solutions to healthcare and environmental challenges. The metagenomic approach enables the study of microbiomes from environments that are difficult to capture with culture-based techniques. This also allows us to identify bioactive molecules, such as therapeutic enzymes and antimicrobial peptides, that may remain undiscovered through culturomics alone, using both functional and sequence-based metagenomics. Additionally, our lab has significantly improved the biodegradation of ammonium perchlorate and polyethylene terephthalate (PET) plastic. In collaboration with the Vikram Sarabhai Space Centre (VSSC) of ISRO, we successfully identified a bacterial culture that degrades the toxic rocket propeller ammonium perchlorate and optimized the culture conditions for optimum degradation and scale-up studies.

Selected Publications:

1. Kumari, A., Kumari, S., Prasad, G.S., & Pinnaka, A.K. (2021). Production of sophorolipid biosurfactant by insect-derived novel yeast *Metschnikowia churdharensis* f.a., sp. nov., and its antifungal activity against plant and human pathogens. *Front. Microbiol.* **12**:678668. doi: 10.3389/fmicb.2021.678668.
2. Vasudeva, G., Sidhu, C., Kalidas, N., Ashish, & Pinnaka, A.K. (2021). Shape-function of a novel metapyrocatechase, RW4-MPC: Metagenomics to SAXS data based insight into deciphering regulators of function. *Int. J. Biol. Macromol.* **188**:1012-1024. doi: 10.1016/j.ijbiomac.2021.08.031.
3. Kumari, A., Mihooliya, K.N., Sahoo, D.K., et al. (2023). Description of lipase producing novel yeast species *Debaryomyces apis* f.a., sp. nov., and a modified pH indicator dye-based method for the screening of lipase producing microorganisms. *Sci. Rep.* **13**:11819. doi: 10.1038/s41598-023-38241-3.

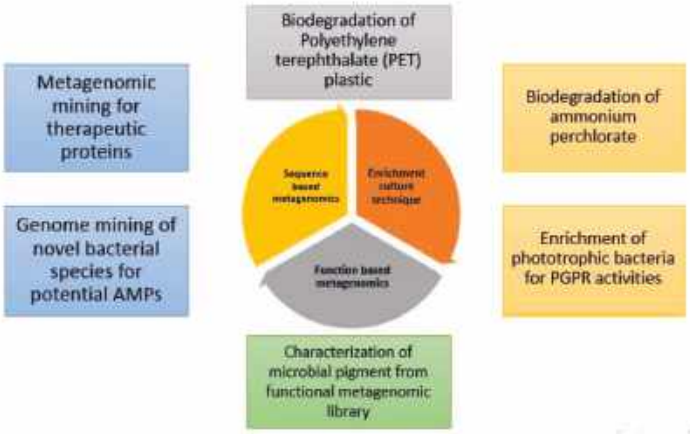


Figure: Flow chart for the ongoing research work in the lab

Team (L to R):
Tarun Kothuri, Hardik Chavda, Sakshi Paliwal, Anil Kumar Pinnaka, Naveen, Divya Sharma, Anant, Riya Kumar

Anirban Roy Choudhury, Ph.D.

Microbial Fermentation and Application Development lab

Harnessing Microbial Polysaccharides, Fluorescent Pigments, and Nanopolyphenols for Innovative Biomaterial Development

Our laboratory is at the forefront of harnessing microbial metabolites for diverse industrial applications. Through meticulous fermentation and optimization processes, we have unlocked the potential of microbial polysaccharides such as pullulan, gellan, and xanthan gum, scaling up pullulan fermentation to a 500 L fermenter, and nearing commercialization. Exploiting the versatility of polysaccharides, we have developed hydrogels and nanogels with stimuli-responsive behavior, facilitating environmental remediation and controlled delivery of bioactive molecules. Innovating in the area of functional foods, we are pioneering biotechnological production of nano-nutraceuticals, focusing on polyphenols for their reported advantageous properties. Our approach emphasizes fermentative and enzymatic methods to enhance water solubility, stability, and bioactivity of polyphenols, utilizing fruit industry waste as a sustainable source. Moreover, we are delving into the realm of microbial fluorescent pigments, tapping into their biocompatibility and non-toxicity for various applications. By isolating and screening microbes from different sources, we aim to uncover novel fluorescent pigments and advance their characterization and application development, thus expanding the horizons of bioprocess development and biomaterial innovation in our lab.

Selected Publications:

1. Roychowdhury, R., Srivastava, N., Kumari, S., Pinnaka, A. K., and Roy Choudhury, A. (2021) Isolation of an exopolysaccharide from a novel marine bacterium *Neorhizobium urealyticum* sp. nov. and its utilization in nanoemulsion formation for encapsulation and stabilization of astaxanthin. *LWT.* **151**, 112105
2. Richa, and Roy Choudhury, A. (2023) Self-assembled pH-stable gellan/κ-carrageenan bigel: Rheological studies and viscosity prediction by neural network. *Int. J. Biol. Macromol.* **237**:124057
3. Srivastava, N., Richa, and Choudhury, A. R. (2023) Enhanced encapsulation efficiency and controlled release of co-encapsulated *Bacillus coagulans* spores and vitamin B9 in gellan/κ-carrageenan/chitosan tri-composite hydrogel. *Int. J. Biol. Macromol.* **227**, 231–240

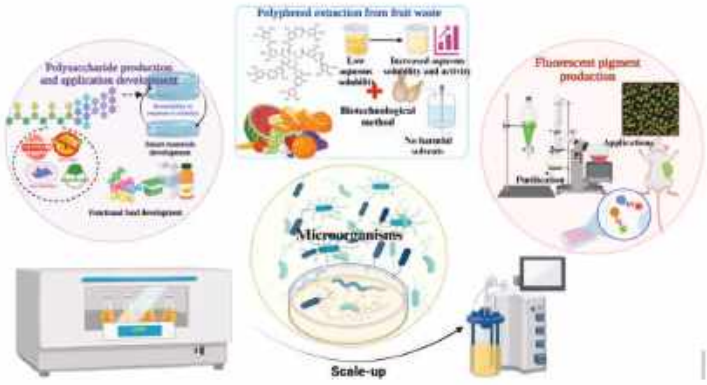


Figure: Exploring bioprocessing strategies for production of novel biomaterial

Team (L to R):
Tixit Sagpariya, Padma Thapa, Dinesh Kumar, Dr. Anirban Roy Choudhury, Nandita Srivastava, Sheetal Katiyar, Sonia Parashar

Anshu Bhardwaj, Ph.D.

Integrated Data Science lab

Applications of data science in infectious diseases and systems medicine

The Integrated Data Science Lab focuses on data science applications in genomics and drug discovery in infectious and mitochondrial diseases. We apply state-of-the-art methods in understanding complex biological phenomena with current focus on antimicrobial resistance and mitochondrial dysfunction comorbidities.

During this period, we developed two platforms, Galaxy-ASIST and MitoLink. Galaxy-ASIST is a unique platform towards implementing global standards for reporting phenotypic and genotypic antimicrobial susceptibility test (AST) data as recommended by CLSI and EUCAST. Evaluation of over 6,500 *Acinetobacter baumannii* (AB) strains indicated that only 10% of publicly available datasets have metadata to implement these standards. Furthermore, discrepancies are observed in the classification of resistant and susceptible isolates as per Cohen's kappa statistics. The platform also offers fine mapping of antimicrobial-resistant determinants. MitoLink is a scalable and modular web-based workflow system developed to study genotype-phenotype correlations in human mitochondrial diseases. It integrates applications for assessment of genomic variation and houses datasets from GenomeAsia Pilot project, gnomAD, ClinVar and DisGenNet. In this study, observations were made on potential comorbidities as evident from gene-disease networks in the Asian population, however, the platform is generic and can be applied to any population dataset. We also published an article capturing the evolution of Human genomics from the Reference Human Genome to Pangenomes.

During this period, ArMoR, the video game on AMR, was also listed as a finalist in the 9th Educational Games Competition at ECGBL 2021.

Selected Publications:

1. Sharma, T., Kumar, R., Kalra, J. S., Singh, S., Bhalla, G.S., & Bhardwaj, A. (2023). Galaxy ASIST: A web-based platform for mapping and assessment of global standards of antimicrobial susceptibility: A case study in *Acinetobacter baumannii* genomes. *Frontiers in microbiology*, 13, 1041847.
2. Singh, V., Pandey, S., & Bhardwaj, A. (2022). From the reference human genome to human pangenome: Premise, promise and challenge. *Frontiers in genetics*, 13, 1042550.
3. Kumar, R., K Rajput, N., Jolly, B., Narwade, A., & Bhardwaj, A. (2021). MitoLink: A generic integrated web-based workflow system to evaluate genotype-phenotype correlations in human mitochondrial diseases: Observations from the GenomeAsia Pilot project. *Mitochondrion*, 61, 54–61.

Figure: Representation of Galaxy-ASIST, MitoLink, ArMoR and Human Pangenome projects

Team (L to R):

Bhupender Singh, Shreya Singh, Anshu Bhardwaj, Shweta Pandey, Simran Gambhir, Somnath Chindhe

(Not in the photograph): Tina Sharma, Rakesh Kumar, Romita Trehan

Ashwani Kumar, Ph.D.

Tuberculosis Pathogenesis Lab

Molecular basis of tuberculosis pathogenesis

Mycobacterium tuberculosis (Mtb) represents a major public health problem. Tuberculosis (TB) treatment relies upon the use of multiple drugs for several months. It is the phenotypic drug tolerance that necessitates the prolonged treatment with multiple drugs. Currently, two hypotheses have been proposed to explain the phenotypic drug tolerance. The first hypothesis is that a large population of persistent bacteria resides in humans upon Mtb infection. The ability of Mtb to persist within humans for decades without any clinical symptoms and then to reactivate, causing active disease, is key to its success as a pathogen, which ensures its continued maintenance, viability, and efficient dissemination in humans. The second hypothesis is that Mtb is capable of forming biofilms in vivo. Currently, my laboratory focuses on understanding the mycobacterial biofilms and whether they exist in infected animals or humans. My laboratory has demonstrated that intracellular thiol reductive stress induces mycobacterial biofilm formation. We have shown further that cellulose is a major component of the extra polymeric substance of Mycobacterial biofilms, and its degradation results in the disruption of mycobacterial biofilms [Nature Communications, 2016]. Intrigued by these findings, we used cellulose as a biomarker and demonstrated the presence of mycobacterial biofilms in the lungs of experimentally infected mice and non-human primates.

We further observed the presence of mycobacterial biofilms in the human clinical samples. Using a mouse model of tuberculosis, we have also demonstrated that in vivo biofilms protect the resident biofilms from antimycobacterial drugs [Nature Communications, 2021].

Selected Publications:

1. Chakraborty, P., Bajeli, S., Kaushal,D., Radotra, B.K., Kumar, A. (2021) Biofilm formation in the lung contributes to virulence and drug tolerance of *Mycobacterium tuberculosis*. Nature Communications. **12**:1606.
2. Iqbal, I.K., Bajeli, S., Sahu, S., Bhat, S.A., Kumar, A. (2021) Hydrogen sulfide-induced GAPDH sulfhydration disrupts the CCAR2-SIRT1 interaction to initiate autophagy. Autophagy. **17**(11):3511-3529.
3. Akela, A.K., and Kumar, A. (2021) Bioenergetic heterogeneity in *Mycobacterium tuberculosis* residing in different subcellular niches. mBio. **12**(3):e0108821.

Patent(s):

1. Vinod Dinkar Chaudhari, Ashwani Kumar, Nurina Saini, Ajit Kumar Akela. Small molecule for the treatment of mycobacterial diseases. Indian Patent Application no. 202311007303. Filing date: 02-02-2023
2. Supankar Das, Harry Garg, Subramaniam Anantha Ramakrishna, Rajesh P. Ringe, Ashwani Kumar, Sanjeev Khosla. Equipment design and assays for monitoring infectivity of air-borne agents. Indian Patent Application No. 202111016274. Filing date: 07-04-2021

Team (L to R):

Jagtar, Rajnish, Utkarsha, Shivani Sahu, Koustubha, Shweta Singh, Jitender Singh, Ashwani Kumar, Rinku Thakran, Rajendra Singh Rajpurohit, Vandana Sharma, Deepali Agarwal, Pramod Kumar

(Not in the photograph: Sapna Sharma, Akriti Sharma, Rajkumar, Navin Baid, Ajit Kumar Akela)

B. Devadatha, Ph.D.

Fungal Biology Lab

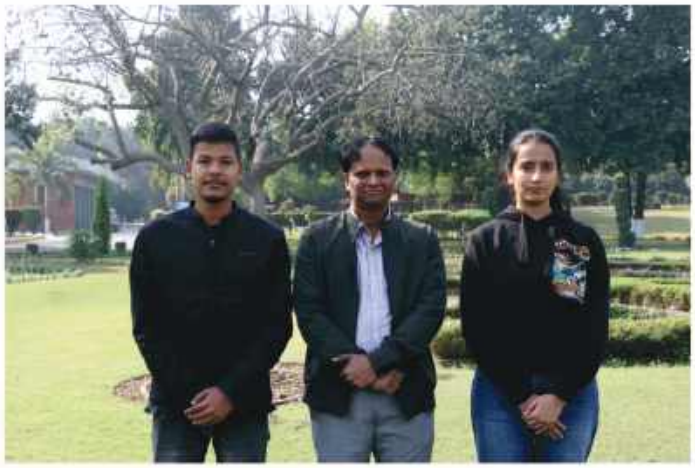
Exploring Fungal Biodiversity for Sustainable Solutions

Our laboratory explores fungal biodiversity, particularly in marine environments, the Pangong Lake, and the Himalayan forests. We are driven by the pursuit of discovering new and unique fungal species and recognizing their significant impacts on animal, human, plant, and ecosystem health. Our research endeavors have led to the collection and characterization of over 80 fungi, predominantly categorized under Ascomycota, Basidiomycota, and Mucoromycota, from diverse habitats. We are actively involved in bioprospecting, focusing on antimicrobials, fatty acids, and enzymes, with potential applications in agriculture and biotechnology. Additionally, we are investigating antifungal resistance mechanisms in *Candida auris*, aiming to identify associated genes crucial for combating fungal infections, especially in healthcare settings. Furthermore, we are optimizing culture conditions for marine Thraustochytrid cultures from Pichavaram mangroves to explore their potential for fatty acid production. Through rigorous exploration and bioprospecting efforts, we aim to harness the untapped potential of fungi for applications in agriculture, biotechnology, and environmental conservation.

Selected Publication(s):

1. Hyde, K. D., Abdel-Wahab, M. A., Abdollahzadeh, J., Abeywickrama, P. D., Absalan, S., Afshari, N. Devadatha B., *et al.* (2023) Global consortium for the classification of fungi and fungus-like taxa. *Mycosphere* **14**, 1960-2012

Figure : Overview of omega-3 fatty acids production from Aurantiochytrium strains under investigation in the laboratory.



Team (L to R):
Neeraj Singh, B. Devadatha, Kritika Saini

Balvinder Singh, Ph.D.

Computational Biology and Molecular Dynamics Simulations Lab

Recognition of a Glutathione Analog by Aldose Reductase: New Insights

Our lab utilizes computational techniques to comprehend the conformational changes following the binding of small molecules with the protein of interest. Among these, molecular dynamics simulation and docking enable researchers to study the stability, binding strength, and interactions of these molecules with proteins. In one such study, our lab has explored the interactions of glutathione backbone with Aldose Reductase. Aldose reductase (AR) is an NADPH-dependent oxidoreductase that is well studied for its role in Diabetes Mellitus. Glutathione-conjugated aldehydes are efficiently catalyzed by AR. The investigation of dynamics of a glutathione analog, γ-glutamyl-S-(1,2-di-carboxyethyl)-cysteinyl-glycine (DCEG) in the binding pocket of AR was closely followed via MD simulations. This study revealed that backbone nitrogen atoms of Ala-299 and Leu-300 formed a tiny pocket gated by the thiol group of Cys-298 and the glycine moiety of DCEG was able to displace the thiol group of Cys-298 to make hydrogen bond interactions with the backbone of Ala-299, Leu-300, and Leu-301. The highlight of study is that the precise movement of the Cys-298 side-chain is crucial for the specific recognition of glutathione by AR. The findings have consequences for the specific recognition of substrate by AR and shall aid in the design & discovery of differential inhibitors.

Selected Publications:

1. Yadav, S., Shinde, R.N., Singh, S., Karthikeyan., S. and Singh, B. (2022) Structurally disordered C-terminal residues of GTP cyclohydrolase II are essential for its enzymatic activity. *J Biomolecular Structure and Dynamics* **40**, 9318-9331
2. Sekhon, G., Singh, B. and Singh, R. (2022) Role of Cys-298 in specific recognition of glutathione by aldose reductase. *J Biomolecular Structure Dynamics* **40**, 6880-6888
3. Arya, P., Kaur, M., Chosyang, S., Kushwaha, N., and Singh, B., (2023) Decrypting Skin Microbiome in Psoriasis: Current Status. *J Psoriasis and Psoriatic Arthritis* **8**,166-178

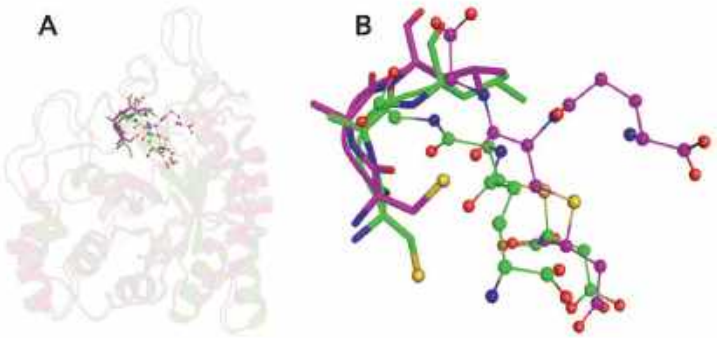


Figure: A. Superimposed conformations of AR:NADPH:DCEG in the open (Green) and close (Magenta) states. B. DCEG (shown as ball and sticks) displaces sulfur of Cys-298 to access the pocket.

Team (L to R):
Stanzin Chosyang, Manpreet Kaur, Balvinder Singh, Neelam Kushwaha, Sayilpreet Kaur, Gurprit Sekhon

Barnali Chaudhuri, Ph.D.

Structural Biology lab

Understanding protein assembly and dynamics

Our major goal is to understand protein assembly and dynamics, which enable their biological functions. We use a consolidative structural biology approach that includes a number of techniques, such as X-ray crystallography, small angle X-ray scattering, and electron microscopy, to understand the mechanisms of actions in biological protein machines. Recent work includes elucidation of conformational changes in ParB CTP switch using chromatography-coupled SAXS and Alphafold-predicted structural models. To decipher the mechanism of a key conformational switching in bacterial cell division motor FtsZ, we used multi-temperature, multi-conformer crystallography. Solution SAXS and crystallography were used to elucidate the structural organization of the mycobacterial polar scaffold Wag31. Lastly, we aim to develop wavelength-dependent K-edge anomalous SAXS as a new tool for the structural biology community.

Selected Publication(s):

1. Virk, K., Yonezawa, K., Choukate, K., Singh, L., Shimizu, N., and Chaudhuri, B. (2022) K-edge anomalous SAXS for protein solution structure modeling. *Acta Crystallogr D Struct Biol.* **D78**, 204-211. (Highlighted in *Photon factory Highlights.* Anomalous solution scattering for protein structure modelling. K. Virk , K. Yonezawa, K. Choukate, L. Singh, N. Shimizu and B. Chaudhuri. (https://www2.kek.jp/imss/pf/eng/science/publ/pfhl/))

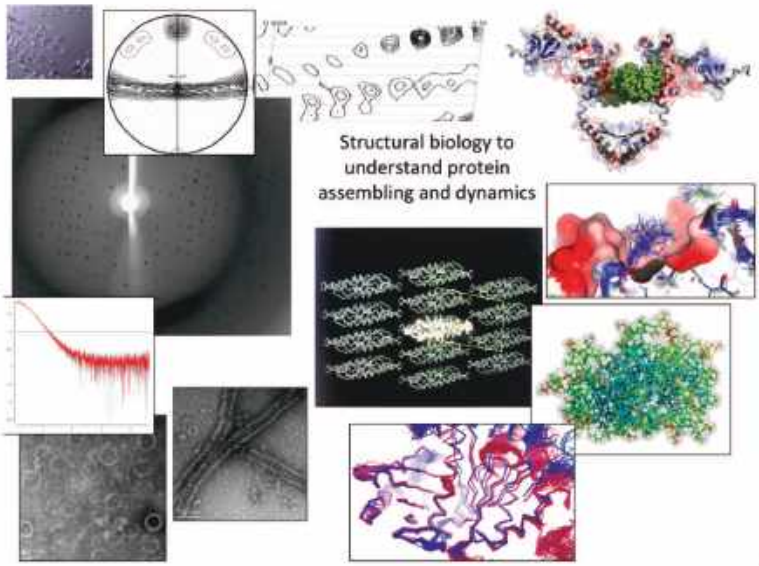


Figure: Combining complementary techniques to understand biological protein machines.

Team (L to R):
Sneh Lata, Barnali Chaudhuri, Anu

Beena Krishnan, Ph.D.

Protein Engineering lab

Investigating cellular processes using sequence- and structure-based protein engineering approach

Our lab research is focused on a molecular-level understanding of sequence-structure-function relationships in proteins using biophysical methods. Proteins key to important cellular processes such as RNA spliced isoforms in the human proteome, viral proteins key to host-pathogen interactions, and proteins involved in imparting antibiotic resistance and motility in bacteria are themes of our current research. The human Vascular Endothelial Growth Factor Aa (hVEGFAa), a key regulator of angiogenesis, undergoes extensive RNA splicing forming multiple isoforms. We have discovered a novel role of one of the hVEGFA spliced isoforms in *S. aureus* infection. In our COVID research, we have engineered and produced mini-variants of SARS-CoV2 Spike and hACE2 proteins and developed a method to test human serum samples for COVID infection in post-vaccinated and infected individuals using all indigenously produced protein reagents. Other ongoing work involves investigating SARS-CoV2 nucleoprotein domain analysis and its interaction with nucleic acids including the viral genomic RNA, and a genotype-phenotype correlational study to explain phenotypic differences such as in antibiotic sensitivity and motility observed in four near-isogenic *Bacillus* strains.

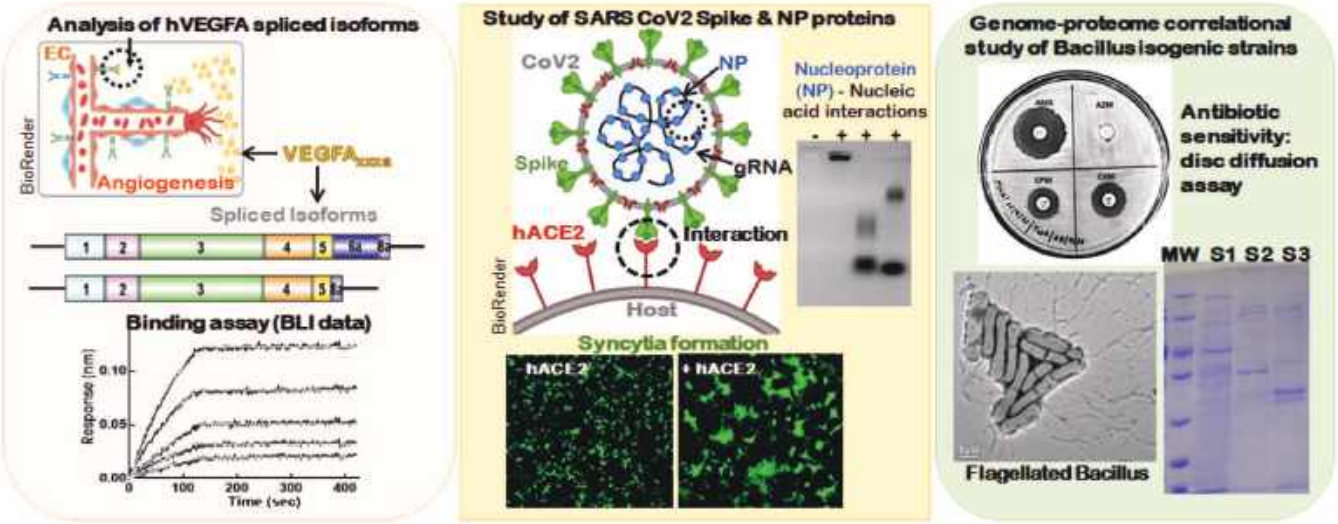


Figure: Depiction of sequence-structure-function-interaction study of human (hVEGFA), viral (SARS CoV2 Spike and Nucleoprotein), and bacterial proteins (flagella and extracellular enzymes) undertaken in our research.

Team (L to R):
Arpit Jain, Shalini Bharti, Anita Kumari, Beena Krishnan, Harsha Saini

Charu Sharma, Ph.D.

Host-Pathogen Interactions and Cell Signaling lab

***M. tuberculosis* Spoligo-SNP studies in India**

Single Nucleotide Polymorphisms (SNP) and genotypic co-analyses of drug resistance and specific lineages are increasingly being undertaken globally. Most of the reports correlating the drug-resistant mutations with specific genotypes in India are based on the First Line Drug resistance and streptomycin resistance. However, inadequate information exists on the relationships of SLD-resistant mutations with different lineages. Besides, the Indian geographical diversity with respect to lineage prevalence has been evaluated only to a limited extent. Therefore, owing to the limited information on *Mtb* strain diversity in Western and Northern Indian settings, we analyzed the mutational characteristics in *rrs*, *eis*, *whiB7*, *gyrA*, *gyrB*, and *tlyA* target loci and lineages of 126 clinical *Mtb* isolates from Lucknow (Northern India); and Mumbai (Western India). The novel mutations observed in our study contribute to the existing pool of information on genetic polymorphisms in the drug-resistant strains from India and indicate the need for geo-specific diagnostics. Besides, our analyses unveiled a potential polymorphic and phylogeographical demarcation among two distinct regions.

Selected Publication(s):

1. Rana, V., Singh, N., Chaitali, N., Kambli, P., Singh, P. K., Singh, U., Jain, A., Rodrigues, C., and Sharma, C. (2022) Molecular epidemiology and polymorphism analysis in drug-resistant genes in *M. tuberculosis* clinical isolates from Western and Northern India. *Infect Drug Res* **15**, 1717-1732

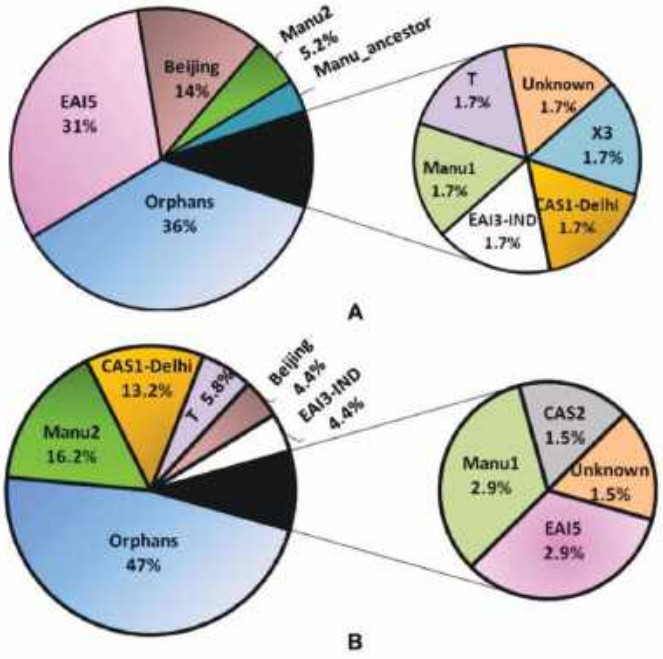


Figure: Percentage of different lineages for the isolates of Mumbai (A) and Lucknow (B) upon spoligotyping analyses using SITVIT2.

Team (L to R):
Ranjodh Singh, Sandhya Koli, Charu Sharma, Vandana Basra

Deepak Kumar Sharma, Ph.D.

Chaperone Biology lab

Targeting Chaperonome to Modulate Balance between Protein Folding and Degradation

Research interests: We are primarily interested in understanding chaperone machinery in the context of neurodegenerative diseases. The major focus is to gain insight into cellular factors that regulate chaperone function in either folding or degradation of Parkinson's disease-associated proteins through processes such as autophagy.

Chaperone-mediated autophagy (CMA): Cellular proteins containing KFERQ-like motifs are translocated into lysosomes under stress. Cytosolic Hsp70 plays a key role in recognizing such substrates and translocating them to LAMP-2A receptor protein on lysosomes. We are exploring regulatory aspects of the role of Hsp70s in the CMA in neuronal cells.

RNAphagy: RNA translocates into lysosomes/vacuoles under stress. We are exploring various components of the cellular machinery that regulates this process.

Hsp70 interactome: Eukaryotes encode multiple cytosolic Hsp70s of which some are constitutive and others stress-inducible. Hsp70s interact with Hsp40s and nucleotide exchange factors (NEF). Similar to Hsp70s, there are multiple Hsp40s and NEFs. We are exploring whether specific Hsp70-Hsp40-NEF complexes are formed under different cellular conditions, and if formed what is the functional significance of such network.

The lab utilizes cellular models such as yeast and mammalian cells or animal models such as *C. elegans* and mouse models of Parkinson's disease.

Selected Publications:

1. Kumar, P., Sahoo, D. K., and Sharma, D. (2021) The identification of novel promoters and terminators for protein expression and metabolic engineering applications in *Kluyveromyces marxianus*. *Metabolic Engineering Communications* **12**, e00160
2. Puri, A., Singh, P., Kumar, N., Kumar, R., and Sharma, D. (2021) Tah1, a key component of R2TP complex that regulates assembly of snoRNP, is involved in de novo generation and maintenance of yeast prion [URE3]. *Journal of Molecular Biology* **433**, 166976
3. Gaur, D., Kumar, N., Ghosh, A., Singh, P., Kumar, P., Guleria, J., Kaur, S., Malik, N., Saha, S., and Nystrom, T., Sharma D. (2022) Ydj1 interaction at nucleotide-binding-domain of yeast Ssa1 impacts Hsp90 collaboration and client maturation. *PLoS Genetics* **18**, e1010442

Patent(s):

Deepak Kumar Sharma, Arpit Gupta, Gajendra Pal Singh Raghava, Ankur Gautam, Anil Koul, Priyanka Singh. Peptide to treat alpha-synuclein amyloid based disorders. Indian Patent Application No. 202211016557. Filing date: 23-03-2022

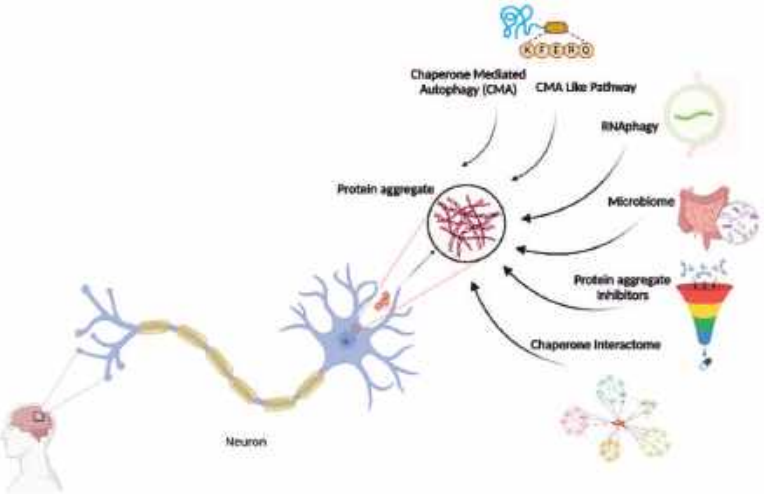


Figure: Our lab is involved in the understanding of quality control pathways that could be targeted to prevent amyloid-associated neuronal toxicity.

Team (L to R):

Ravindra Dhawan, Avinash Kushwaha, Deepak Sharma, Surjeet Singh, Arpit Tyagi, Sreeragh

(Sitting L to R): Meenal Rastogi, Akshya Sharma, Namra Farooqi, Upasana Sharma, Madhumita Dey

Dibyendu Sarkar, Ph.D.

Biochemistry and Molecular Microbiology Lab

Probing metabolic remodeling of *Mycobacterium tuberculosis* that integrates stress response to intracellular survival

We have been studying the stress response and virulence regulation of *Mycobacterium tuberculosis* (Mtb) with an emphasis on the *phoP-phoR* two-protein regulatory system, which is essential for Mtb virulence. Studies from our group have led to the consideration of how PhoP functions as a global regulator of mycobacterial physiology. We demonstrated that PhoP interacts with a number of other regulators and numerous DNA sites interspersed over the mycobacterial chromosome. We showed stress-specific convergence of PhoP (a two-component regulator) and two mycobacterial genome-encoded heat-shock repressors to coordinate the heat-shock response of Mtb. These studies represent the first of their kind showing how protein-protein interactions contribute to the stress-specific regulation of gene expression in Mtb. Along the line, we studied global regulation of gene expression in response to acid stress and hypoxia, the two critical players in mycobacterial persistence. Using genetic experiments coupled with biochemical analyses, we uncovered that PhoP interacts with stress-inducible extra-cytoplasmic sigma factors, SigE and SigH, to integrate stress response, coupling low pH with the maintenance of mycobacterial redox homeostasis. We continue to investigate the origin(s) of binding specificity in protein complexes, and probe determinants of complex formation to understand the biological consequences of these interactions impacting mycobacterial physiology.

Selected Publications:

1. Goar, H., Paul, P., Khan, H., Sarkar, D. (2022). Molecular Connectivity between Extracytoplasmic Sigma Factors and PhoP Accounts for Coupled Mycobacterial Stress Response. *J Bacteriol.* **204**:e0011022.
2. Khan, H., Paul, P., Sevalkar, R.R., Kachhap, S., Singh, B., Sarkar, D. (2022). Convergence of two global regulators to coordinate expression of essential virulence determinants of *Mycobacterium tuberculosis*. *Elife.* **11**.
3. Singh, P.R., Goar, H., Paul, P., Mehta, K., Bamniya, B., Vijjamarri, A.K., et al. (2023). Dual functioning by the PhoR sensor is a key determinant to *Mycobacterium tuberculosis* virulence. *PLoS Genet.* **19**:e1011070.

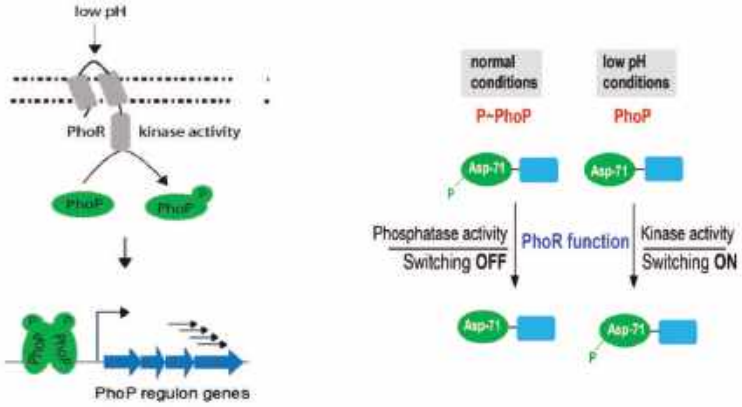


Figure: Schematic models highlight that PhoR senses low pH to activate PhoP-PhoR system and how dual functioning of PhoR as a kinase and phosphatase subsequently regulates the expression of the mycobacterial *phoP* regulon.

Team (L to R):

(Standing L to R) - Bhuwaneshwar Thakur, Khushboo Mehta, Bhanwar Bamniya, Kajal Verma, Partha Paul

(Sitting L to R) - Rajendra Das, Dibyendu Sarkar

Dipak Dutta, Ph.D.

Molecular Biochemistry lab

Gene regulation and bacterial physiology under environmental challenges

My laboratory is dedicated to exploring the biochemical basis of the survival strategy of bacteria by looking at the functioning of the central dogma and metabolic pathways. We employ various approaches (gene cloning, protein expression and purification, genetic manipulation using homologous recombination and P1 transduction, reporter gene assays, radioisotope-mediated transcription and replication assays to visualize the products in urea-denaturing PAGE, enzyme kinetics, microarray, metabolomics, 2D proteomics in situ footprinting, confocal microscopy, flow cytometry, etc.) to address the fundamental questions. The ongoing projects are:

- Impact of Replisome and RNA polymerase collision on the plasmid copy numbers
- Unravelling genetic circuits for intrinsic alkalization and riboswitch activation under metal stress
- Rho-dependent transcription termination and stress response mechanism
- Unravelling spermidine stress management in *E. coli*, *Shigella*, *Salmonella* and *Staphylococcus*
- Industrial production and formulation of T7 RNA polymerase and pyrophosphatase enzymes for mRNA synthesis

Selected Publications:

1. Kumar, V., Mishra, R.K., Ghose, D., Kalita, A., Dhiman, P., Prakash, A., Thakur, N., Mitra, G., Chaudhari, V.D., Arora, A., Dutta, D. (2022) Free spermidine evokes superoxide radicals that manifest toxicity. *Elife.*, 11:e77704.
2. Kalita, A., Mishra, R.K., Kumar, V., Arora, A., Dutta, D. (2022) An Intrinsic Alkalization Circuit Turns on mntP Riboswitch under Manganese Stress in *Escherichia coli*. *Microbiol Spectr*, **10**, e0336822.
3. Shikha, S., Kumar, V., Jain, A., Dutta, D., Bhattacharyya, M.S. Unraveling the mechanistic insights of sophorolipid-capped gold nanoparticle-induced cell death in *Vibrio cholerae*. (2023) *Microbiol Spectr.* **11**(6):e0017523.

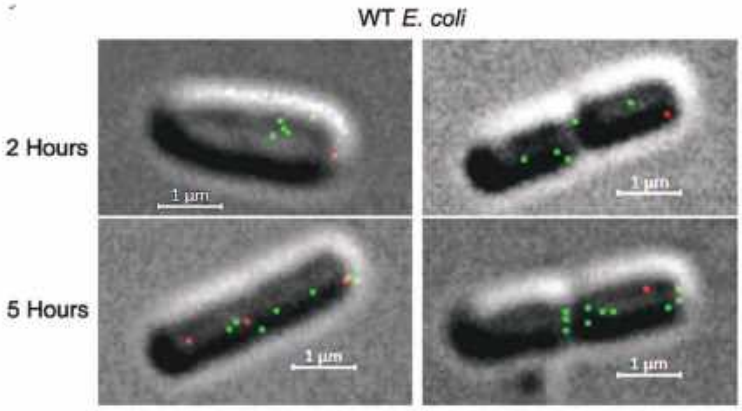


Figure: Fluorescence microscopy images showing distribution of replication initiation foci (green) and plasmid foci (red) in non-dividing and dividing *E. coli* cells after 2 and 5 hours of growth.

Team (L to R):
Ankita Lamba, Ruchika Thakur, Dipak Dutta, Neha Verma, Kanika Bhardwaj

E. Senthil Prasad, Ph.D.

Fermentation Scale-up and Technology Development lab

Fermentation process development for the production of Inulinase enzyme

Our research team focuses on developing chicory plant-based bioproducts like Inulin, FOS and Fructose. Inulinase (EC 3.2.1.7), also known as 1-D-fructan fructanohydrolase, catalyzes the hydrolysis of inulin into fructose and fructan polymers by targeting the β-1,2-glycosidic bonds. Exoinulinase specifically removes terminal fructose residues from the non-reducing ends of inulin molecules, whereas endoinulinase acts on internal bonds within inulin, producing inulotriose, inulotetrose, and other fructan polymers (Xu et al., 2024). Fructose is widely used to produce high-fructose syrup, an essential sweetener. FOS, on the other hand, serve as prebiotics in food and beverages, dietary supplements, and animal feed. Among various microbial sources, fungi have garnered significant interest for inulinase production due to their unique advantages. Our lab has screened fungal isolates from inulin syrup samples sourced from a factory in Himachal Pradesh. Our primary focus is to produce endoinulinase for fructo-oligosaccharides (FOS) production. In this study, we isolated 4 promising endoinulinase-producing fungal strains from 16 screened isolates. The incubation time for inulinase production varied among these fungal strains. The extracellular enzyme-containing broth was filtered, and centrifuged, and the supernatant underwent ultrafiltration using a 10kDa filtration membrane. The retentate was subjected to ammonium sulfate precipitation for partial enzyme purification. The precipitate was dissolved in a small volume of 10 mM sodium acetate buffer (pH 5.0) and subsequently dialyzed using 3 kDa Millipore concentrators. The dialyzed enzyme was utilized for quantitative analysis, such as DNS-A, and for characterization under various physical and chemical conditions. The enzyme exhibited optimal inulinase activity at pH 5.5 and a temperature range of 55°C to 65°C, with an activity of 28 IU/mL and a specific activity of 123.9 U/mg. High-purity inulinase was achieved through ammonium sulfate precipitation, followed by a purification process involving hydrophobic interaction, anion exchange, and gel filtration chromatography.

Selected Publications:

1. Selvaraj, M. K., Thakur, A., Kumar, M., Pinnaka, A. K., Suri, C. R., Siddhardha, B, Prasad E.S. (2023). Ion-pumping microbial rhodopsin protein classification by machine learning approach. *BMC Bioinformatics*.24: 29.
2. Espinoza-Araya, C., Starbird, R., Prasad, E.S., Renugopalakrishnan, V., Mulchandani, A., Bruce, B.D. and Villarreal, C.C. (2023). A bacteriorhodopsin-based biohybrid solar cell using carbon-based electrolyte and cathode components. *Biochimica et Biophysica Acta (BBA)-Bioenergetics*. **1864**(4): 148985.

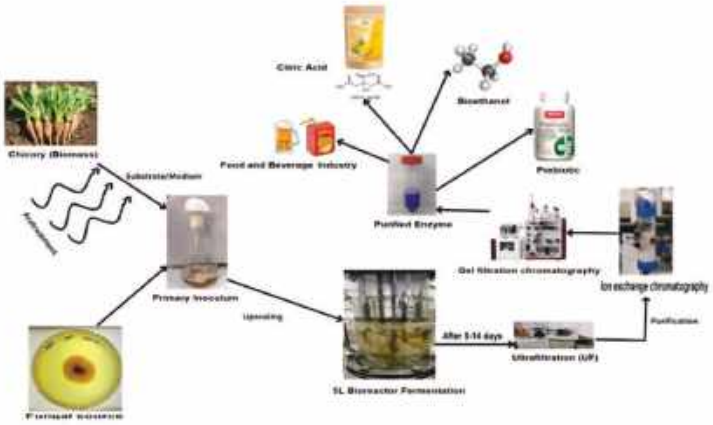


Figure: Schematic representation of onsite inulinase production, purification, and application.

Team (L to R):
Khadim Husain, E. Senthil Prasad, Sandeep, Rajesh Kumar

Easa Naga Malleswari, Ph.D.

Molecular Microbiology and Infectious Diseases lab

Host-Microbial Dynamics: Deciphering Molecular Interactions in Infectious Disease Pathogenesis

The continuous increase in multidrug resistance among clinical pathogens is a significant public health threat. However, our understanding of the cellular and molecular pathogenesis of clinical bacterial strains remains limited. Consequently, treating such infections is increasingly challenging for hospitals and governments alike. Therefore, understanding bacterial pathogenesis is essential for developing more effective antibiotic treatments. Our research group focuses on elucidating the molecular and biochemical mechanisms contributing to bacterial resistance. Additionally, we are exploring ***"Host-Pathogen"*** interactions through post-translational modifications. These efforts aim to develop intervention strategies and provide insights into disease progression.

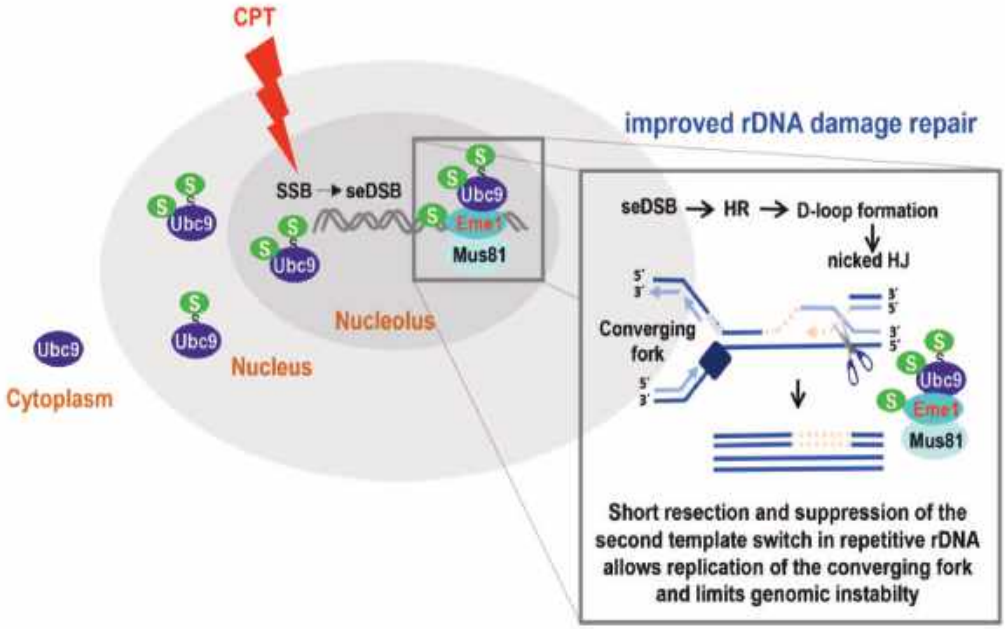


Figure: : Sumoylation of UBC9 and EME1 improves cell survival by colocalizing in nucleolar repair speckles and promoting DNA repair through the converging replication fork.

Team (L to R):
Bhupendra Shukla, Ajay Kumar, Easa Naga Malleswari, Athira Pramod, Devachandana C. Prabhu and Deepthi Prakash

Govindan Rajamohan, Ph.D.

Bacterial Signaling and Drug Resistance lab

Antimicrobial Resistance and Phospho-signaling in priority pathogens

Antimicrobial resistance (AMR) is a major issue in healthcare and communities across the globe. Despite several antibiotic discovery to development programmes and policies to prevent AMR, pathogens continue to (re-)emerge and persist, causing millions of deaths each year, and by 2050, they are anticipated to be the primary cause of death. The World Health Organization and the Government of India have published lists of priority pathogens of global concern. Therefore, there is critical need for the development of novel antibacterials to tackle the infections. *Acinetobacter baumannii*, a Gram negative 'Superbug' , causes simple to severe nosocomial infections and incidences have been reported worldwide. At present, there remains a substantial knowledge gap in understanding the biology in how, why and when the Priority Gram negative and positive pathogens (*A. baumannii, Klebsiella pneumonaie, Escherichia coli, Staphylococcus aureus, Clostridioides difficile*) develop resistance to clinically accessible antibiotics. Currently, we are focusing on understanding the trends of innate and acquired resistance genes, novel molecular mechanisms of AMR, and idiosyncratic phospho-signaling pathways that modulate antimicrobial resistance and cellular functions, all of which have the potential to act as promising drug targets and enable us in designing effective intervene strategies to control healthcare associated infections.

Selected Publications:

1. Bharathi SV, Rajamohan G. Biocide-Resistant *Escherichia coli* ST540 Co-Harboring ESBL,*dfrA14* Confers QnrS-Dependent Plasmid-Mediated Quinolone Resistance. Antibiotics (Basel). 2022 Nov 30;11(12):1724.

2. Bharathi SV, Venkataramaiah M, RajamohanG. Genotypic and Phenotypic Characterization of Novel Sequence Types of Carbapenem-Resistant *Acinetobacter baumannii*, With Heterogeneous Resistance Determinants and Targeted Variations in Efflux Operons. Front Microbiol. 2021 Dec 23;12:738371.

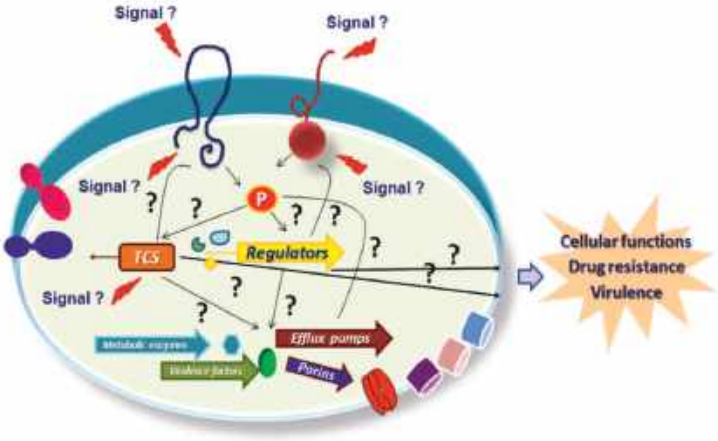


Figure: Schematic diagram depicts the phosphorylation mediated one and two component signaling proteins and regulation of prominent antimicrobial resistant determinants in the critical bacterial pathogens.

Team (L to R):
Chankit Giri, Karthikeyan K, Govindan Rajamohan, Mahesh Kumar, Naveenraj R

(Not in the photograph: Vijaya Bharathi Srinivasan)

Hemraj S. Nandanwar, Ph.D.

Clinical Microbiology & Antimicrobial Research lab

Development of New Antibiotics, Potentiators, and Inhibitors to tackle AMR

Multi-drug resistance (MDR) and extensive-drug resistance (XDR) are serious problems in infectious diseases because resistance to new drugs arises rapidly as they are introduced. Mostly, hospital-acquired infections and community-acquired resistance are becoming more common where resistant bacteria become dominant very rapidly. Therefore, there is an urgent need for new/alternate bio-actives. In addition, our research is focused on the preclinical development of antibiotics, and inhibitors as a drug candidate to manage antibiotic resistance in bacteria. We apply all scientific approaches for drug development up to the preclinical stage to translate further. Currently, we are developing efflux pump inhibitors against both Gram-positive and negative bacteria, a new antibiotic with a novel mode of action against Gram-negative bacterial infections, and a novel antibiotic against mupirocin-resistant MRSA. We employ various aspects of clinical microbiology as well as molecular, chemical, biochemical, bio-informatics, structural biology and pharmacological approaches, detailed molecular characterization, and evaluation of drug or drug like molecules.

Selected Publications:

1. Chandal, N., Tambat, R., Kalia, R., Kumar, G., Mahey, N., Jachak, S. and Nandanwar, H. (2023) Efflux pump inhibitory potential of indole derivatives as an arsenal against *norA* over-expressing *Staphylococcus aureus*. ASM's *Microbiology Spectrum*, 11, No. 5: e04876-22
2. Tambat, R., Mahey, N., Chandal, N., Verma, D. K., Jangra, M., Thakur, K. G. and Nandanwar, H. (2021): A microbe-derived efflux pump inhibitor of the resistance-nodulation-cell division (RND) protein restores antibiotic susceptibility in *Escherichia coli* and *Pseudomonas aeruginosa*. *ACS Infectious Diseases* 8, 2, 255–270
3. Mahey, N., Tambat, R., Verma, D. K., Chandal, N., Thakur, K. G., Nandanwar, H. (2021) Antifungal Azoles as Tetracycline Resistance-Modifiers in *Staphylococcus aureus*. *Applied and Environmental Microbiology*, 13;87(15):e0015521.

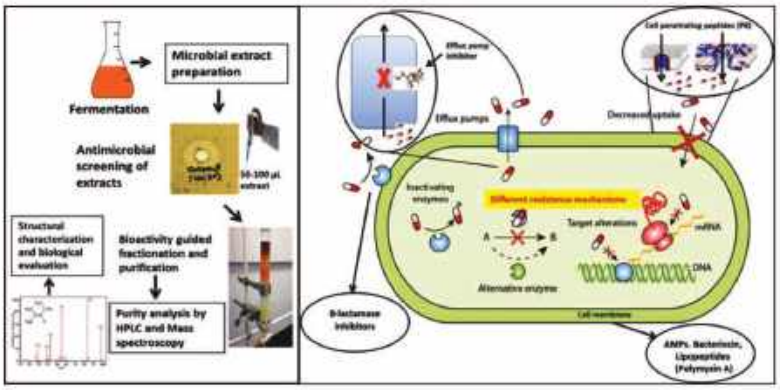


Figure: : Microbial fermentation, bimolecular separation & discovery of antibiotics, antimicrobial peptides, efflux pump inhibitors, β-lactamase inhibitors, etc. from microbes and their further pre-clinical development

Patent(s):

1. Hemraj Santuji Nandanwar, Krishan Gopal Thakur, Rushikesh Tambat, Dipesh Kumar, Nisha Mahey and Nishtha Chandal. Composition for the treatment of multi-drug resistant gram-positive bacterial infections. Indian Patent Application no. 202111015518, Filing date: 31-03-2021.
2. Vinod Dinkar Chaudhari, Pulkit Dhiman, Hemraj Santuji Nandanwar, Vikas Pathania, Krishan Gopal Thakur, Satyajeet Das. Substituted tricyclic heterocyclic compounds as metallo-beta-lactamase inhibitors. Indian Patent Application no. 202111024755, Filing date: 03-06-2021.

Team (L to R):

Nishtha Chandal, Vikas Pathania, Nisha Mahey, Shobit Attery, Vrushali Raka, Souvik Manna, Rajneesh Dadwal, Nidhi Sharma, Vidhy Singh

(Sitting L to R): Hemraj Nandanwar and Vineet Kunar

Imtiyaz Yaseen, Ph.D.

Chromatin Biology and Antimicrobial Resistance lab

Involvement of Epigenetic mechanisms in driving antimicrobial drug resistance

Drug resistance arising from the genetic mutations of the key genes responsible for driving the resistance has been the key focus for a long time. The generation and development of genetic mutation is a slow and irreversible process and thus aren't ideal for the microbes to survive in rapidly changing environments. Recent studies have challenged this conventional wisdom that resistance stems only from genetic mutations by showing mechanisms by which resistant cells harbour distinct epigenetic set-ups over multiple genes whose change in expression confers resistance to them. We started our lab towards the fall of 2023 and are interested in understanding the role of epigenetic mechanisms in these bet-hedging survival mechanisms. In one of the projects, we are currently performing screens to identify and isolate these unstable resistant isolates in a few members of the ESKAPE pathogen family. The outcome from multiple screens has shown around 50% of the population was resistant even after growing them without the drug for 600 generations, suggesting the involvement of genetic mutations. The other 50% of the resistant isolates harbour unstable resistance, losing resistance after growing for 600 generations without a drug, suggesting the involvement of epigenetic-like mechanisms. We are now in the process of identifying the mechanisms responsible for the generation of this unstable resistance survival. We are simultaneously carrying out the same screens with fungal pathogens like candida albicans. Our long-term goal is to identify the drivers responsible for the generation of unstable resistance phenotypes, which we believe can be used as drug targets.

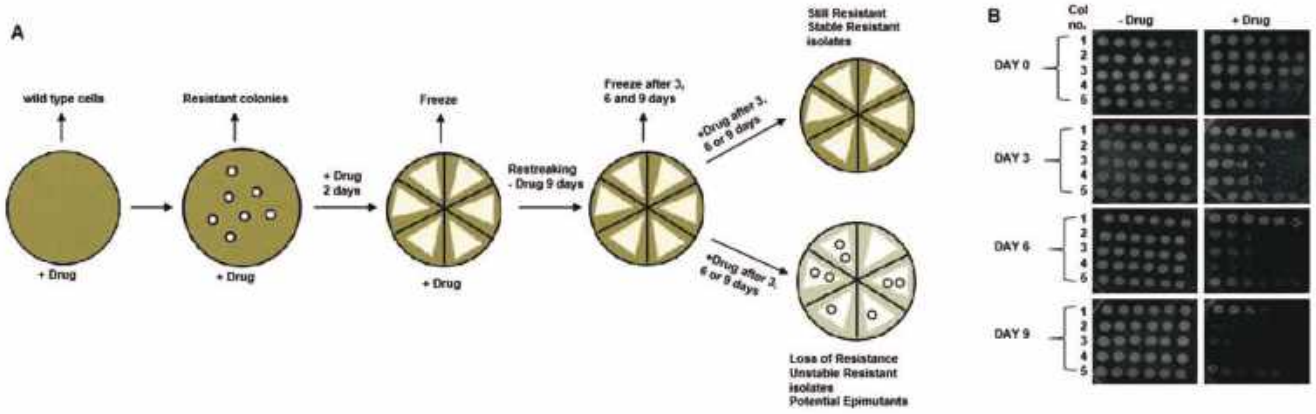


Figure : : (A) Screen strategy to distinguish between genetic mutants and epimutants (B) Representative image of a screen showing the tracing of five isolates performed with one member of ESKAPE pathogen family, showing gradual loss of resistance suggesting the involvement of epigenetic-like mechanism.

Team (L to R):
Amanpreet, Imtiyaz, and Azim

Karthikeyan Subramanian Ph.D.

Protein Crystallography lab

Characterization of proteins involved in bacterial riboflavin biosynthesis pathway

In riboflavin biosynthesis pathway, GTP cyclohydrolase II (GCHII) catalyses the conversion of GTP to 2,5-diamino-6-ribosylamino-4(3H)-pyrimidinone-5'-phosphate (DARP) and is shown to be essential for most of the pathogens. Earlier crystal structure studies on GCHII revealed that the last 20–25 C-terminal residues were unstructured and thus their function remained elusive. To understand the role of unstructured C-terminal residues, a series of C-terminal deletion mutants of GCHII from *Helicobacter pylori* (hGCHII) were generated and their catalytic activity was compared with its wild-type. We observed that none of the C-terminal deletion mutants showed any enzymatic activity indicating that these residues are essential for GCHII function. To get additional insights for such loss of activity, homology models of full-length and deletion mutants of hGCHII were generated and subjected to molecular dynamics (MD) simulation studies. MD studies revealed that antepenultimate His-190 is essential for the catalytic activity as it plays a role in the hydrolysis of GTP as well as in the release of product DARP. This explains our observation wherein even the deletion of only the last four amino acids from the C-terminal region lost the catalytic activity of hGCHII. In summary, we suggest that the unstructured C-terminal residues of GCHII must be considered during rational drug designing.

Selected Publications:

1. Yadav, S., Shinde, R. N., Singh, S., Karthikeyan, S., and Singh, B. (2021) Structurally disordered C-terminal residues of GTP cyclohydrolase II are essential for its enzymatic activity. *Journal of Biomolecular Structure and Dynamics*. **40**, 9318–9331
2. Singh, P. R., Goar, H., Paul, P., Mehta, K., Bamniya, B., Vijjamarri, A.K., Bansal, R., Khan, H., Karthikeyan, S., and Sarkar, D.* (2023) Dual functioning by the PhoR sensor is a key determinant to *Mycobacterium tuberculosis* virulence. *PLOS Genetics*. 10.1371 /journal. pgen. 1011070
3. Kazi, A., Ranjan, A., Kumar M.V.V., Agianian, B., Martin Garcia Chavez, M.G., Vudatha, V., Wang, R., Vangipurapu, R., Chen, L., Kennedy, P., Subramanian, K., Quirke, J. C. K., Beato, F., Underwood, P. W., Fleming, J. B., Trevino, J., Hergenrother, P. J., Gavathiotis, E., and Sebti, S. M*. (2023) Discovery of KRB-456, a KRAS G12D Switch-I/II Allosteric Pocket Binder That Inhibits the Growth of Pancreatic Cancer Patient-derived Tumors. *Cancer Res. Commun.* **3(12)**, 2623-2639

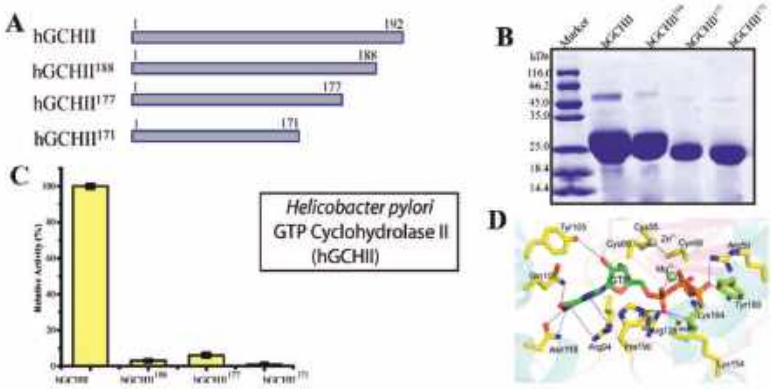


Figure: : Characterization of hGCHII. Schematic (A), SDS-page of purified hGCHII deletion mutant proteins (B) and their enzymatic activity (C). Active site of modeled hGCHII showing the interaction of His^{190} with the phosphate group of GTP (D).

Team (L to R):
Himanshi Bakshi, Divya Bharti, Karthikeyan Subramanian, Sriraj Seth, Surinder Singh

Krishan Gopal Thakur, Ph.D.

Structural Biology lab

Structural biology techniques to understand biological processes and aid drug discovery

Coordinated protein-protein interactions (PPIs) play important roles in most biological processes like signal transduction, transcription, translation, cell division, etc. Studying protein-protein interactions is thus imperative to get a broader view of a biological process. PPIs have also been of particular interest in the recent past as they represent important and novel drug targets for future therapeutic applications. The more ambitious goal of my group is to identify and validate 'hotspots' on protein-protein interfaces that could be targeted for drug design. We use X-ray crystallography along with a combination of other biophysical/biochemical techniques like mass spectrometry, surface plasmon resonance (SPR), isothermal titration calorimetry (ITC), analytical centrifugation, etc. to reveal high-resolution molecular details of proteins and protein-protein complexes and characterize their interactions. At present, our group is actively working in the area of drug discovery to tackle viral (SARS-CoV-2) and antimicrobial-resistant bacterial infections.

Selected Publications:

1. Kapoor, S., Kodesia, A., Kalidas, N., Ashish, and Thakur, K. G. (2021) Structural characterization of *Myxococcus xanthus* MglC, a component of the polarity control system, and its interactions with its paralog MglB. *J Biol Chem* **296**, 100308
2. Verma, D. K., Kapoor, S., Das, S., and Thakur, K. G. (2022) Potential Inhibitors of SARS-CoV-2 Main Protease (M(pro)) Identified from the Library of FDA-Approved Drugs Using Molecular Docking Studies. *Biomedicines* **11**
3. Deep, A., Singh, L., Kaur, J., Velusamy, M., Bhardwaj, P., Singh, R., and Thakur, K. G. (2023) Structural insights into DarT toxin neutralization by cognate DarG antitoxin: ssDNA mimicry by DarG C-terminal domain keeps the DarT toxin inhibited. *Structure* **31**, 780-789 e784

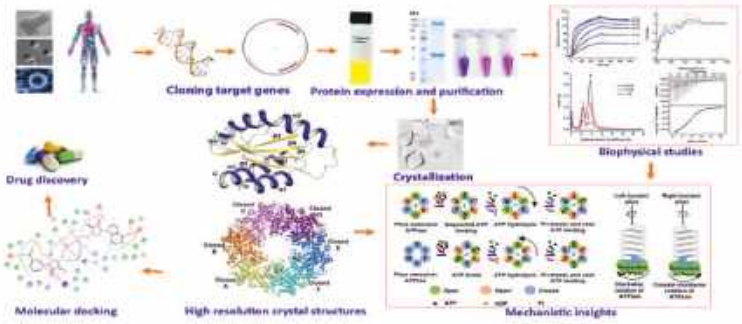


Figure: We use X-ray crystallography and other biophysical/biochemical techniques to understand biological processes at the molecular level.

Patent(s):

1. Hemraj Santuji Nandanwar, Krishan Gopal Thakur, Rushikesh Tambat, Dipesh Kumar, Nisha Mahey and Nishtha Chandal. Composition for the treatment of multi-drug resistant gram-positive bacterial infections. Indian Patent Application no. 202111015518, Filing date: 31-03-2021.
2. Vinod Dinkar Chaudhari, Pulkit Dhiman, Hemraj Santuji Nandanwar, Vikas Pathania, Krishan Gopal Thakur, Satyajeet Das. Substituted tricyclic heterocyclic compounds as metallo-beta-lactamase inhibitors. Indian Patent Application no. 202111024755, Filing date: 03-06-2021.
3. Thakur Krishan Gopal, Arora Anjuman, Verma Dipesh. Thakur Krishan Gopal, Arora Anjuman, Verma Dipesh. Indian Patent Application No. 202117043402. Filing date: 24-09-2021.
4. Vinod Dinkar Chaudhari, Krishan Gopal Thakur, Rajesh Ringe, Deshkanwar Singh, Simran Kaur, Ravneet Singh Chawla, Akshay Joshi. Substituted benzimidazoles for treating viral diseases. Indian Patent Application no. 202211044091. Filing date: 01-08-2022.
5. Vinod Dinkar Chaudhari, Krishan Gopal Thakur, Rajesh Ringe, Simran Kaur, Manjot Kaur, Ravneet Singh Chawla, Akshay Joshi. Compound for treating viral infections. Indian Patent Application No. 202311007365. Filing date: 06-02-2023.
6. Vinod Dinkar Chaudhari, Pulkit Dhiman, Krishan Gopal Thakur, Satyajeet Das. Dihydrochromeno-pyrrole compounds as metallo-beta-lactamase inhibitors and process for the preparation thereof. Indian Patent Application No. 202311041398. Filing date: 14-06-2023.

Team (L to R):
Vineet Rana, Anupama Joshi Aulakh, Akriti Kodesia, Latika, Krishan Gopal, Charandeep Singh, Ravneet Singh Chawla, Akshay Joshi

Mani Shankar Bhattacharyya, Ph.D.

Biocatalysis and Fermentation lab

Exploring biocatalytic routes for the development of sophorolipid derivatives for biotechnological application

My research group focuses on the production and biotechnological utilization of biosurfactants. Biosurfactants, such as sophorolipid (SL), produced by fermentation, have been demonstrated to have applications in drug delivery and as antifungal agents. After establishing the antimicrobial properties of SL-capped gold nanoparticles (Microbiology Spectrum, 2023), by harnessing the structure forming attributes of the acidic SL (ASL), we have synthesized novel (biosurfactant-based) nanostructures, noisome, for cargo delivery applications of drug and other biomaterials. Further, followed by the establishment of the fact that the SL exhibits antifungal properties; derivatives of the ASL have been synthesized by esterification with naphthyl ethanols, using lipase as a biocatalyst. One of the derivatives (ASLdC3) has been proven to exhibit superior antifungal properties (Figure 1) with the potential to be developed as a potent antifungal drug candidate. Moreover, biocatalytic synthesis of drugs and drug intermediates, especially chiral intermediates, has remained one of the priority areas in the pharmaceutical sector. We have recently established the biocatalytic synthetic route for chiral naphthyl ethanol synthesis using *Rhodotorula kratochvilovae* (isolated from the high-altitude Himalayan region) as whole cell oxidoreductive biocatalyst (Sustainable Chemistry and Pharmacy, 2022). The biocatalyst is also capable of deracemization of racemic naphthyl ethanols by using its battery of enzymes (Frontiers in Bioengineering and Biotechnology, 2023).

Selected Publications:

1. Kumar, S., Verma, N. K., Basotra, S. D., Sharma, D. Prasad, G. S., Bhattacharyya M. S. (2023) Harnessing dual applications of a novel ascomycetes yeast, *Starmerella cerana* sp. nov., as a biocatalyst for stereoselective ketone reduction and biosurfactant production. *Frontiers in Bioengineering and Biotechnology* **11**, 1264826
2. Shikha, S., Kumar, V., Jain, A., Dutta, D., Bhattacharyya, M.S. (2023) Unraveling the mechanistic insights of sophorolipid-capped gold nanoparticle-induced cell death in *Vibrio cholerae*. *Microbiology Spectrum* **11**, e00175-23
3. Verma, N. K., Kumar, S., Prasad, G. S., Bhattacharyya, M. S. (2022) Biocatalytic deracemization of racemic naphthyl alcohols by using a novel yeast isolate *Rhodotorula kratochvilovae* (MTCC 13029), *Sustainable Chemistry and Pharmacy*, **26**, 100609.

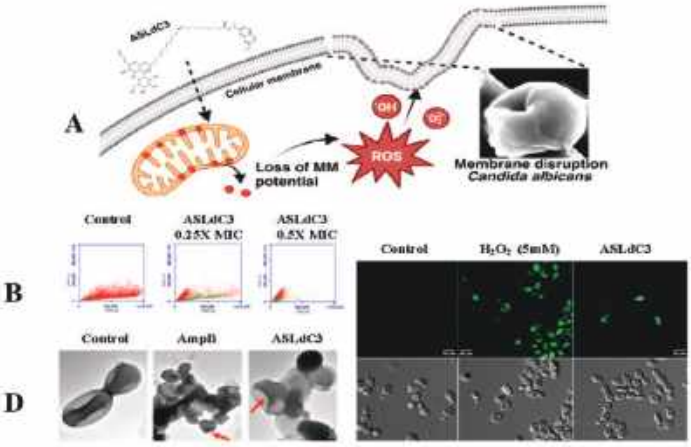


Figure: : Antifungal activity of ASLdC3 against *C. albicans*. (A) Schematic representation of the effect of ASLdC3 on mitochondrial membrane potential (MMP) and generation of oxidative stress in *C. albicans*. (B) Representative dot plot showing the effect of ASLdC3 on MMP measured using DiOC6(3) using flow cytometry. (C) Representative CLSM images of *Candida albicans* stained with H2DCFDA indicating ROS generation in the presence of ASLdC3. (D) TEM images of cells 3 h after treatment with 10 µg/mL ASLdC3 and 1 µg/mL amphotericin B

Team (L to R):

Sweta Dalal, Yachna Kumari, Dawinder Singh, Mani Shankar Bhattacharyya, Sandal Deep Basotra, Ankita Jain, Navjot Kaur

Manoj Kumar, Ph.D.

Virology and Bioinformatics lab

Developing bioinformatic tools for viral research

Dr. Manoj Kumar's laboratory focuses on emerging and re-emerging human viruses. The team has developed AI/ML tools for identifying inhibitors against various viruses, including 'antiCorona', 'antiDengue', 'antiHCV', 'antiEbola', and 'antiNipah' accessible from http://bioinfo.imtech.res.in/manojk/. To validate these inhibitors as potential antiviral agents, the lab employs molecular docking approaches. The group has also created the 'Biofilm-I' and 'anti-Biofilm' algorithms, which predict biofilm inhibitors to address antimicrobial resistance (AMR). Additionally, the lab has established databases such as 'DrugRepV' for repurposed drugs targeting emerging viruses and 'AntiVIRmiR' for host and viral miRNAs.

Their research extends to RNA sequencing (RNAseq) analyses for identifying therapeutic targets and repurposing drug candidates for Epstein-Barr virus (EBV) and human papillomavirus (HPV)-associated cancers. The team has benchmarked genome assemblers for viral next-generation sequencing (NGS), including SARS-CoV-2. Furthermore, they have performed metaviromic analyses to study the diversity of bacteriophages and DNA viruses from freshwater sources, including the N-Choe stream and the River Ganges.

The lab has experimentally validated the potential drug repurposing candidates. We cultured SARS-CoV-2 variants of concern (VOCs), including the Wuhan, Delta, and Omicron strains, evaluated the antiviral efficacy and toxicity of these repurposed drugs, and produced SARS-CoV-2 pseudovirus particles to study drug interactions with the viral spike protein (as illustrated in Figure).

Selected Publications:

1. Rajput, A., Bhamare, K.T., Thakur, A., Kumar, M (2023). Anti-Biofilm: Machine Learning Assisted Prediction of IC_{50} Activity of Chemicals Against Biofilms of Microbes Causing Antimicrobial Resistance and Implications in Drug Repurposing. *J Mol Biol.* **435**(14):168115.
2. Kamboj, S., Rajput, A., Rastogi, A., Thakur, A., Kumar, M (2022). Targeting non-structural proteins of Hepatitis C virus for predicting repurposed drugs using QSAR and machine learning approaches. *Computational and Structural Biotechnology Journal*, **20**, 3422-3438.
3. Rajput, A., Thakur, A., Mukhopadhyay, A., Kamboj, S., Rastogi, A., Gautam, S., Jassal, H., Kumar, M. (2021). Prediction of repurposed drugs for Coronaviruses using artificial intelligence and machine learning. *Comput Struct Biotechnol J.* **19**:3133-3148.

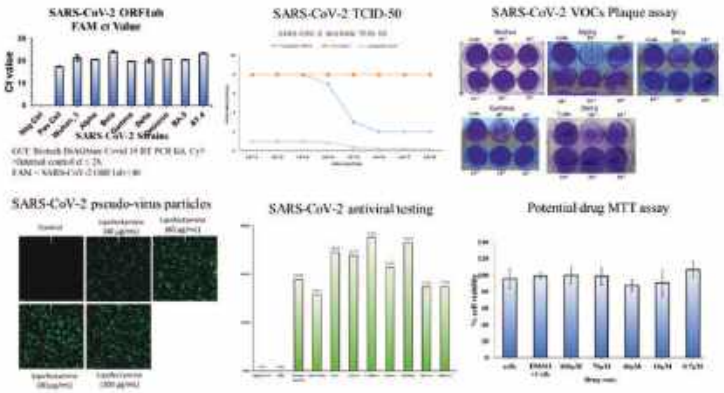


Figure: Overview of antiviral screening of potential repurposing drugs against SARS-CoV-2 VOCs

Team (L to R):
Sakshi Kamboj, Anamika Thakur, Sakshi Gautam, Manoj Kumar, Amit Kumar Gupta, Adhip Mukhopadhyay, Amber Rastogi

(Not in the Photograph):
Kailash T. Bhamare, Hiteshi Vaidya, Maryam Akhtar

Neeraj Khatri, Ph.D.

iCARE lab

Therapeutic Potential of *Lactiplantibacillus plantarum* 2621: Combating Bacterial Infections, Oxidative Stress, and Promoting Wound Healing

Lactiplantibacillus plantarum MTCC 2621 (Lp2621) is a well-characterized probiotic strain with numerous health benefits, though its wound-healing potential remains underexplored. This study evaluated the antibacterial, anti-biofilm, antioxidant, and wound-healing properties of its cell-free supernatant. Lp2621 exhibited strong antibacterial activity against indicator bacteria, showed no hemolytic activity, and was confirmed safe through a skin irritation assay in BALB/c mice, with no adverse dermal reactions. Its supernatant provided 60–100% protection against H_2O_2-induced oxidative stress in A549 cells and significantly accelerated wound healing in both *in vitro* scratch assays and *in vivo* excision wound models. In mice, topical application of Lp2621 gel promoted faster wound healing compared to vehicle or betadine treatments, including in wounds infected with *Staphylococcus aureus* and MRSA 831. Histological analysis revealed enhanced wound repair, characterized by early upregulation of the pro-inflammatory cytokine IL-6, followed by increased IL-10 expression. Additionally, Lp2621 effectively countered MRSA infections by inhibiting biofilm formation and supporting wound healing through its immunomodulatory and antibacterial properties. These findings highlight the therapeutic potential of Lp2621 in combating bacterial infections, reducing oxidative stress, and accelerating wound healing

Selected Publications:

1. Dubey, A. K., Podia, M., Priyanka, N., Raut, S., Singh, S., Pinnaka, A. K., & Khatri, N. (2021). Insight Into the Beneficial Role of *Lactiplantibacillus plantarum* Supernatant Against Bacterial Infections, Oxidative Stress, and Wound Healing in A549 Cells and BALB/c Mice. *Frontiers in Pharmacology*, **12**, 728614.
2. Dubey, A. K., Sharma, M., Parul, N., Raut, S., Gupta, P., & Khatri, N. (2023). Healing wounds, defeating biofilms: *Lactiplantibacillus plantarum* in tackling MRSA infections. *Frontiers in Microbiology*, **14**, 1284195

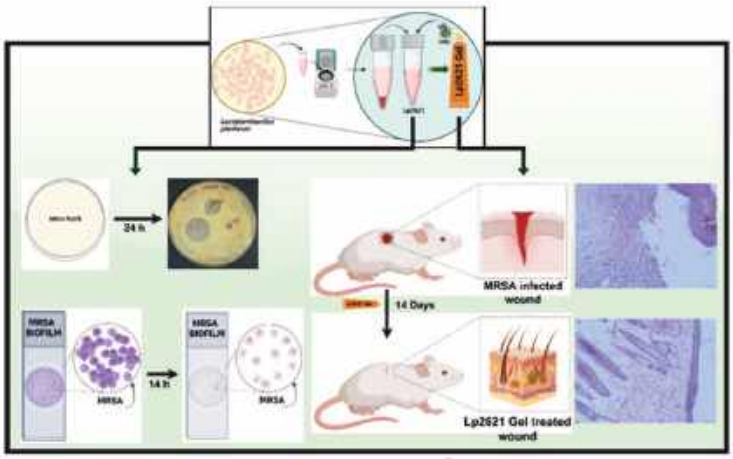


Figure: : Antibacterial, antioxidant, and wound healing potential of Lp2621.

Team (L to R):
Ashish Dubey, Rameet Kaur, Mohini, Priyanka, Ram Bharti.

(Sitting L to R): Bhupinder Singh Chopra, Neeraj Khatri, Sachin Raut.

Nithya Vadakedath, Ph.D.

Microbial Ecology and Genomics lab

Deciphering microbial diversity, its interactions, and bioprospecting of novel natural chemicals

Decoding the microbiome of unconventional ecological niches will result in collecting countless new and unique cultures for developing therapeutics and biochemicals of commercial importance. We study bacterial, cyanobacterial, and microalgal diversity, map genomes of rare and uncultivable microbes, and develop rational, directed screening techniques to isolate novel species and metabolites from non-traditional environmental niches. We are committed to orchestrating credible research in the bioprospecting of natural compounds, unraveling the hidden biosynthetic potential of microbes, and converting gene sequences encoding novel metabolites into purified molecules in tubes. The coupling of the genome mining program with synthetic biology will allow us to generate novel biochemicals sustainably, modulate their quality and titers, and elucidate the molecular mechanism of unique phenotypic traits, etc. We are involved in developing anti-Quorum sensing and anti-biofilm molecules as the next generation of antimicrobial agents from unique and untapped natural resources and understanding their role in biofilm formation and virulence inhibition to address the multidrug resistance problem. We also focus on finding microbial solutions for the remediation of hazardous chemicals and carbon sequestration. Omics-based approaches are being used to understand how microbes adapt to these environments and metabolize toxic chemicals and turn them into value-added metabolites.

Selected Publications:

1. Prasad, B., Richter, P., Vadakedath, N., Haag, F. W., Strauch, S. M., Mancinelli, R., Schwarzwälder, A., Etcheparre, E., Gaume, N., Lebert, M. (2021). How the space environment influences organisms: An astrobiological perspective and review. *International Journal of Astrobiology*, **20**(2), 159-177.
2. Sharma, P., Tripathi, S., Vadakedath, N., & Chandra, R. (2021). In-situ toxicity assessment of pulp and paper industry wastewater on *Trigonella foenum-graecum* L: potential source of cytotoxicity and chromosomal damage. *Environmental Technology & Innovation*, **21**, 101251.
3. Yadav, V., Manjhi, A., & Vadakedath, N. (2023). Mercury remediation potential of mercury-resistant strain *Rheinheimera metallidurans* sp. nov. isolated from a municipal waste dumping site. *Ecotoxicology and Environmental Safety*, **257**, 114888

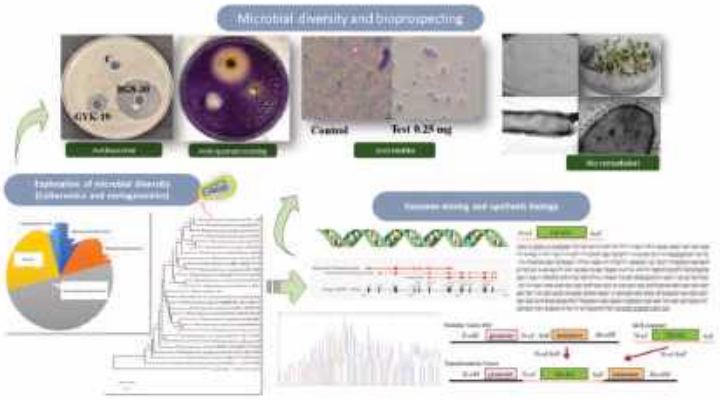


Figure: Graphical abstract of Lab research interest

Team (L to R):
Renuka Moore, Anjali Manjhi, Nithya Vadakedath, Akhil Nair, Vinay Yadav

(Not in the photograph: Yukthi Gupta)

Pawan Gupta, Ph.D.

Molecular Biology lab

Understanding nuclear receptors in infection and disease

Host-Pathogen Interaction (*Mycobacterium tuberculosis, Mtb*): *Mtb* is the etiologic agent of tuberculosis in humans and is responsible for more morbidity than any other bacterial disease. We are investigating host-pathogen interaction, in the context of host lipid sensing nuclear receptor and pathogen lipids, contributing towards *Mtb* pathogenesis or clearance. We are also investigating transcription factors modulation of macrophage polarization, plasticity and acting as combats or cohorts to *Mtb* survival. We are elucidating mechanisms of Autophagy and drug non-responsiveness emanating from the host.

Immune Cells Plasticity and Inflammatory Disease: Inflammatory mice models of rheumatoid arthritis (RA), encephalomyelitis (EAE), and allergic asthma (AA) are being used to study the differential expression and function of nuclear receptors in plasticity, polarization, and activation of T cell, B cell, DCs, and macrophage.

Metabolic Diseases: Neuron, Cancer biology, Anemia, Sepsis: We plan to investigate the molecular circuitry of neuron function, differentiation, and cancer at the level of nuclear receptors and associated coactivators and corepressors.

SMART and Switchable Therapeutic Proteins and Post-Translational Modification (PTM): We are deciphering the PTM and complex regulation of orphan/nuclear receptors. We are attempting oral/bronchial protein vehicle, next-generation switchable recombinant erythropoietin, insulin, growth factors, and cytokines.

Selected Publications:

1. Kumar, S., Nanduri, R., Bhagyaraj, E., Kalra, R., Ahuja, N., Chacko, A.P., Tiwari, D., Sethi, K., Saini, A., Chandra, V., Jain, M., Gupta, S., Bhatt, D., Gupta, P. (2021) Vitamin D3-VDR-PTPN6 axis mediated autophagy contributes to the inhibition of macrophage foam cell formation. *Autophagy* **17**(9):2273-2289.
2. Tiwari, D., Ahuja, N., Kumar, S., Kalra, R., Nanduri, R., Khare, A.K., Gupta, S., Bhagyaraj, E., Arora, R., Gupta, P. (2022) Nuclear receptor Nr1d1 alleviates asthma by abating GATA3 gene expression and Th2 cell differentiation. *Cell Mol Life Sci.* **79** (6); 308.
3. Kalra, R., Tiwari, D., Dkhar, H.K., Bhagyaraj, E., Kumar, R., Bhardwaj, A., Gupta, P. (2023) Host factors subverted by *Mycobacterium tuberculosis:* Potential targets for host directed therapy. *Int Rev Immunol.* **42** (1); 43-70.

Team (L to R):

Rashmi Arora, Asheesh Kumar Khare, Pawan Gupta, Vipashu Kaushal, Saumyata Kumawat, Rahul Sharma

(Not in the photograph: Drishti Tiwari, Nancy Ahuja, Sumit Kumar, Shalini Gupta

Prabhu B. Patil, Ph.D.

Bacterial Genomics and Evolution lab

Insights into host-pathogen-microbiome-microenvironment interactions using rice as a model plant

Using high-throughput culturomics and genomics we are trying to understand other facets of host-pathogen and host-microbe interactions. This can be unique and new microenvironment that a host or the pathogen or the commensal is exposed during its life-time. Our hypothesis is that this micro-environment is leading to emergence of predominant and unique lineages with more pathogenicity potential thereby undermining efforts to understand and manage this pathogen. For example, as rice is grown under intensive submerged conditions, this microenvironment represent a never seen ecology for a rice microbe in general and a serious pathogen like *Xanthomonas oryzae* pv. *oryzae* (Xoo). Similarly, Xoo has deal with the host microbiome that also consist of non-pathogenic counterparts ie., non-pathogenic Xanthomonas (NPX). Using the case study of Xoo and rice, we provide evidence on the role of microenvironment in shaping population structure of the pathogen and also community structure of microbiota associated with the host.

Selected Publications:

1. Rana, R., Jaiswal, G., Bansal, K., and Patil, P. B. (2023) Comparative genomics reveals the emergence of copper resistance in a non-pigmented *Xanthomonas* pathogen of grapevine. *Environ. Microbiol. Rep.* **15**, 716-726
2. Singh, A., Bansal, K., Kumar, S., and Patil, P. B. (2022) Deep Population Genomics Reveals Systematic and Parallel Evolution at a Lipopolysaccharide Biosynthetic Locus in *Xanthomonas* Pathogens That Infect Rice and Sugarcane. *Appl. Environ. Microbiol.* **88**, e00550-00522
3. Bansal, K., Kumar, S., Kaur, A., Singh, A., and Patil, P. B. (2021) Deep phylo-taxono genomics reveals *Xylella* as a variant lineage of plant associated *Xanthomonas* and supports their taxonomic reunification along with *Stenotrophomonas* and *Pseudoxanthomonas*. *Genomics* **113**, 3989-4003

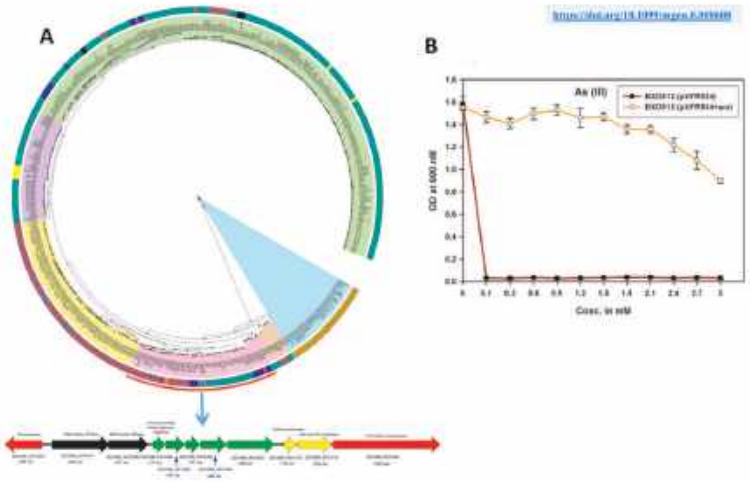


Figure: A horizontally acquired arsenic resistance (Ars) cassette in *X. oryzae* pv, oryzae population A) Global phylogenomic tree depicting dotted lineage harbouring 12kb Ars cassette B) Gain of function genetic studies with Ars cassette in a susceptible isolate

Team (L to R):
Gagandeep Jaiswal, Arushi Chaudhry, Rekha Rana, Anushika Sharma, Tanu Saroha, Ashish Datta, Prabhu B. Patil

Pradip Sen, Ph.D.

Cell Biology and Immunology lab

Role of TIM-3 receptor in immunoregulation during *Leishmania donovani* infection

Visceral leishmaniasis (VL), caused by *Leishmania donovani* (LD), is the second most deadly parasitic disease in the world after malaria. A key pathogenic factor accounting for disease progression is immunosuppression, the molecular basis for which is not yet fully understood. Since dendritic cells (DCs) normally initiate antileishmanial immune responses, we investigated whether DCs are dysregulated during LD infection, and assessed its role in immunosuppression. Accordingly, we determined the regulatory effect of LD on DCs. Notably, whether LD promotes or inhibits DC activation/maturation remains obscure. Furthermore, the receptor through which LD exerts immunoregulatory effect on DCs is still ill-defined. Our study for the first-time has demonstrated that LD inhibits DC activation and maturation via the T cell immunoglobulin and mucin protein-3 (TIM-3) receptor, and thereby attenuates the capacity of DCs to trigger antileishmanial immune responses *in vivo*. In addition, TIM-3 promotes conventional type-2 DC (cDC2) polarization that favors disease-promoting type-2 T helper cell (Th2) response. These findings uncover a unique mechanism by which LD subverts host immune responses, and suggests TIM-3 as a potential new target for immunotherapy against VL.

Selected Publications:

1. Yadav, M., Akhtar, M. N., Mishra, M., Kumar, S., Kumar, R., Shubham, Nandal, A., and Sen, P. (2023) *Leishmania donovani* Attenuates Dendritic Cell Trafficking to Lymph Nodes by Inhibiting C-Type Lectin Receptor 2 Expression via Transforming Growth Factor-beta. *Microbiol Spectr* **11**, e0412222
2. Mishra, M., Yadav, M., Kumar, S., Kumar, R., and Sen, P. (2023) TIM-3 increases the abundance of type-2 dendritic cells during Leishmania donovani infection by enhancing IL-10 production via STAT3. *Cell Death Dis* **14**, 331
3. Akhtar, M. N., Kumar, S., and Sen, P. (2022) *Leishmania donovani* Impedes Antileishmanial Immunity by Suppressing Dendritic Cells via the TIM-3 Receptor. *mBio* **13**, e0330921

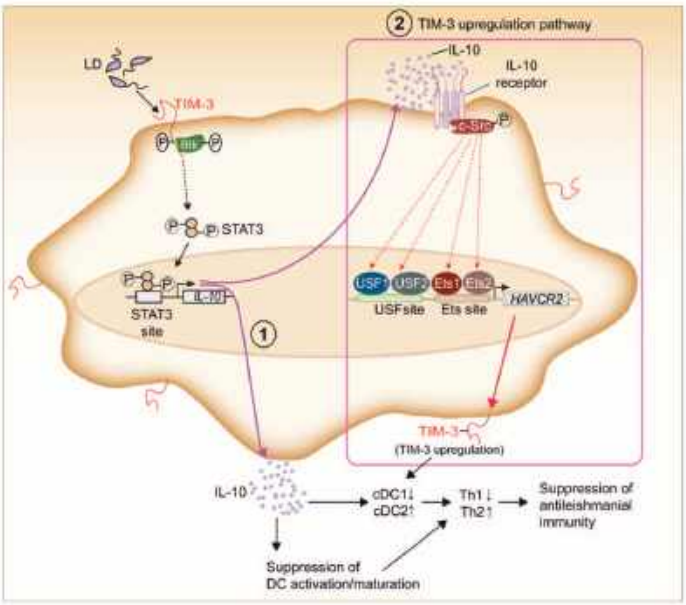


Figure: Model showing how DC-expressed TIM-3 regulates antileishmanial immune response. During infection, LD increases DC IL-10 secretion via TIM-3 (1). IL-10 augments disease-promoting Th2 response by inhibiting DCs and raising cDC2 abundance either directly or via TIM-3 (2).

Team (L to R):
Anil Nandal, Shubham, Pradip Sen, Raj Kumar and Sandeep Kumar

Raman Parkesh, Ph.D.

Computational and Medicinal Chemistry lab

Convergence of Biology and Chemistry: Advancing Antimicrobial Therapies and Nanomaterials

My current research focus involves delving deep into the intricate roles of enzymes, both bacterial and mammalian, within physiological and pathological processes. Through this exploration, I aim to unveil insights that could pave the way for identifying small molecule therapeutics tailored to combat human diseases. In pursuit of these objectives, our group champions the development and application of cutting-edge technologies at the convergence of chemistry, biology, and chembioinformatics, ascribing to the philosophy that addressing the most pressing biomedical challenges necessitates innovative, multidisciplinary approaches. In particular, we utilize a multidisciplinary approach to explore mechanisms of disease pathology and identify chemical probes and lead molecules for both disease diagnosis and treatment, with particular emphasis on the development of small molecule therapeutics for tuberculosis, ESKAPE pathogens, and epigenetic proteins. Further, my laboratory specializes in bottom-up synthesis of functionalized nanoparticles, leveraging novel chemical molecules for applications in biological and environmental sensing.

Selected Publications:

1. Loharch, S., Chhabra, S., Kumar, A., Swarup, S. and Parkesh, R. (2021) Discovery and characterization of small molecule SIRT3-specific inhibitors as revealed by mass spectrometry. Bioorganic Chemistry, **110**, p.104768.
2. Kumar, A., Loharch, S., Kumar, S., Ringe, R.P. and Parkesh, R. (2021) Exploiting cheminformatic and machine learning to navigate the available chemical space of potential small molecule inhibitors of SARS-CoV-2. Computational and Structural Biotechnology Journal, **19**, pp.424-438.
3. Sasan, S., Chopra, T., Gupta, A., Tsering, D., Kapoor, K.K. and Parkesh, R. (2022) Fluorescence "turn-off" and a colorimetric sensor for Fe2+, Fe3+, and Cu2+ ions based on a 2, 5, 7-triarylimidazopyridine scaffold. ACS omega, 7(13), pp.11114-11125.

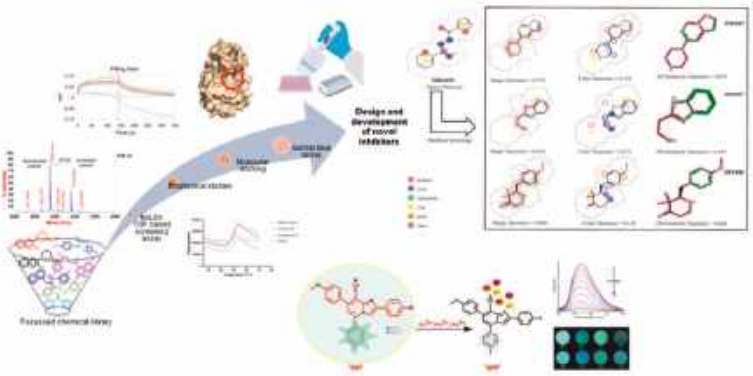


Figure: Synthesis at the Interface of Chemistry and Biology.

Patent(s):

1. Raman Parkesh, Sonali Chhabra. Benzo[de]isoquinoline-1,3-dione based compound and use thereof. Indian Patent Application No. 202311053165. Filing date: 07-08-2023.

Team (L to R):
Tavishi Chopra, Abhinit Kumar, Raman Parkesh, Abdul Rahman, Sonali Chhabra, Sapna Swarup

Ramya T.N.C., Ph.D.

Molecular Glycobiology lab

Glycan-binding proteins, Glycoconjugates, and Glyco-enzymes

Our laboratory is interested in the study of microbial glycoproteins, carbohydrate-active enzymes, and carbohydrate-binding modules (CBMs). In the period of this report, we were fortunate to make some seminal findings in these research areas. We identified two new glycosidic linkages, Ser/Thr-O-Neu5Ac and Ser/Thr-O-KDO, in the course of our studies on recombinant and heterologously expressed Maf flagellin nonulosonic acid glycosyltransferases of the Gram-positive bacteria, *Clostridium botulinum*, and *Geobacillus kaustophilus*. We demonstrated the potential of microbial alginate lyases in disrupting the alginate-rich biofilms of *Pseudomonas aeruginosa*, a common pathogen in cystic fibrosis lung. We also successfully constructed a ~10 Gb metagenomic phage display library from the metagenomic DNA of healthy human fecal samples (Figure) and fine-tuned the biopanning procedure using a L-fucose-binding phage to identify the carbohydrate-binding domain present at a copy number of just 100 (amidst a total of ~10^{10} phages). Using this system, we identified several previously unannotated carbohydrate-binding domains, which do not find a hit to any known Pfam domain - four complex N-glycan binding domains (MG1, MN3, MU1, and MU3), a levan binding domain (Lev-Lev5), a beta-D-glucan binding domain (BDG-BDG6), and a dextran/laminarin/pectin binding domain (Dex-Dex7/Lam-Glc9/Lam-Lam9/Pec-Pec1) (Figure).

Selected Publications:

1. Akhtar, A., Lata, M., Sunsunwal, S., Yadav, A., Lnu, K., Subramanian, S., and Ramya, T. N. C. (2023) New carbohydrate binding domains identified by phage display based functional metagenomic screens of human gut microbiota. *Commun Biol* 6, 371
2. Mahajan, S., and Ramya, T. N. C. (2021) *Cellulophaga algicola* alginate lyase inhibits biofilm formation of a clinical *Pseudomonas aeruginosa* strain MCC 2081. *IUBMB Life* 73, 444-462
3. Khairnar, A., Sunsunwal, S., Babu, P., and Ramya, T. N. C. (2021) Novel serine/threonine-O-glycosylation with N-acetylneuraminic acid and 3-deoxy-D-manno-octulosonic acid by bacterial flagellin glycosyltransferases. *Glycobiology* 31, 288-306

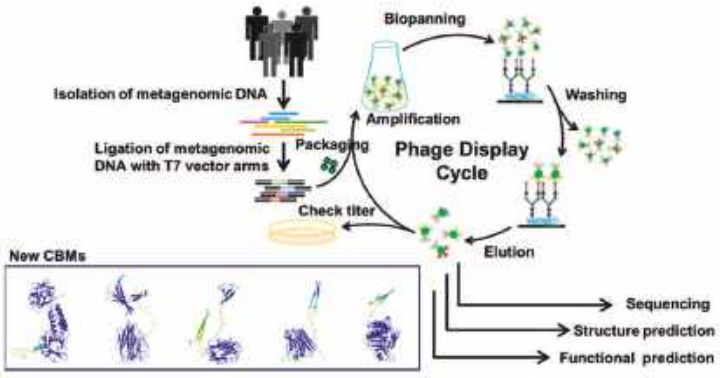


Figure: : Construction of a metagenomic phage display library from the metagenomic DNA of healthy human fecal samples, and identification of new carbohydrate binding domains by biopanning against glycoconjugates

Team (L to R):

Anu Walia, Tabassum Siddiqui, Kajal, Madhu Lata, Ramya T.N.C., Priyanka Shaw, Neetu, Shivangi

(Not in the photograph: Sonali Sunsunwal)

Rashmi Kumar, Ph.D.

Immunology lab

Host-microbiota interaction in health and disease

Research in my lab focuses on characterizing the resident microbiota and host immune system interaction in the context of inflammation and aging. Chronic inflammation is the underlying factor of many diseases and ailments associated with old age. We have studied the dynamics of resident microbiota (intra-tumoral or gut microbiota), their communal interactions, and the modulation of the host's immune system in the onset and progression of oral squamous cell carcinoma (OSCC) and Inflammatory bowel diseases (IBD), which are important in the Indian context.

Our study identified microbial signatures of oral squamous cell carcinoma (OSCC) for early and late-stage stratification and their immunomodulatory potential. This study advocates combining the microbiome and immune signature of tumors for their prognostic and diagnostic application. Another area of research in our lab is centered on understanding the influence of microbial dysbiosis on age-associated immune dysfunction. Recently, we established the correlation between gut dysbiosis and loss of DCs tolerance in old age. Furthermore, we show the impact of gut replenishment with beneficial bacteria on the reinvigoration of the immune system.

Currently, we are exploring the mechanism of probiotic-mediated immunomodulation to ameliorate chronic inflammation and fulfill our long-term goal of microbiota-based therapeutic management of diseases.

Selected Publications:

1. Bashir, H., Singh, S., Singh, R. P., Agrewala, J. N., and Kumar, R. (2023) Age-mediated gut microbiota dysbiosis promotes the loss of dendritic cells tolerance. Aging Cell **22**, e13838
2. Gautam, S. S., Singh, R. P., Karsauliya, K., Sonker, A. K., Reddy, P. J., Mehrotra, D., Gupta, S., Singh, S., Kumar, R., and Singh, S. P. (2022) Label-free plasma proteomics for the identification of the putative biomarkers of oral squamous cell carcinoma. J Proteomics **259**, 104541
3. Pratap Singh, R., Kumari, N., Gupta, S., Jaiswal, R., Mehrotra, D., Singh, S., Mukherjee, S., and Kumar, R. (2023) Intratumoral Microbiota Changes with Tumor Stage and Influences the Immune Signature of Oral Squamous Cell Carcinoma. Microbiol Spectr **11**, e0459622

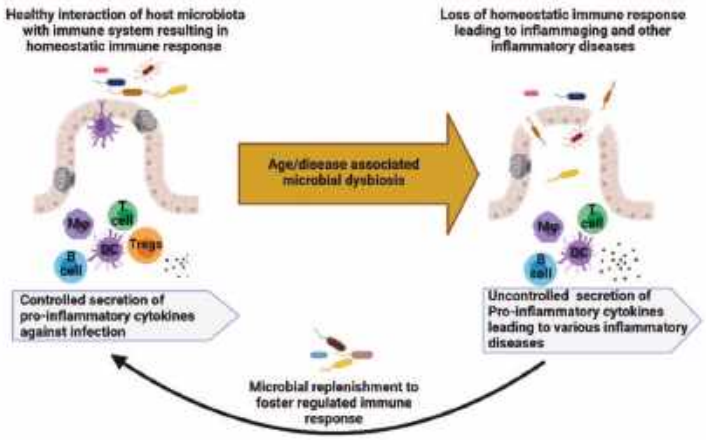
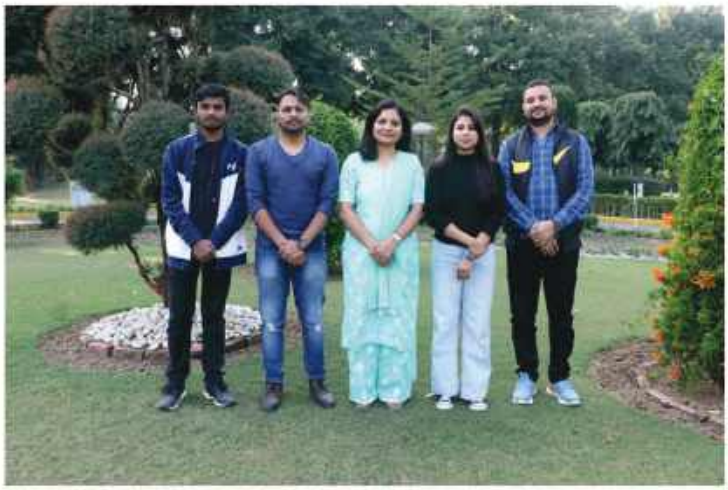


Figure: **Microbiota-mediated** modulation of host's immune system

Team (L to R):
Pratik Medhe, Akhil Agarwal, Rashmi Kumar, Priya Biswas, Raghvendra Pratap Singh.

(Not in the photograph: Hilal Bashir, Anchal Bawa)



Ravi Pratap Narayan Mishra, Ph.D.

Vaccines and Biotherapeutics lab

Vaccine & Biotherapeutics research and bioprocess development

Vaccine Design and Bioprocessing: We use reverse vaccinology-linked bioprocess technologies to create vaccine antigens against bacterial and viral infections, construct processes, and scale up those processes in order to prove the technology's feasibility, we use reverse vaccinology-linked bioprocess technologies.

Innovative Approaches in Monoclonal Antibody (mAb) Development: We use a CHO cell-based bioprocess platform to create stable cell lines and scale up bioreactor-based production of therapeutic monoclonal antibodies (mAbs) that are compatible with the industry. In order to increase therapeutic efficacy and specificity, we are also looking into new protein/antibody-drug conjugates for targeted cancer therapy.

Cell Bank Development and Strain Engineering in Biopharmaceuticals: Ensuring GMP ComplianceWe have state-of-the-art facilities for the development of cGMP-compliant cell banks and vectors used in the early development and biomanufacturing of biopharmaceuticals, such as vaccines, biotherapeutics, fermentation-based APIs, industrial enzymes, and diagnostics. Strain engineering and biopharma cell bank development under GMP conditions are also available.

Selected Publications:

1. Jitender, Kumar, B.V., Singh, S., Verma, G., Kumar, R., Mishra, P.M., Kumar, S., Nagaraj, S.K., Nag, J., Joy, C.M. and Nikam, B., (2023). A broadly protective CHO cell expressed recombinant spike protein subunit vaccine (IMT-CVAX) against SARS-CoV-2. bioRxiv, 2023-04.
2. Nandal, J., Mihooliya, K. N., Verma, H., Kalidas, N., Ashish, F., Mishra, R. P. N., & Sahoo, D. K. (2022). Evaluation of physicochemical and functional similarity of a new CHO derived anti-EGFR antibody P-mAb to its reference medicinal product. *Artificial Cells, Nanomedicine, and Biotechnology*, **50** (1), 17–28.

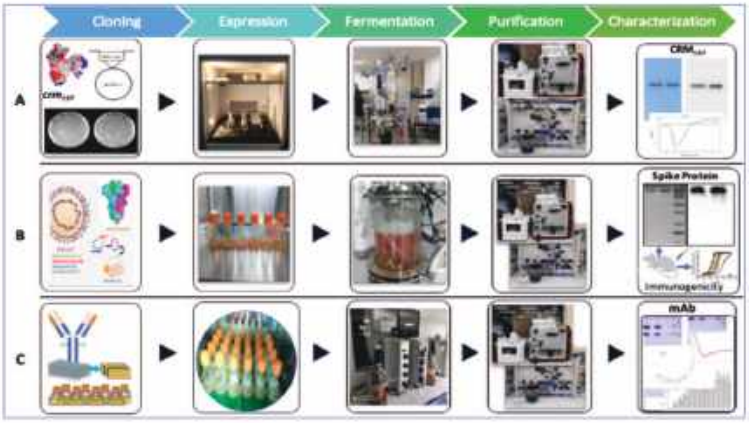


Figure: Vaccine and biotherapeutic development workflow

Patent(s):

1. Ravi Pratap Narayan Mishra, Reetesh Kumar, Jitender, Bhusarapu Vikram Kumar, Sneha Singh. Recombinant protein for management of SARS-COV-2 infection. Indian Patent Application No. 202211030140. Filing date: 25-05-2022.
2. Ravi Pratap Narayan Mishra, Jitender, Reetesh Kumar, Bhusarapu Vikram Kumar, Sneha Singh. Process for recombinant production of SARS-COV-2 spike protein. Indian Patent Application No. 202211051218. Filing date: 08-09-2022.

Team (L to R):

Jaideep Mehta, Ravinder Kanojia, Ravi Mishra, Paramjeet Kaur, Ritesh Kumar

(Standing L to R): Ashwani Bharadwaj, Sneha Singh, B. Vikram, Dhananjay Mankotia, Mumtaz, Shubham Singh, Jitender Nandan, Pranaya M. Mishra, Rajesh, Sushmita Negi, Kuldeep Singh, Geetika Verma, Karanbir Singh

Srinivasan Krishnamurthi, Ph.D.

Bacterial Diversity, Systematics and Genomics Research Lab

Deciphering Prokaryotic Diversity and Functional Roles Across Different Extreme Habitats and the Gut Microbiome Using Multi-Omics Approaches

Our lab is dedicated to uncovering and characterizing prokaryotic diversity from a wide array of natural and anthropogenically influenced habitats, with a strong emphasis on both taxonomic and functional studies. We have successfully isolated, purified, and characterized several bacterial strains from diverse environments, including marine macroalgae, sediments, salt pans, river Ganges, Pangong Lake, Lonar Lake, contaminated sites, and the human gut. Our studies have identified around 35 genera, with *Vibrio*, *Pseudomonas*, *Staphylococcus*, and *Bacillus* being the most frequently isolated from coral samples. Notably, 17 novel taxa belonging to genera such as *Algoriphagus*, *Azoarcus*, *Croceibacterium*, *Microvirga*, *Nitratireductor*, *Paracoccus*, *Pseudidiomarina*, *Salinimicrobium*, *Sulfitobacter*, *Myxococcus* have been identified with detailed genome sequencing of key strains revealing unique functional features. Our investigations into macroalgal-associated surface microbial communities have unveiled a rich distribution of CAZyme activities, especially in *Bacillus* and *Vibrio* spp. that degraded raw sugarcane bagasse and citrus peels. Metabolome profiling identified several metabolites on macroalgal surfaces, with significant roles in bacterial and plant processes.

Our research group has proposed several novel taxa *Yangia mangrovi*, *Halomonas icarae*, and *Geoalkalibacter halelectricus*. Culture-independent approaches revealed *Proteobacteria* and *Bacteroidetes* as dominant phyla in marine seaweeds whereas *Firmicutes*, *Verrucomicrobia*, and *Planctomycetes* formed part of the core microbial communities in Pangong Lake and the river Ganges. At explosive-contaminated sites, *Euryarchaeota*, *Crenarchaeota*, and *Thaumarchaeota*, alongside functional genes like *cyt P450*, *xenA/B*, and *xplA/B*, were associated with contaminant degradation.

In collaboration with premier medical institutes, PGIMER Chandigarh and DMCH Ludhiana, we are investigating gut microbiota alterations in IBD patients.

Selected Publications:

1. Kumar, P., Verma, A., Sundharam, S. S., Ojha, A. K., and Krishnamurthi, S. (2022) Exploring Diversity and Polymer Degrading Potential of Epiphytic Bacteria Isolated from Marine Macroalgae. *Microorganisms*. **10**.3390/ microorganisms 10122513
2. Pal, Y., Mayilraj, S., and Krishnamurthi, S. (2022) Exploring the Distinct Distribution of Archaeal Communities in Sites Contaminated with Explosives. *Biomolecules*. **10**.3390/ biom 12040489
3. Yadav, S., Singh, R., Sundharam, S. S., Chaudhary, S., Krishnamurthi, S., and Patil, S. A. (2022) *Geoalkalibacter halelectricus* SAP-1 sp. nov. possessing extracellular electron transfer and mineral-reducing capabilities from a haloalkaline environment. *Environ. Microbiol.* **24**, 5066–5081

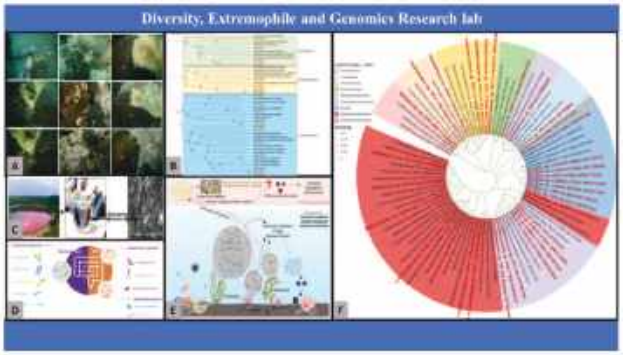


Figure: Bacterial systematics and ecology in diverse environments like Sponge-corals (A, B), Alkaline lake (C), Human gut (D), Intertidal macroalgae (E, F)

Team (L to R):

Shiva Sundharam S., Siddhakam Palmal, Joyasree Das, Srinivasan Krishnamurthi, Pravin Kumar, Lalit Kumar, Deepak Bhatt

(Not in the photograph: Manoj Kumar, Payal Thakur and Ritu Jatav, Deepika Pal, Ashish Verma, Yash Pal, Pooja Yadav, Anup Kumar Ojha, Anshul Sharma, Shamli Chandel, Bhawna Bisht, Jasmeet Kaur, Suchita Tandon, Sonia Kadyan, Ishfaq Nabi Najar and Rakesh Kumar)

S. Kumaran, Ph.D.

Structural and Quantitative Biology lab

Elucidating principles of competitive-allostery mechanism

In our lab, we focus on understanding the regulatory principles of the multi-enzyme cysteine regulatory complex (CRC) using quantitative structural biochemistry and computational methods. CRC is formed by associating two enzymes, cysteine synthase (CS), and serine acetyltransferase (SAT). Our research has uncovered a novel competitive-allosteric regulatory mechanism that allows CRC to overcome high-affinity competitive inhibition. This mechanism facilitates substrate binding through a ternary complex within the active site tunnel. Remarkably, the small molecule substrate, despite its lower affinity compared to the larger high-affinity enzyme binding partner, can bind site-specifically to cysteine synthase, triggering the dissociation of serine acetyltransferase. This discovery provides insight into CRC regulation and guides us in designing and developing target-specific small molecule interventions. By applying these principles, we have developed computational and experimental methods to design small molecule ligands that specifically bind to Tumor Necrosis Factor-alpha (TNF-alpha), offering potential therapeutic applications.

Selected Publications:

1. Singh, R. P., Saini, N., Sharma, G., Rahisuddin, R., Patel, M., Kaushik, A., & Kumaran, S. (2021). Moonlighting biochemistry of cysteine synthase: a species-specific global regulator. *Journal of molecular biology*, **433**(22), 167255
2. Kaushik, A., Rahisuddin, R., Saini, N., Singh, R. P., Kaur, R., Koul, S., & Kumaran, S. (2021). Molecular mechanism of selective substrate engagement and inhibitor disengagement of cysteine synthase. *Journal of Biological Chemistry*, **296**

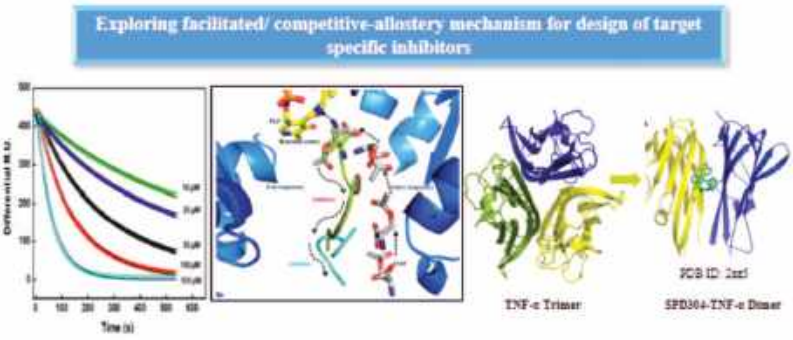


Figure: Mechanism of competitive-allostery showing noncanonical substrate mediated "facilitated/accelerated dissociation" of SAT from CRC (cysteine regulatory complex) and design of target-specific competitive-allostery inhibitor against Tnf-α.

Team (L to R):
Randeep Sharma, Naincy Kaushal, S. Kumaran, Digvijay Singh Naruka, Paramjeet Kaur, Indu Yadav

(Not in the photograph: Apurwa Mahajan)

Sanjeev Khosla, Ph.D.

Epigenetics lab

Epigenetis of host-microbe interaction

Our laboratory is interested in ientifying epigenetic events that occur during inter-species interaction, particularly in the interaction of the human host cells with microbes.

We have identified mycobacterial epigenetic effector proteins, Rv2966c and Rv1988 that interact with the host cellular machinery. Rv2966c is a non-CpG-specific methyltransferase, causing repression of genes in THP1 macrophages infected with *M. tuberculosis* H37Rv (*Sharma et al 2016, Nucleic Acids Research 43:3922*). Our recent work has shown its interaction with the host RNA methyltransferase complex proteins, METTL3 and METTL14. Furthermore, Rv2966c significantly reduces m6A RNA methylation in the host. Rv1988, the mycobacterial histone methyltransferase that targets histone H3 at R42, causes transcriptional repression of specific host genes, triggering attenuation of the host defense machinery (*Yaseen et al 2015, Nature Communications 6:8922*). We have now identified the interaction of multiple host epigenetic effector proteins with Rv1988.

Our laboratory has shown that the host epigenetic effector, SUV39H1 inhibits *M. tuberculosis* biofilm formation through trimethylation of HupB on its cell surface. We now show the interaction of HupB with eDNA in the extracellular matrix of *M. tuberculosis* biofilm.

We are also interested in understanding the influence of *Lactocaseibacillus*, a commensal bacterium present in the human gut, on epigenetic regulation of gene expression in cocultured intestinal cells. Coculture with *L. rhamnosus* was found to alter the packaging of host DNA in chromatin through histone modifications and m6A mRNA methylation. Furthermore, we showed the interaction of *Lactocaseibacillus* histone-like protein, HU, with histone H3 in the intestinal cell nucleus.

Selected Publications:

1. Singh, P.R., Dadireddy, V., Udupa, S., Kalladi, S.M., Shee, S., Khosla, S., Rajmani, R.S., Singh, A., Ramakumar, S., Nagaraja, V. (2023) The *Mycobacterium tuberculosis* methyltransferase Rv2067c manipulates host epigenetic programming to promote its own survival" *Nature Communications* **14**, 8497.
2. Moharir, S.C., Thota, S.C., Goel, A., Thakur, B., Tandel, D., Reddy, S.M., Vodapalli, A., Singh Bhalla, G., Kumar, D., Singh Naruka, D., Kumar, A., Tuli, A., Suravaram, S., Chander Bingi, T., Srinivas, M., Mesipogu, R., Reddy, K., Khosla, S., Harshan, K.H., Bharadwaj Tallapaka, K., Mishra, R.K. (2022) Detection of SARS-CoV-2 in the air in Indian hospitals and houses of COVID-19 patients. *Journal of Aerosol Science* **164**, 106002.
3. Rajeev, R., Dwivedi, A.P., Sinha, A., Agarwaal, V., Dev, R.R., Kar, A., Khosla, S. (2021) Epigenetic interaction of microbes with their mammalian hosts. *Journal of Biosciences* **46**, 94.

Patent(s):

1. Supankar Das, Harry Garg, Subramaniam Anantha Ramakrishna, Rajesh P. Ringe, Ashwani Kumar, Sanjeev Khosla. Equipment design and assays for monitoring infectivity of air-borne agents. Indian Patent Application No. 202111016274. Filing date: 07-04-2021.

Team (L to R):
Sonu Diwakar, Richa Garg, Sanjeev Khosla, Jainis Thapar, Digvijay Singh Naruka

(Not in the photograph: Rajeev Ramisetti, Ambey Prasad Dwivedi, Anunay Sinha, Paramjeet Kaur)

Saumya Ray Chaudhuri, Ph.D.

Microbial Physiology and Molecular Biology lab

Biology of Vibrios and gut commensals

Molecular insight on the ligand binding pocket of HapR: *Vibrio cholerae* is a prolific bacterium. Cumulative studies demonstrate the key role of quorum sensing in the lifecycle of this bacterium. Of the sensory network components, HapR is known as a high cell density master regulator. Until now, no information is available on native HapR ligand despite the protein having a ligand binding pocket. Interestingly, the function of SmcR, a HapR homologue of *Vibrio vulnificus*, is inhibited by a small molecule of Qstatin. Structural analysis of SmcR with Qstatin identifies key interacting residues in SmcR ligand binding domain. Despite bearing significant homology with SmcR, HapR function remained unabated by Qstatin. Sequence alignment indicates divergence in the key residues of the ligand binding pocket between these two regulators. A series of ligand-binding domain mutants of HapR was constructed where only the HapR quadruple mutant responded to Qstatin and newly synthesized IMT-VC-212. Crystal structure analysis revealed four key residues are responsible for changes in the volume of the ligand binding pocket of the HapR quadruple mutant compared to the wild-type counterpart, thereby increasing the accessibility of Qstatin and its derivative in the case of the former. The mechanistic insights exuberating from this study will remain instrumental in designing inhibitors against wild-type HapR

Selected Publications:

1. Farr, D., Nag, D., Chazin, W. J., Harrison, S., Thummel, R., Luo, X., Raychaudhuri, S., Withey, J. H. (2022) Neutrophil-associated responses to *Vibrio cholerae* infection in a natural host model. *Infect Immun.* **90(3)**, 1-13. doi: 10.1128/iai.00466-21
2. Nag, D., Farr, D., Raychaudhuri, S., Withey, J. H. (2022) An adult zebrafish model for adherent-invasive *Escherichia coli* indicates protection from AIEC infection by probiotic *E. coli* Nissle.. *iScience* **9;25(7)**:104572. doi: 10.1016/j. isci.2022.104572.
3. Sen, H., Choudhury, G. B., Pawar, G., Sharma, Y., Bhalerao, S. E., Chaudhari, V. D., Datta, S., Raychaudhuri, S. (2023) Diversity in the ligand binding pocket of HapR attributes to its uniqueness towards several inhibitors with respect to other homologues-A structural and molecular perspective. *Int J Biol Macromol.* **1;233**:123495. doi: 10.1016/j. ijbiomac. 2023.123495

Team (L to R):
Himanshu Sen, Manpreet Kaur, Saumya RayChaudhuri, Shradha Surin, Nandita Sharma, Kiran Heer.

(Not in the photograph: Manjula Ekka, Sonali Eknath Bhalerao)

Srikrishna Subramanian, Ph.D.

Protein and Genome Evolution lab

Data-driven exploration of protein and microbial genome evolution

We have developed and optimized workflows for microbial genomics and metagenomics. We have assembled several microbial genomes using data obtained from the long-read PacBio technology. We explored the *Minicystis rosea* DSM 24000^T genome, a soil myxobacterium with the largest known complete bacterial genome (16.04 Mbp). Gene duplication plays a significant role in its genome expansion, contributing to its many signal transduction genes linked to complex social behaviour and diverse niche adaptation. We identified a putative gene cluster for the biosynthesis of polyunsaturated fatty acid (PUFA).

Additionally, we compared transporter proteins of pathogenic and non-pathogenic ESKAPE strains to understand their role in drug resistance. We used sequence and structure-based approaches to identify novel transporter proteins and predict virulence factors and drug resistance-related motifs. We are also investigating plasmid genomes to understand gene duplication's impact on host bacteria function and evolution. Finally, we are developing 'HiFiBGC', a tool to detect biosynthetic gene clusters (BGCs) in long, accurate HiFi metagenomes.

Selected Publications:

1. Pal, S., Sharma, G., and Subramanian, S. (2021) Complete genome sequence and identification of polyunsaturated fatty acid biosynthesis genes of the myxobacterium *Minicystis rosea* DSM 24000(T). *BMC Genomics* **22**, 655
2. Akhtar, A., Lata, M., Sunsunwal, S., Yadav, A., Lnu, K., Subramanian, S., and Ramya, T. N. C. (2023) New carbohydrate binding domains identified by phage display based functional metagenomic screens of human gut microbiota. *Commun Biol* **6**, 371
3. Singh, D., Pal, S., Subramanian, S., and Manickam, N. (2023) Comparative genomic analysis of a multidrug-resistant ExPEC strain IITR156 isolated from the confluence of three Indian rivers. *Journal of Hazardous Materials Advances* **12**, 100364

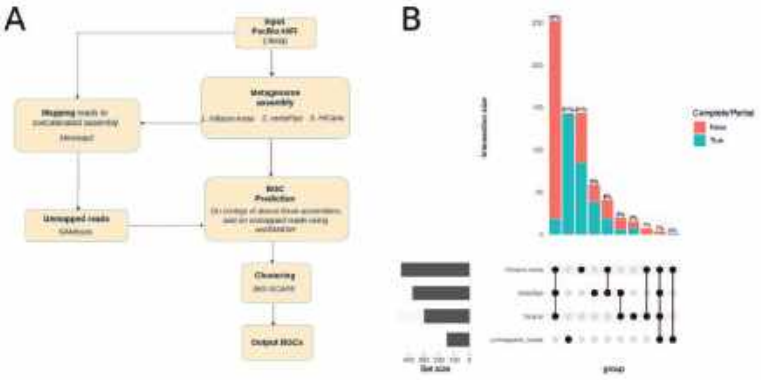


Figure: **(A)** Schematic representation of HiFiBGC workflow for identification of BGCs in PacBio HiFi metagenomes. **(B)** An Upset plot displaying the contribution from three different HiFi-tailored metagenome assemblies and unmapped reads to the total count of BGCs returned by HiFiBGC for the chicken gut cecum metagenome.

Team (L to R):
Amit Yadav, Mohit Sharma, Srikrishna Subramanian, Shilpee Pal, Padmani Sandhu

(Not in the photograph: Anu Negi)

Suresh Korpole, Ph.D.

Bacterial Research lab

Microbial diversity and antimicrobial peptides from prokaryotes

We are studying the microbial diversity of complex ecosystems for their biotechnological applications. Bacteria existing in complex environments often produce antimicrobial compounds as a competitive advantage for their establishment. Our lab focus is on the identification and characterization of antimicrobial peptides (AMPs), and so far, we have isolated AMP-producing strains pertaining to genera like *Bacillus*, *Brevibacillus*, *Paenibacillus*, *Lactobacillus*, *Lysinibacillus*, *Clostridium*, *Weisella*, *Streptomyces*, etc. and characterized most of them. Interestingly, a strain GI-9 identified as a *Brevibacillus* secreted AMP of class IId bacteriocins and named laterosporulins revealed structural homology with beta-defensins and a striking architectural similarity with alpha-defensins. Another AMP characterized as a lanthipeptide was yielded by a *Paenibacillus* sp. strain A3 and named penisin, which reduced bacterial burden and protected BALB/c mice in a bacteremia model infected with *Staphylococcus aureus* MTCC 96. Laterosporulin homologs were observed from various *Brevibacillus* spp. strains. Presently, we are involved in the recombinant expression of laterosporulins for the production of effective molecules. Further, we are characterizing probiotic strains isolated from soil and oral environments to check their potential of being probiotics or GRAS strains. Some *Lactobacillus* strains exhibited high bile salt hydrolase (BSH) enzyme activity and other probiotic properties. Also, establishing novel taxa by polyphasic taxonomy and providing authentic microbial strains.

Selected Publications:

1. Choksket, S., Kaur, M., Pinnaka, A. K., Korpole, S., (2023) An antimicrobial thiopeptide producing novel actinomycetes *Streptomyces terrae* sp. nov., isolated from subsurface soil of arable land, *FEMS Microbes*, Volume **4**, xtad014.
2. Choksket, S., Harshvardhan, Rana, R., Patil, P. B., Korpole, S., (2023). *Lysobacter arvi* sp. nov. isolated from farmland soil. *Curr. Microbiol.*, **80**, 387.
3. Singh, S.S., Sharma, D., Singh, C., Kumar, S., Singh, P., Sharma, A., Das, D.K., Pinnaka, A. K., Thakur, K.G., Ringe, R.P., Korpole, S. (2023). Brevicillin, a novel lanthipeptide from the genus *Brevibacillus* with antimicrobial, antifungal, and antiviral activity, *J. Appl. Microbiol.*, **134**, lxad054.

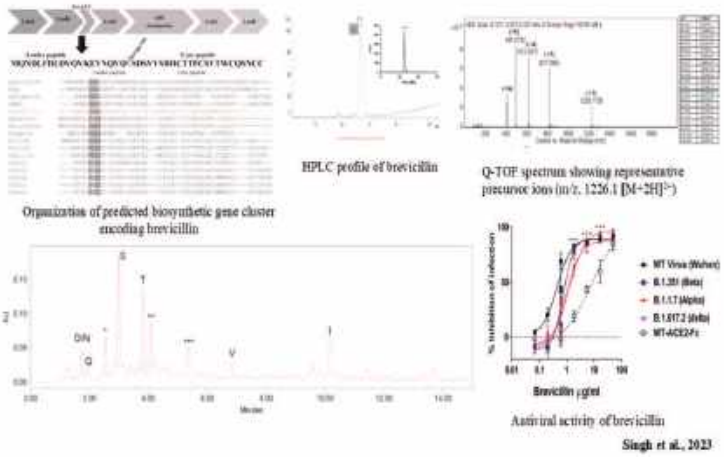


Figure: Characterization of an antimicrobial lantipeptide from Brevibacillus sp. strain Af8

Team (L to R):

Stanzin Choksket, Nandini Verma, Suresh Korpole, Harshvardhan, Riya Singla

(Not in the photograph: Sumit Mittal, Mamta Mishra, Upasana Sharma, Riya Singla, Manisha Rawat)

Venkata Ramana Vemuluri, Ph.D.

Environmental and Applied Microbiology lab

Exploration and Exploitation of Environmental Microorganisms for Sustainable Solutions

Our current research primarily focuses on identifying and developing novel antimicrobial photosensitizers derived from photo-responsive microbial pigments such as bacteriochlorophylls, carotenoids, chlorins, and indole/pyrrole derivatives. These photosensitizers show promise for the non-invasive treatment of microbial infections, particularly in tropical applications such as wounds, scalp, and skin infections, through photodynamic therapy (PDT). Parallelly, we also work on exploring and exploiting the vast biodiversity of microbes to discover potential bioactive molecules such as antimicrobials and industrially important enzymes. In addition, our study includes surveillance and understanding the antimicrobial resistance (AMR) in diverse habitats. Furthermore, our lab is also discovering and characterizing novel microbial taxa using phenotypic and genotypic approaches.

Selected Publications:

1. Darji, H., Verma, N., Lugani, Y., Mehrotra, P., Sindhu, D. K., and Vemuluri, V. R. (2021) Polyphasic characterization of and genomic insights into a haloalkali-tolerant *Saccharibacillus alkalitolerans* sp. nov., that produces three cellulase isozymes and several antimicrobial compounds. Antonie Van Leeuwenhoek **114**, 1043-1057
2. Lugani, Y., and Vemuluri, V. R. (2022) Extremophiles diversity, biotechnological applications and current trends. In Extremophiles, CRC Press. pp 1-30
3. Patil, V. S., Lugani, Y., Chaudhari, R. D., Karodi, P. P., Mane, P. C., Mehrotra, P., Pawar, S. P., Shouche, Y. S., and Vemuluri, V. R. (2021) Description and genomic insights into a multidrug resistant novel bacterium Savagea serpentis sp. nov., isolated from the scats of a vine snake (*Ahaetulla nasuta*). Antonie van Leeuwenhoek **114**, 687-696

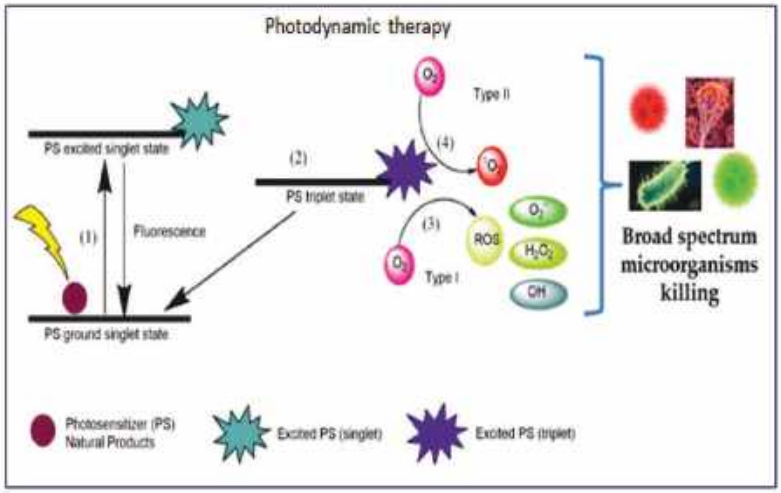


Figure: The mechanism of photodynamic therapy to kill pathogenic microbes by using photosynthetic bacterial pigments developed in our study.

Team (L to R):
Himani, Madhu Kumari, Saloni Sharma, Venkata Ramana Vemuluri, Karanbir Singh Aulakh, Roohani Sharma, Dev Kant Sindhu, Priyam Mehrotra

Vijayender Bhalla, Ph.D.

Immunodiagnostics and Biosensors lab

Nanotechnology, Immunodiagnostics and Biosensors for Healthcare

Our research team focuses on developing detection methods to address major public health issues by exploring nanotechnology-based state-of-the-art biosensing technologies. We intend to uncover simple solutions to complex problems related to rapidly detecting microbes in water and food products, pesticides and explosives in environmental samples, and typhoid and cardiac biomarkers in clinical samples. Considering the major key requirements of sensitivity, specificity, rapid and low-cost detection, we focus on developing point-of-care colorimetric, electrochemical, immunodiagnostic and LFIA-based sensing platforms. Our lab's prime interest is bioconjugation chemistry, nanomaterial synthesis/fabrication, nanocomposites, and bifunctionalized nanobioprobe development. We also focus on the expression and purification of biomarkers, synthesis of aptamers, and antibody generation. We develop peptides that can be used as diagnostic markers instead of proteins.

We investigate Affordable and Indigenous Rapid Detection (AIRD) platforms such as enzyme and nanoparticle-based techniques employing nanoclusters-polymeric/biological coatings, etc. for developing on-site biosensing techniques.

We have developed aptamers for potential cardiac biomarkers i.e. Troponin I, BNP, and NT proBNP. Using these aptamers, we have developed new kinds of gold nanoparticle assays that are technically more advanced than the classical assay and can be used for rapid detection of troponin I (1, 2). We have developed a novel nanoparticles-based color-shift technology for Typhoid diagnostics and performed clinical evaluation (3). We have identified a few potent exposed epitopes as diagnostic hits within the outer membrane associated with *Salmonella* virulence. We use these peptides to detect *Salmonella* serotypes in food and water to achieve the high specificity required for samples loaded with probiotics. We have designed a rapid and highly sensitive electrochemical assay for *Salmonella* employing a perfectly blocked silver nanobioprobe developed using our optimized surface coatings.

Selected Publications:

1. Kakkar, S., Chauhan, S., Bharti, Rohit, M., and Bhalla, V. (2023) Conformational switching of aptamer biointerfacing graphene-gold nanohybrid for ultrasensitive label-free sensing of cardiac Troponin I. *Bioelectrochemistry*. **150**, 108348
2. Kakkar, S., Chauhan, S., Bala, R., Bharti, Kumar, V., Rohit, M., and Bhalla, V. (2022) Site-directed dual bioprobes inducing single-step nano-sandwich assay for the detection of cardiac troponin I. *Microchimica Acta*. **189**, 366
3. Choudhary, M., Bisht, B., Saini, J. K., Bharti, Singh, P., Bhardwaj, P., Dilawari, R., Pinnaka, A. K., Ray, P., Gupta, M., Sethi, S., Suri, C. R., Raje, M., and Bhalla, V. (2023) Bifunctionalized nanobioprobe based rapid color-shift assay for typhoid targeting Vi capsular polysaccharide. *Biosensors and Bioelectronics*. **228**, 115195

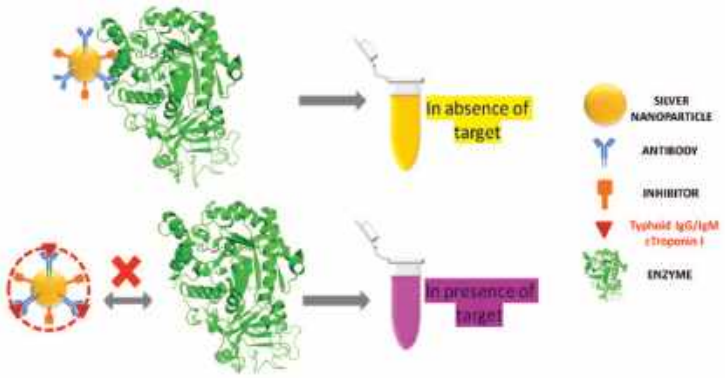


Figure: Color-shift assay for typhoid based on our patented Enzyme – nanoparticle interplay-based detection technology.

Patent(s):

1. Vijayender Bhalla, Virendra Kumar, Saloni Kakkar, Bharti. DNA aptamers. Indian Patent Application No. 202111043591. Filing date: 24.09.2021.

Team (L to R):

Namita Basnal, Bhawana Bisht, Priya Bhardwaj, Vijayender Bhalla, Jai Kumar, Bharti, Vedika

Vinod Dinkar Chaudhari, Ph.D.

Medicinal Chemistry lab

Drug Discovery and Methodology Development

Our lab focuses on drug discovery in different therapeutic areas, such as antimicrobial resistance and infectious and neglected diseases. Apart from this, the other areas of our research are green methodology development and total synthesis of bioactive natural products.

Metallo Beta-lactamase inhibitors: We have designed and synthesized a library of compounds, and tested against clinically relevant MBLs. Our lead compound showed potency in the nanomolar range, and the compounds showed synergy with last-resort antibiotics.

Bd-oxidase inhibitors: *Mycobacterium tuberculosis* is one of the most successful human pathogens and remains the leading cause of death despite the availability of treatment and prevention methods. Our lab is working on small molecule drug discovery targeting mycobacterial respiration through novel mechanisms, designed and synthesized several novel inhibitors.

Novel Anti-virals drug discovery: Over the last century, the rate of viral infections has been burgeoning at an alarming pace illustrated by devastating outbreaks. Our research team aims to discover novel small molecules to target broad-spectrum antivirals. We have synthesized a library of compounds and evaluated their anti-viral activity with SAR study.

Selected Publications:

1. Sharma, Y., Pawar, G. P., Chaudhari, V. D. (2023) One-Pot Domino Reaction: Direct Access to Polysubstituted 1,4- 2 Benzothiazine 1,1-Dioxide via Water-Gas Shift Reaction Utilizing DMF/H2O. *J Org Chem.* **88** (1), 701
2. Sen, H., Choudhury G, B., Pawar, G., Sharma, Y., Bhalerao, S. E., Chaudhari, V. D., Datta, S., Raychaudhuri, S. (2023) Diversity in the ligand binding pocket of HapR attributes to its uniqueness towards several inhibitors with respect to other homologues - A structural and molecular perspective. *Int. J. Biol. Macromol.* **233**, 123495
3. Gupta, A., Sharma, Y., Pawar, G. P., Ashish., Nihalani, D., Chaudhari, V. D. (2022), An efficient and scalable synthesis of Isodesmosine. *J. Heterocycl. Chem.* **59** (5), 958

Patent(s):

1. Vinod Dinkar Chaudhari, Pulkit Dhiman, Hemraj Santuji Nandanwar, Vikas Pathania, Krishan Gopal Thakur, Satyajeet Das. Substituted tricyclic heterocyclic compounds as metallo-beta-lactamase inhibitors. Indian Patent Application no. 202111024755, Filing date: 03-06-2021.
2. Vinod Dinkar Chaudhari, Krishan Gopal Thakur, Rajesh Ringe, Deshkanwar Singh, Simran Kaur, Ravneet Singh Chawla, Akshay Joshi. Substituted benzimidazoles for treating viral diseases. Indian Patent Application no. 202211044091. Filing date: 01-08-2022.
3. Vinod Dinkar Chaudhari, Ashwani Kumar, Nurina Saini, Ajit Kumar Akela. Small molecule for the treatment of mycobacterial diseases. Indian Patent Application No. 202311007303. Filing date: 02-02-2023.
4. Vinod Dinkar Chaudhari, Krishan Gopal Thakur, Rajesh Ringe, Simran Kaur, Manjot Kaur, Ravneet Singh Chawla, Akshay Joshi. Compound for treating viral infections. Indian Patent Application No. 202311007365. Filing date: 06-02-2023.
5. Vinod Dinkar Chaudhari, Pulkit Dhiman, Krishan Gopal Thakur, Satyajeet Das. Dihydrochromeno-pyrrole compounds as metallo-beta-lactamase inhibitors and process for the preparation thereof. Indian Patent Application No. 202311041398. Filing date: 14-06-2023.

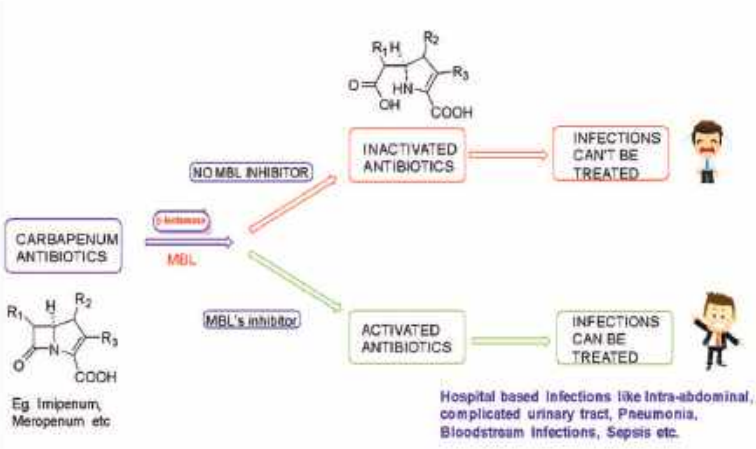


Figure: The mechanism of photodynamic therapy to kill pathogenic microbes by using photosynthetic bacterial pigments developed in our study.

Team (L to R):

Simran Kaur, Nurina Saini, Pulkit Dhiman, Vinod Chaudhari, Ganesh Lal Meena and Yogesh

Rajeev K. Tyagi, Ph.D.

Biomedical Parasitology and Translational-immunology Lab

Immunology of infectious and inflammatory diseases

Our lab has recently explored the phyto-compound (oleuropein; OLP) and its anti-inflammatory, immunomodulatory role in the macrophage-model of inflammation (MMI). We saw that OLP mediated reduction in the inflammation was controlled by the PI3K-Akt1 signalling to establish the "immune-homeostasis". Also, OLP treatment influenced the cell death/autophagy axis leading to the modulated inflammation for extended cell-survival. The autophagy like escape-mechanisms employed by the *P. falciparum* in the routine asexual blood stage infection and in the challenge model of *P. berghei* infection to circumvent anti-plasmodial defences has been a remarkable finding.

The anti-cancer role of OLP in the breast cancer cells confirmed by the modified gene expression patterns has been confirmed by the RNA seq analysis.

We are exploring the therapeutic efficacy of combination of aceclofenac and methotrexate to treat the rheumatoid arthritis (RA), and the mechanism underlying the reduction of inflammation and alleviation of pain and sufferings due to RA pathogenesis. Our investigations on patients with RA suggests that combination treatment regimen checks the conversion of Th1 to Th17 cell phenotype. Experiments are underway to validate the retention of Th1 cell phenotype by the combination treatment in the mouse model of experimental RA.

Selected Publications:

1. Chaudhari, R., Tandel, N., Sahu, K., Negi, S., Bashir, H., Rupareliya, A., Mishra, R. P., Dalai, S. K., and Tyagi, R. K. (2021) Transdermal Immunization of Elastic Liposome-Laden Recombinant Chimeric Fusion Protein of *P. falciparum* (PfMSP-Fu(24)) Mounts Protective Immune Response. *Nanomaterials (Basel, Switzerland)* **11**
2. Garg, N. K., Tandel, N., Bhadada, S. K., and Tyagi, R. K. (2021) Nanostructured Lipid Carrier-Mediated Transdermal Delivery of Aceclofenac Hydrogel Present an Effective Therapeutic Approach for Inflammatory Diseases. *Frontiers in pharmacology* **12**, 713616
3. Jadon, R. S., Sharma, G., Garg, N. K., Tandel, N., Gajbhiye, K. R., Salve, R., Gajbhiye, V., Sharma, U., Katare, O. P., Sharma, M., and Tyagi, R. K. (2021) Efficient in vitro and in vivo docetaxel delivery mediated by pH-sensitive LPHNPs for effective breast cancer therapy. *Colloids and surfaces. B, Biointerfaces* **203**, 111760

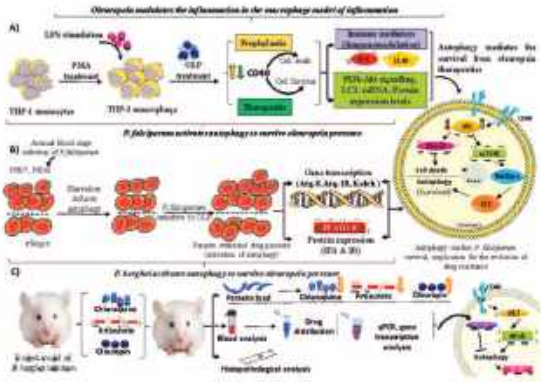


Figure: Model Indicating Anti-plasmodial Defense by autophagy under Oleuropein (OLP) pressure. Antimalarial activity of OLP in the laboratory strain (3D7, D10-Atg18, Dd2) of *P. falciparum* and confirmation of the escape of anti-plasmodial defenses mediated by the autophagy.

Team (L to R):
Sushmita Negi, Prakriti Sharma, Rajeev K. Tyagi, Neil Roy Chaudhary

Rajesh P. Ringe, Ph.D.

Virology Lab

Designing vaccine immunogens against viruses

The principal objective of the research is to understand the entry of HIV and SARS-CoV-2 in the host cells. Although HIV strains from subtype B and African subtype C lineages have been well characterized, the Indian clade C strains remarkably differ in terms of pathogenesis. As predominantly circulating strains in India, we focus our research on these strains. The goal of our research is to design native-like Env glycoprotein immunogens for the induction of broadly neutralizing antibodies (bNAbs) against clade C HIV-1 strains. HIV has an Envelope glycoprotein (gp160) anchored on the viral membrane and is the principal target of neutralizing antibodies. Using a novel strategy, we stabilized the soluble glycoprotein trimers that retained native-like structure which could be potential immunogens to elicit virus-neutralizing antibodies. These immunogens representing the Indian Clade C strains are being studied for their immunogenicity in mice and rabbits. The initial observations suggest that the soluble trimers do induce virus-neutralizing antibodies against the desirable epitopes present on the trimer whereas the induction of non-neutralizing antibodies is suppressed.

Our other key research areas are SARS-CoV-2 Spike-based immunogen design and anti-SARS-CoV-2 drug discovery. The RBD-based protein subunits with stabilizing mutations were generated as vaccine candidates which showed induction of potent and broadly active neutralizing antibodies. We could also optimize the cell-based assays for screening of hundreds of compounds for anti-viral activity which identified potential patentable compounds exhibiting strong anti-viral activities. We are also studying the role of viral glycoprotein conformation and host factors that influence viral entry in the host cells.

Selected Publications:

1. Kumar, S., Delipan, R., Chakraborty, D., Kanjo, K., Singh, R., Singh, N., Siddiqui, S., Tyagi, A., Jha, V., Thakur, K.G., Pandey, R., Varadarajan, R., Ringe, R.P. (2023). Mutations in S2 subunit of SARS-CoV-2 Omicron spike strongly influence its conformation, fusogenicity and neutralization sensitivity. *Journal of Virology.* **97**(11):e0092223.
2. Mittal, N., Kumar, S., Rajmani, R.S., Singh, R., Lemoine, C., Jakob, V., Bj, S., Jagannath, N., Bhat, M., Chakraborty, D., Pandey, S., Jory, A., Sa, S.S., Kleanthous, H., Dubois, P., Ringe, R.P., Varadarajan, R. (2023). Enhanced protective efficacy of a thermostable RBD-S2 vaccine formulation against SARS-CoV-2 and its variants. *NPJ Vaccines.* **8**(1):161.
3. Kumar, N., Taily, I.M., Singh, C., Kumar, S., Rajmani, R.S., Chakraborty, D., Sharma, A., Singh, P., Thakur, K.G., Varadarajan, R., Ringe, R.P., Banerjee, P., Banerjee, I. (2023). Identification of diphenylurea derivatives as novel endocytosis inhibitors that demonstrate broad-spectrum activity against SARS-CoV-2 and influenza A virus both in vitro and in vivo. *PLoS Pathog.* **19**(5):e1011358.

Patent(s):

1. Supankar Das, Harry Garg, Subramaniam Anantha Ramakrishna, Rajesh P. Ringe, Ashwani Kumar, Sanjeev Khosla. Equipment design and assays for monitoring infectivity of air-borne agents. Indian Patent Application No. 202111016274. Filing date: 07-04-2021.
2. Vinod Dinkar Chaudhari, Krishan Gopal Thakur, Rajesh Ringe, Deshkanwar Singh, Simran Kaur, Ravneet Singh Chawla, Akshay Joshi. Substituted benzimidazoles for treating viral diseases. Indian Patent Application no. 202211044091. Filing date: 01-08-2022.
3. Vinod Dinkar Chaudhari, Krishan Gopal Thakur, Rajesh Ringe, Simran Kaur, Manjot Kaur, Ravneet Singh Chawla, Akshay Joshi. Compound for treating viral infections. Indian Patent Application No. 202311007365. Filing date: 06-02-2023.

Team (L to R):

Sahil Kumar, Chanchal Sharma, Rajesh P. Ringe, Jyoti Jadoun, Rathina Delipan

FACILITIES

Microbial Type Culture Collection & Gene Bank (MTCC): A National Facility

Microbes are vital to biological diversity and play a crucial role in ecosystem health, biogeochemical cycles, bioremediation, human health, soil fertility and nutrient recycling. They are intrinsically linked to all life forms on the Earth, demonstrating immense diversity and functional versatility. As key players in biotechnology, microbes require proper preservation to ensure their availability for future use. Authorized culture collections are critical for maintaining microbial diversity. Over the last 3 decades, there has been increasing demand for reliable and authenticated microbial cultures due to the increased growth of biotech, pharmaceutical industries etc. Microbial Type Culture Collection & Gene Bank (MTCC) is a National facility jointly funded by the Council of Scientific and Industrial Research (CSIR) and the Department of Biotechnology (Govt. of India). It is an affiliate of the World Federation for Culture Collections (WFCC) and is registered with the World Data Centre for Microorganisms (WDCM). The main objectives of MTCC are 1) procurement of cultures and ex-situ conservation of microorganisms, 2) provide authentic microbial cultures to industries as well as academic and research institutes, 3) deliver identification, freeze-drying and other microbiology-related services, 4) act as a depository of patent cultures and conduct research on microbial diversity, taxonomy and related areas. During the last 34 years, MTCC has established itself as a premier culture collection in the country. Initially, MTCC activities were mainly related to supplying microbial cultures and providing microbial identification services. Realizing the need for an internationally recognized patent depositary in India, Govt. of India has approved it to make MTCC an International Depositary Authority (IDA) under the Budapest Treaty. The MTCC was recognized by the World Intellectual Property Organization (WIPO), Geneva, Switzerland, as an International Depository Authority (IDA) on October 4, 2002, thus becoming the first IDA in India. Several researchers from India and other countries deposit their microorganisms as part of the patent procedure in MTCC. MTCC is also designated as the Repository of India's National Biodiversity Authority (NBA) for accepting microorganisms for deposit. Over the last 19 years, it has expanded its service and research activities, and it is now comparable with any of the best culture collections in the world in terms of expertise, services provided and research publications. A summary of MTCC activities from 2020 to 2023 includes:

Conservation of Microbial Resources: MTCC explores the microflora from different ecological niches of the country. MTCC scientists regularly go on scientific expeditions, collect samples from various environmental niches, and characterize and conserve them using long-term preservation methods. This activity helps map and document the microbial diversity of the country and description of novel microbial taxa from the region. The microorganisms collected are also used to screen various natural chemicals, e.g., enzymes, bioactive molecules, biofertilizers, probiotics, bioremediation, etc. As a Designated Repository (DR), MTCC receives several microbial cultures for general deposit from researchers all over India and conserves them in its repository.

Catalog of Microorganisms: MTCC maintains a database of the cultures collected from various locations in India; information related to the microbial cultures is available on the website https://www.mtccindia.res.in. More than 80% of MTCC's general collection is of Indian origin from various ecological niches of India. About 12,000 are listed on the online catalog (https://www.mtccindia.res.in/catalog) and are available for distribution. This collection includes reference strains, type strains of novel taxa, strains used for teaching purposes, genetic stock, etc. Relevant information is computerized for easy search and retrieval.

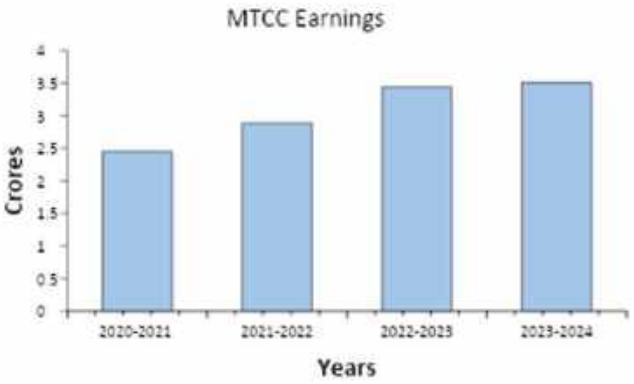
Confidential deposits: MTCC accepts actinobacteria, bacteria, fungi, plasmids and yeasts for confidential deposit purposes under various categories such as: 1) Safe deposit- Confidential deposit service for those valuable cultures for which patent protection has not been sought. 2) Deposits under the Budapest Treaty- The Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure, 199 cultures were deposited under these categories during 2021-2023.

Supply of authentic microbial cultures: MTCC has been at the forefront in offering quality services related to microbiology to several thousands of researchers. MTCC's customer database has more than 10,000 unique customers from all over the country. Schools, colleges, universities, research organizations, and pharmaceutical, biotech and food companies involved in microbiology and biotechnology-related work depend on MTCC for authentic microbial cultures. During the last three years (2021-2023), MTCC has supplied 15051 microbial cultures to various research organizations, academic institutions and industries.

Microbial characterization: Microbial characterization is a specialized field that requires special training and expertise. MTCC has state-of-the-art facilities, skilled personnel, and extensive knowledge to support microbial characterization. The center offers various services, including phenotypic characterization, ribosomal RNA gene sequencing, fatty acid methyl esters (FAME) profiling using MIDI, MALDI biotyper analysis, Biolog, VITEK2 etc. These services cater to researchers from academic, research and commercial organizations. During the last three years, 359 service requests have been processed using these methodologies. MTCC provides services with ISO certification as per 9001:2015 in 2018 guidelines.

MOU with Indian Pharmacopoeia Commission: CSIR-Institute of Microbial Technology and Indian Pharmacopoeia Commission (IPC) signed a Memorandum of Understanding (MOU) on October 25, 2013, to provide certified reference microbial cultures to the Indian pharma stakeholders. Dr. Girish Sahni (Director; CSIR-IMTECH) and Dr. G.N. Singh [Secretary-cum-Scientific Director; Indian Pharmacopoeia Commission, and Drug Controller General India (DGCI)] released the first batch of "Reference microbial cultures" in a function organized in CSIR-Institute of Microbial Technology (CSIR-IMTECH), in the presence of distinguished guests and staff members of CSIR-MTECH. The MoU has entered a second phase, and as part of this MOU, IPC has designated MTCC as the provider of "Certified Reference Microbial Cultures, to pharma stakeholders. The supply of "Certified Reference Microbial Cultures" from MTCC benefits all pharma stakeholders in terms of quality, availability, supply duration, and cost.

Research activity on Microbial Diversity, Taxonomy, Genomics and exploitation: MTCC scientists are actively involved in research activities related to microbial diversity, taxonomy, environmental biotechnology etc. They have described over 150 novel microbial taxa and published draft genomes for 40 species. The research activities of individual scientists are given separately under research programs.



Hands-on Training Workshops: MTCC has conducted hands-on workshops on the 'Identification of Microbes by MALDI-MS and Microscopy' in 2022 to 2023.

MTCC has expanded its services to include testing the antimicrobial activity of compounds, such as extracts, disinfectants and antiseptics, Testing microbiological growth on the product and Isolation and Identifying microorganisms from samples (water, food & other finished products). MTCC has also established a COVID-19 clinical specimen repository designated by ICMR and actively participated in societal research initiatives, such as COVID-19 surveillance in domestic sewage. Also, a new division of Microlage and Cyanobacteria is being established.

Team:
K. Suresh, P. Anil Kumar, S. Krishnamurthi, V. Venkata Ramana, Amit Kumar, Nithya Vadakedath, Devdatta, Easa Nagamalleswari, Dhan Prakash, S. Muthukrishnan, Hariom Kushwaha, Sumit Mittal, Amit Gautam, Kavita Kumari, Girja Ditya.

Biochemical Engineering Research And Process Development Centre (BERPDC)

BERPDC is one of India's largest and most sophisticated centers for research in technology development, process optimization, and scale-up in Bioprocess Technology. The center has state-of-the-art facilities to carry out cutting-edge research in fermentation technology and is backed up by excellent downstream facilities. It is well equipped with fermenters (1L to 500L), a downstream facility for therapeutic proteins, and a GMP-compliant facility for therapeutic proteins & biopharmaceutical cell bank. It is a unique amalgamation of expertise in biochemical engineering & applied microbiology with vast experience working with Industries and government organizations. The facility has been catering to the fermentation and bioprocess requirements of various users from the Industry and other R&D establishments.

Mandate: Translating the technology from the lab to the pilot plant
Objectives: The overall objective is the discovery & development of fermentation-based products. Under the umbrella of overall objective, the sub-objectives are as follows:

- To demonstrate proof of concept (POC) to technologies up to pilot scale
- To establish *in-house* fermentation-based technology platforms
- To provide services & solutions to Industry and Academia
- To provide state-of-the-art upstream & downstream processing facilities
- To carry out problem to solution-based collaborative / sponsored research
- To create skilled HR in "Bioprocess Technology" to cater to fermentation-based biotech industries
-

Core competencies:

- Development and scale-up of batch & fed-batch fermentation processes using microbial fermentation platforms.
- High cell density fermentation-based technology platform for recombinant bacteria and yeast strains
- Design, development & scale-up of downstream and purification process for fermentation-based small molecules, secondary metabolites, and therapeutics
- Expression and purification of recombinant proteins, biosimilars and biotherapeutics
- Mammalian cell culture-based process: CHO Cell-based cell-line generation and process development
-

Recently completed translational projects:

- Fermentation-based technology development for biodegradation of ammonium perchlorate
- Production of a bio-medically important glycolipid bio-surfactant sophorolipid and its evaluation for antifungal activity *(CSIR-funded)*
- Novel xylanase for the production of xylo-oligosaccharides & Pectinase for bio-scouring application in the textile industry *(In-house funded)*
-

Ongoing translational projects:

- Biotechnological production of nano-polyphenol from fruit processing industry wastes *(CSIR-funded)*
- Development of the state of the art Pilot Plant Facility for microbial fermentation & down-stream at Biochemical Engineering Research and Process Development Centre of CSIR-IMTECH *(CSIR-funded)*
- Preclinical development antibiotic against colistin-resistant Gram-negative infections *(CSIR-funded)*
- Development of efflux pump inhibitor-antibiotic combination therapy to treat bacterial infections *(DBT-funded)*
- Investigation of in-vivo efficacy and probable mechanism of action for newly discovered antibiotic against MDR bacterial pathogens *(DST-funded)*
- The development of a plasmonic photothermal-based sterilization device for surgical instruments *(CSIR-funded)*
- Process Development for α-Amylase *(Industry-funded)*
- Process development for inulinase enzyme *(In-house-funded)*
- Setting-up of cGMP-grade microbial cell-bank facility *(BIRAC-funded)*
- Development of POC for COVID-19 Vaccine: m-RNA based vaccine & bio-therapeutics *(CSIR-funded)*
- Recombinant *E. coli* based technology at 5 L fermentation scale for $rCRM_{197}$ *(In-house-funded)*
- Development of novel & efficient drug delivery system especially for water soluble BC class IV drugs using

glycolipids *(In-house-funded)*

- Biocatalytic process development for chiral amine synthesis as pharmaceutical intermediates (*Industry-funded)*

- **Long-term vision:**
  - Developing fermentation-based processes for industrially important biomolecules & bio-chemicals: *Active pharmaceutical ingredients (APIs) as an import substitution; Nutraceuticals and food additives; Anti-infectives, antibiotics & inhibitors; Anti-oxidants, Microbial polysaccharides, Industrial enzymes, Bio-surfactants; etc.*
  - Providing solutions to Indian fermentation and allied industries
  - Augmentation of existing facility to meet the industry requirement
  - Bioprocessing research using synthetic & precision biology/ 3D tissue modeling
  - Skill development in "Bioprocess techn ology" for academia & industries

Team:
Hemraj Nandanwar, Anirban Roy Choudhury, E. Senthil Prasad, Ravi Mishra, Mani Shankar Bhattacharya, Ravinder Kanojia, Devinder Singh, Vineet Kumar, Sandeep Kumar, Jaideep Mehta, Dinesh Kumar

Bioinformatics Centre

Bioinformatics Centre (BIC) at the CSIR-Institute of Microbial Technology (IMTECH) served as a national facility supported by the Department of Biotechnology (DBT) under the BioTechnology Information Systems Network (BTISnet) programme of DBT till March 2020. The staff of BIC has been conducting Research and Development (R&D) activities in bioinformatics and computational biology. This facility houses Computational Resources for Drug Discovery (CRDD) and maintains infrastructure for protein modeling and engineering, in addition to providing information technology (IT) services to IMTECH. The Government of India established the Biotechnology Information System Network (BTISnet) in 1987, the first of its kind worldwide. BIC at CSIR-IMTECH, Chandigarh, was one of the DICs supported by DBT under the BTISnet programme. It has shown consistent growth in bioinformatics, whether in carrying out peer-reviewed research (in different areas viz. infectious and rare diseases, genome assembly and annotation, virology, protein structure evolution and modeling, etc) or in providing services, databases and software to worldwide community. BIC has developed more than ~200 prediction web servers and biological databases, which get 2.5 million hits every month on average. CSIR-IMTECH Bioinformatics Centre, with 57 databases, has been ranked 6th in the world out of >2000 Institutions from 80 countries as per BIGD (http://ngdc.cncb.ac.cn/databasecommons/#stat). The users are from major institutions/universities, including Cambridge, Harvard, Yale, and Stanford, in addition to state universities in developed countries and rest of the world.

The major activities of BIC staff are as follows:

Computational Resources for Drug Discovery (CRDD): BIC staff has developed CRDD, an important *in silico* module of Open Source Drug Discovery (OSDD), a mega project of CSIR. CRDD web portal provides computational resources related to drug discovery on a single platform, including methods for drug target identification, cheminformatics, and pharmacoinformatics. CRDD provided computational resources for researchers in the field of computer-aided drug design.

3D Virtual Reality and 3D Printing: 3D Virtual reality is popular among visitors at CSIR-IMTECH. This virtual reality system comprises a 3D graphics facility with an immersive virtual reality system and graphics workstations. In India, this lab is the first of its kind to foster an atmosphere of active discussions in the area of structural biology and drug design as it is used for high-end visualization of protein structure data. A 3D printing facility has been established at BIC. These facilities were made available for visitors and users at CSIR-IMTECH.

Infrastructure for big data analytics: BIC maintains state-of-the-art infrastructure for data science projects, including applications of machine learning and AI in genomics, structural biology, and drug discovery. Recently, CSIR-IMTECH established a two-petabyte (PB) state-of-the-art Scale-out NAS and several high-end compute nodes for the analysis of large and complex biological datasets.

IT Services: The IT team at CSIR-IMTECH is responsible for IT hardware, software issues, and networking support. The team offers excellent e-connectivity in the institute and addresses all major day-to-day issues of IT infrastructure and networking.

Team:
Balvinder Singh, Srikrishna Subramanian, Manoj Kumar, Anshu Bhardwaj, Chander Shekhar Sharma, Harminder Singh, Sandeep Kumar, Paramjit Lal, Amit.

IMTECH Centre for Animal Resources & Experimentation (iCARE)

The IMTECH Centre for Animal Resources & Experimentation (iCARE) provides resources and assistance to IMTECH researchers in the design and conduct of animal experiments in compliance with the most thorough ethical and scientific guidelines issued from time to time by the Committee for the Control and Supervision of Experiments on Animals (CCSEA). In addition to breeding and caring for high-quality laboratory animals, iCARE also provides veterinary services, training for new users and technical support for facility users.

Unique features of the facility

- CCSEA, Govt. of India accredited breeding and experimentation facility
- Facility maintains mice (inbred and transgenic), rats, hamsters, and rabbits in different rooms
- Adequate infrastructure and space for isolation of experiments on different species of animals
- Well-equipped areas to handle inbred, transgenic/knockout, disease, and surgical models
- Dedicated service corridor for better barrier management
- Independent AHU for different areas
- The facility is constructed/segregated in such a way as to provide dedicated places and services to users as per their requirements
- The facility is under electronic surveillance with CCTV cameras, and only authorized persons are allowed in the facility through biometric access
- The facility has Animal Bio-safety Level II (ABSL-II) laboratory for working on infectious agents
- The establishment of an ABSL-3 laboratory in iCARE is underway

The cutting-edge, barrier-maintained building has been constructed as per the guidelines of the Committee for the Control and Supervision of Experiments on Animals (CCSEA), Department of Animal Husbandry and Dairying (DAHD), Ministry of Fisheries, Animal Husbandry and Dairying (MoFAH&D), India, under registration number 55/GO/ReRcBiBt/S/99/CPCSEA. The 30,000-square-foot facility is divided into three floors and has rooms for housing laboratory animals, a surgical and in vivo imaging laboratory, procedure rooms, and an animal biosafety laboratory (ABSL-II). When entering the animal and procedure rooms, staff members and facility users must wear personal protective equipment (PPE), such as disposable coveralls, face masks, head coverings, shoe covers, and gloves.

The facility keeps rats, hamsters, and rabbits in separate rooms, as well as fourteen strains of mice (inbred and knockout mice) (see Table 1 for details). Each colony of inbred and knockout mice is kept in an individually ventilated cage (IVC) system. The genetic and health quality control of the animals is regularly monitored according to standard quality control procedures.

Inbred mice	BALB/cAnNCrl	C57BL/6NCrl	NOD/MrkTac
	DBA/1	DBA/2	
Transgenic mice	B6.129S4-Vdr^{tm1Mbd}/J	B6.129S2-Aire $^{tm1.1Doi}$/J	C57BL/6N-Tg (Thy1-SNCA)15Mjff/J
	FVB.129S2(B6)-Hmox1^{tm1Poss}/J	B6.129-Pparg^{tm2Rev}/J	B6.Cg-Tg (THY1-SNCA*A30P)TS2Sud/J
	B6.Cg-Nr1d1^{tm1Ven}/LazJ	B6.129S6-Nr1h3^{tm1Djm}/J	B6.Cg-Tg (THY1-SNCA*A53T)F53Sud/J
Rat	Sprague Dawley		
Hamster	Golden Syrian		
Rabbit	New Zealand White		

Table 1: Laboratory animals maintained at iCARE

All animal experiments at IMTECH are regulated by the Institutional Animal Ethics Committee (IAEC), which was set up in accordance with CCSEA guidelines. During the reporting period, the IAEC held 6 meetings at which 63 new projects, 48 amendments in already IAEC-approved projects and progress/completion reports of 153 ongoing projects were reviewed and approved by the committee. The facility can meet the requirements of animal users for various IAEC-approved projects and has supplied 8886 inbred mice, 197 transgenic/knockout mice, 921 rats, 42 rabbits, and 46 hamsters to various IAEC-approved projects of the institute as well as to external institutes registered with CCSEA under Technical Service Projects (TSP) as per CSIR guidelines. During the reporting period,

iCARE users published 33 papers in prestigious journals after using animals from iCARE. In addition to these publications, many students have also used animals for their theses.

iCARE provides users with various sophisticated and specialized facilities such as fluorescence tomography (whole-body imaging system for small animals), laser Doppler blood flow meter, stereotactic instrument, surgical microscope, automated analyzers for hematology and blood biochemistry, an animal biosafety level II (ABSL II) laboratory, and a neurobehavioral research laboratory (Figure 1). In addition to breeding, veterinary care, and management, iCARE staff provide technical and professional support to the scientific community of the Institute to facilitate their research on animals. In addition, as part of CSIR-IMTECH's CSIR Integrated Skill Initiative, iCARE has organized various training/workshop programs on the basic bio-methodology of laboratory animals to facilitate the facility's users to conduct humane and ethical animal research. CSIR-IMTECH has been conditionally accredited by NSDC, Agriculture Skill Council of India, for the course "Laboratory Animal Attendant" (AGR/Q4606; duration: 304 hours), and the same course is organized by iCARE regularly.

Figure 1: Glimpse of iCARE

Team:
Bhupinder Singh Chopra, Sachin Raut, Neeraj Khatri

RESEARCH PUBLICATIONS AND INTELLECTUAL PROPERTY

RESEARCH PUBLICATIONS

2021

1. Agarwal, S., Tiwari, P., Deep, A., Kidwai, S., Gupta, S., Thakur, K. G. *et al.* (2021) System-Wide Analysis Unravels the Differential Regulation and In Vivo Essentiality of Virulence-Associated Proteins B and C Toxin-Antitoxin Systems of Mycobacterium tuberculosis (vol 217, pg 1809, 2018) Journal of Infectious Diseases **223**, 733-733 10.1093/infdis/jiaa556

2. Agrawal, P., Bhagat, D., Mahalwal, M., Sharma, N., and Raghava, G. P. S. (2021) AntiCP 2.0: an updated model for predicting anticancer peptides Briefings in Bioinformatics **22**, 12 10.1093/bib/bbaa153

3. Ahmed, S., Khan, M. S., Gayathri, S., Singh, R., Kumar, S., Patel, U. R. *et al.* (2021) A Stabilized, Monomeric, Receptor Binding Domain Elicits High-Titer Neutralizing Antibodies Against All SARS-CoV-2 Variants of Concern Frontiers in Immunology **12**, 15 10.3389/fimmu.2021.765211

4. Akela, A. K., and Kumar, A. (2021) Bioenergetic Heterogeneity in Mycobacterium tuberculosis Residing in Different Subcellular Niches Mbio **12**, 19 10.1128/mBio.01088-21

5. Aqdas, M., Maurya, S. K., Pahari, S., Singh, S., Khan, N., Sethi, K. *et al.* (2021) Immunotherapeutic Role of NOD-2 and TLR-4 Signaling as an Adjunct to Antituberculosis Chemotherapy Acs Infectious Diseases **7**, 2999-3008 10.1021/acsinfecdis.1c00136

6. Aqdas, M., Singh, S., Amir, M., Maurya, S. K., Pahari, S., and Agrewala, J. N. (2021) Cumulative Signaling Through NOD-2 and TLR-4 Eliminates the Mycobacterium Tuberculosis Concealed Inside the Mesenchymal Stem Cells Frontiers in Cellular and Infection Microbiology **11**, 11 10.3389/fcimb.2021.669168

7. Bansal, K., Devi, N., Aqdas, M., Sharma, R. K., Agrewala, J. N., Katare, O. P. *et al.* (2021) Protein transduction domain functionalized gold nanoparticles for effective delivery of potent cytotoxic agent in cancer cells Journal of Molecular Liquids **328**, 6 10.1016/j.molliq.2021.115385

8. Bansal, K., Kaur, A., Midha, S., Kumar, S., Korpole, S., and Patil, P. B. (2021) Xanthomonas sontii sp. nov., a non-pathogenic bacterium isolated from healthy basmati rice (Oryza sativa) seeds from India Antonie Van Leeuwenhoek International Journal of General and Molecular Microbiology **114**, 1935-1947 10.1007/s10482-021-01652-1

9. Bansal, K., Kumar, S., Kaur, A., Singh, A., and Patil, P. B. (2021) Deep phylo-taxono genomics reveals Xylella as a variant lineage of plant associated Xanthomonas and supports their taxonomic reunification along with Stenotrophomonas and Pseudoxanthomonas Genomics **113**, 3989-4003 10.1016/j.ygeno.2021.09.021

10. Bharathi, S. V., Venkataramaiah, M., and Rajamohan, G. (2021) Genotypic and Phenotypic Characterization of Novel Sequence Types of Carbapenem-Resistant Acinetobacter baumannii, With Heterogeneous Resistance Determinants and Targeted Variations in Efflux Operons Frontiers in Microbiology **12**, 18 10.3389/fmicb.2021.738371

11. Bharti, R., Chopra, B. S., Raut, S., and Khatri, N. (2021) Pueraria tuberosa: A Review on Traditional Uses, Pharmacology, and Phytochemistry Frontiers in Pharmacology **11**, 20 10.3389/fphar.2020.582506

12. Bhattacharya, J., Chandrawacar, A. S., Dhiman, K., Sewall, L. M., Ozorowski, G., Cottrell, C. A. *et al.* (2021) Structural features of a novel HIV-1 Indian clade C trimeric soluble Env SOSIP and the polyclonal neutralizing antibody responses developed in vaccinated rabbits Journal of the International Aids Society **24**, 1,

13. Brouwer, P. J. M., Antanasijevic, A., de Gast, M., Allen, J. D., Bijl, T. P. L., Yasmeen, A. *et al.* (2021) Immunofocusing and enhancing autologous Tier-2 HIV-1 neutralization by displaying Env trimers on two-component protein nanoparticles Npj Vaccines **6**, 14 10.1038/s41541-021-00285-9

14. Chakraborty, P., Bajeli, S., Kaushal, D., Radotra, B. D., and Kumar, A. (2021) Biofilm formation in the lung contributes to virulence and drug tolerance of Mycobacterium tuberculosis Nature Communications **12**, 17 10.1038/s41467-021-21748-6

15. Chaudhari, R., Tandel, N., Sahu, K., Negi, S., Bashir, H., Rupareliya, A. *et al.* (2021) Transdermal Immunization of Elastic Liposome-Laden Recombinant Chimeric Fusion Protein of P. falciparum (PfMSP-Fu₂₄) Mounts Protective Immune Response Nanomaterials **11**, 23 10.3390/nano11020406

16. Chaudhary, A., Bhalla, S., Patiyal, S., Raghava, G. P. S., and Sahni, G. (2021) FermFooDb: A database of bioactive peptides derived from fermented foods Heliyon **7**, 8 10.1016/j.heliyon.2021.e06668

17. Chaudhary, S., Dhiman, A., Dilawari, R., Chaubey, G. K., Talukdar, S., Modanwal, R. *et al.* (2021) Glyceraldehyde-3-Phosphate Dehydrogenase Facilitates Macroautophagic Degradation of Mutant Huntingtin Protein Aggregates Molecular Neurobiology **58**, 5790-5798 10.1007/s12035-021-02532-5

18. Chaudhary, S., Dhiman, A., Patidar, A., Malhotra, H., Talukdar, S., Dilawari, R. *et al.* (2021) Moonlighting glyceraldehyde-3-phosphate dehydrogenase (GAPDH) modulates protein aggregation Biochi mica Et Biophysica Acta-Molecular Basis of Disease **1867**, 4 10.1016/j.bbadis.2021.166202

19. Chaudhary, S., Patidar, A., Dhiman, A., Chaubey, G. K., Dilawari, R., Talukdar, S. *et al.* (2021) Exposure of a specific pleioform of multifunctional glyceraldehyde 3-phosphate dehydrogenase initiates CD14-dependent clearance of apoptotic cells Cell Death & Disease **12**, 11 10.1038/s41419-021-04168-8

20. Chhabra, S., Kumar, S., and Parkesh, R. (2021) Chemical Space Exploration of DprE1 Inhibitors Using Chemoinformatics and Artificial Intelligence Acs Omega **6**, 14430-14441 10.1021/acsomega.1c01314

21. Choudhary, P., Badmalia, M. D., Ashish, G., and Rao, A. (2021) Shape-function insights into bifunctional O-GlcNActransferase of Listeria monocytogenes EGD-e Glycobiology **31**, 275-287 10.1093/glycob/cwaa076

22. Choudhury, J., Singh, L., and Chaudhuri, B. (2021) Biophysical Studies of Interaction between Mycobacterial SepF and FtsZ Biophysical Journal **120**, 22A-22A,

23. Darji, H., Verma, N., Lugani, Y., Mehrotra, P., Sindhu, D. K., and Vemuluri, V. R. (2021) Polyphasic characterization of and genomic insights into a haloalkali-tolerant Saccharibacillus alkalitolerans sp. nov., that produces three cellulase isozymes and several antimicrobial compounds Antonie Van Leeuwenhoek International Journal of General and Molecular Microbiology **114**, 1043-1057 10.1007/s10482-021-01575-x

24. Datta, S. (2021) Optimizing Granulocyte Colony-Stimulating Factor Transcript for Enhanced Expression in Escherichia coli Frontiers in Bioengineering and Biotechnology **9**, 9 10.3389/fbioe.2021.630367

25. Dey, P., Chaudhuri, S. R., Efferth, T., and Pal, S. (2021) The intestinal 3M (microbiota, metabolism, metabolome) zeitgeist-from fundamentals to future challenges Free Radical Biology and Medicine **176**, 265-285 10.1016/j.freeradbiomed.2021.09.026

26. Dubey, A. K., Podia, M., Priyanka, Raut, S., Singh, S., Pinnaka, A. K. *et al.* (2021) Insight into the Beneficial Role of Lactiplantibacillus plantarum Supernatant Against Bacterial Infections, Oxidative Stress, and Wound Healing in A549 Cells and BALB/c Mice Frontiers in Pharmacology **12**, 14 10.3389/fphar.2021.728614

27. Dyavar, S., R., Singh, R., Emani, R., Ganesh Pawar, G., **Chaudhari, V. D.**, Podany, A.; Fletcher, C.; Salunke, D. (2021). Role of toll-like receptor 7/8 pathways in regulation of interferon response and inflammatory mediators during SARS-CoV2 infection and potential therapeutic options. *Biomedicine & Pharmacotherapy, 141 (2021) 111794*

28. Dwivedi, V. D., Arya, A., Yadav, P., Kumar, R., Kumar, V., and Raghava, G. P. S. (2021) DenvInD: dengue virus inhibitors database for clinical and molecular research Briefings in Bioinformatics **22**, 8 10.1093/bib/bbaa098

29. Gani, Z., Boradia, V. M., Kumar, A., Patidar, A., Talukdar, S., Choudhary, E. *et al.* (2021) Mycobacterium tuberculosis glyceraldehyde-3-phosphate dehydrogenase plays a dual role-As an adhesin and as a receptor for plasmin(ogen) Cellular Microbiology **23**, 16 10.1111/cmi.13311

30. Garg, N. K., Tandel, N., Bhadada, S. K., and Tyagi, R. K. (2021) Nanostructured Lipid Carrier-Mediated Transdermal Delivery of Aceclofenac Hydrogel Present an Effective Therapeutic Approach for Inflammatory Diseases Frontiers in Pharmacology **12**, 18 10.3389/fphar.2021.713616

31. Gaur, R., Verma, D. K., Alam, S. I., and Kamboj, D. V. (2021) Identification of MHC Class I bound peptides of Francisella tularensis Live Vaccine Strain using mass spectrometry European Journal of Pharmaceutical Sciences **158**, 8 10.1016/j.ejps.2020.105651

32. Gaurav, S., Ranjan, R., Kuldeep, J., Dhiman, K., Mahapatra, P. P., Ashish *et al.* (2021) The N-terminus region of Drp1, a Rint1 family protein is essential for cell survival and its interaction with Rad50 protein in fission yeast S.pombe Biochimica Et Biophysica Acta-General Subjects **1865**, 11 10.1016/j.bbagen.2020.129739

33. Gautam, V., Patil, P. P., Bansal, K., Kumar, S., Kaur, A., Singh, A. *et al.* (2021) Description of Stenotrophomonas sepilia sp. nov., isolated from blood culture of a hospitalized patient as a new member of Stenotrophomonas maltophilia complex New Microbes and New Infections **43**, 7 10.1016/j.nmni.2021.100920

34. Grover, V., Chopra, P., Mehta, M., Kumari, S., Sehgal, K., Jain, R. *et al.* (2021) Improvisation and Evaluation of Laterosporulin Coated Titanium Surfaces for dental Applications: An In Vitro Investigation Indian Journal of Microbiology **61**, 203-211 10.1007/s12088-021-00933-7

35. Gupta, G., Agarwal, U., Kumar, N. R., and Gupta, P. (2021) Identification and efficacy of active metabolites of pomegranate fruit peel aqueous extract against sucking pests of rose and their predators Proceedings of the Indian National Science Academy **87**, 324-335 10.1007/s43538-021-00028-3

36. Gupta, R., Kumar, A., Kumar, S., Pinnaka, A. K., and Singhal, N. K. (2021) Naked eye colorimetric detection of Escherichia coli using aptamer conjugated graphene oxide enclosed Gold nanoparticles Sensors and Actuators B-Chemical **329**, 9 10.1016/j.snb.2020.129100

37. Iqbal, I. K., Bajeli, S., Sahu, S., Bhat, S. A., and Kumar, A. (2021) Hydrogen sulfide-induced GAPDH sulfhydration disrupts the CCAR2-SIRT1 interaction to initiate autophagy Autophagy **17**, 3511-3529 10.1080/15548627.2021.1876342

38. Jadon, R. S., Sharma, G., Garg, N. K., Tandel, N., Gajbhiye, K. R., Salve, R. *et al.* (2021) Efficient in vitro and in vivo docetaxel delivery mediated by pH-sensitive LPHNPs for effective breast cancer therapy Colloids and Surfaces B-Biointerfaces **203**, 12 10.1016/j.colsurfb.2021.111760

39. Kalra, R., Conlan, X. A., Areche, C., Dilawari, R., and Goel, M. (2021) Metabolite Profiling of the Indian Food Spice Lichen, Pseudevernia furfuracea Combined With Optimised Extraction Methodology to Obtain Bioactive Phenolic Compounds Frontiers in Pharmacology **12**, 16 10.3389/fphar.2021.629695

40. Kapoor, S., Kodesia, A., Kalidas, N., Ashish, and Thakur, K. G. (2021) Structural characterization of Myxococcus xanthus MglC, a component of the polarity control system, and its interactions with its paralog MglB Journal of Biological Chemistry **296**, 15 10.1016/j.jbc.2021.100308

41. Kaur, A., Rana, R., Saroha, T., and Patil, P. B. (2021) Discerning the role of a functional arsenic- resistance cassette in the evolution and adaptation of a rice pathogen Microbial Genomics **7**, 14 10.1099/mgen.0.000608

42. Kaur, G., Khurana, D., Minz, R., Dutta, U., Ray, P., Singhe, P. *et al.* (2021) Microbiome signature in multiple sclerosis in North India Journal of the Neurological Sciences **429**, 1 10.1016/j.jns.2021.118147

43. Kaur, H., Kumar, R., Lathwal, A., and Raghava, G. P. S. (2021) Computational resources for identification of cancer biomarkers from omics data Briefings in Functional Genomics **20**, 213-222

10.1093/bfgp/elab021

44. Kaur, H., Lathwal, A., Dhall, A., and Raghava, G. P. S. (2021) integrative multi-omics approach for stratification of tumor recurrence risk groups of hepatocellular carcinoma patients Hepatology **74**, 346A-347A.

45. Kaur, H., Sasan, S. P., Yadav, A., Martoliya, Y., and Mondal, A. K. (2021) Distinct role of HAMP and HAMP-like linker domains in regulating the activity of Hik1p, a hybrid histidine kinase 3 from Magnaporthe oryzae Molecular Genetics and Genomics **296**, 1135-1145 10.1007/s00438-021-01809-7

46. Kaur, T., Shukla, B. N., Yadav, V. K., Kulkarni, M. J., and Rao, A. (2021) Comparison of glycoprofiles of rituximab versions licensed for sale in India and an analytical approach for quality assessment Journal of Proteomics **244**, 10 10.1016/j.jprot.2021.104267

47. Kaushal, S., Kumar, A., Soni, S., and Singhal, N. K. (2021) Antibody assisted graphene oxide coated gold nanoparticles for rapid bacterial detection and near infrared light enhanced antibacterial activity Sensors and Actuators B-Chemical **329**, 10 10.1016/j.snb.2020.129141

48. Kaushik, A., Rahisuddin, R., Saini, N., Singh, R. P., Kaur, R., Koul, S. *et al.* (2021) Molecular mechanism of selective substrate engagement and inhibitor disengagement of cysteine synthase Journal of Biological Chemistry **296**, 17 10.1074/jbc.RA120.014490

49. Khairnar, A., Sunsunwal, S., Babu, P., and Ramya, T. N. C. (2021) Novel serine/threonine-O-glycosylation with N-acetylneuraminic acid and 3-deoxy-D-manno-octulosonic acid by bacterial flagellin glycosyltransferases Glycobiology **31**, 288-306 10.1093/glycob/cwaa084

50. Khatri, B., Raghunathan, S., Chakraborti, S., Rahisuddin, R., Kumaran, S., Tadala, R. *et al.* (2021) Desolvation of Peptide Bond by O to S Substitution Impacts Protein Stability Angewandte Chemie-International Edition **60**, 24870-24874 10.1002/anie.202110978

51. Klionsky, D. J., Abdel-Aziz, A. K., Abdelfatah, S., Abdellatif, M., Abdoli, A., Abel, S. *et al.* (2021) Guidelines for the use and interpretation of assays for monitoring autophagy (4th edition) Autophagy **17**, 1-382 10.1080/15548627.2020.1797280

52. Kumar, A., Loharch, S., Kumar, S., Ringe, P. R., and Parkesh, R. (2021) Exploiting cheminformatic and machine learning to navigate the available chemical space of potential small molecule inhibitors of SARS-CoV-2 Computational and Structural Biotechnology Journal **19**, 424-438 10.1016/j.csbj.2020.12.028

53. Kumar, A., Nanda, J. S., Saini, S., and Singh, J. (2021) An RNAi-independent role of AP1-like stress response factor Pap1 in centromere and mating-type silencing in Schizosaccaromyces pombe Journal of Biosciences **46**, 14 10.1007/s12038-021-00199-7

54. Kumar, N., Gupta, A. K., Sudan, S. K., Pal, D., Randhawa, V., Sahni, G. *et al.* (2021) Abundance and Diversity of Phages, Microbial Taxa, and Antibiotic Resistance Genes in the Sediments of the River Ganges Through Metagenomic Approach Microbial Drug Resistance **27**, 1336-1354 10.1089/mdr.2020.0431

55. Kumar, P., Sahoo, D. K., and Sharma, D. (2021) The identification of novel promoters and terminators for protein expression and metabolic engineering applications in Kluyveromyces marxianus Metabolic Engineering Communications **12**, 13 10.1016/j.mec.2020.e00160

56. Kumar, R., Deshpande, S., Sewall, L. M., Ozorowski, G., Cottrell, C. A., Lee, W. H. *et al.* (2021) Elicitation of potent serum neutralizing antibody responses in rabbits by immunization with an HIV-1 clade C trimeric Env derived from an Indian elite neutralizer Plos Pathogens **17**, 27 10.1371/journal.ppat.1008977

57. Kumar, R., Rajput, N. K., Jolly, B., Narwade, A., and Bhardwaj, A. (2021) MitoLink: A generic integrated web-based workflow system to evaluate genotype-phenotype correlations in human mitochondrial diseases: Observations from the GenomeAsia Pilot project Mitochondrion **61**, 54-61 10.1016/j.mito.2021.09.005

58. Kumar, S., Nanduri, R., Bhagyaraj, E., Kalra, R., Ahuja, N., Chacko, A.P., Tiwari, D., Sethi, K., Saini, A., Chandra, V., Jain, M., Gupta, S., Bhatt, D., Gupta, P. (2021) Vitamin D3-VDR-PTPN6 axis mediated autophagy contributes to the inhibition of macrophage foam cell formation. Autophagy 17(9) 2273-2289.

59. Kumar, V., Patiyal, S., Dhall, A., Sharma, N., and Raghava, G. P. S. (2021) B3Pred: A Random-Forest-Based Method for Predicting and Designing Blood-Brain Barrier Penetrating Peptides Pharmaceutics **13**, 13 10.3390/pharmaceutics13081237

60. Kumar, V., Patiyal, S., Kumar, R., Sahai, S., Kaur, D., Lathwal, A. *et al.* (2021) B3Pdb: an archive of blood-brain barrier-penetrating peptides Brain Structure & Function **226**, 2489-2495 10.1007/s00429-021-02341-5

61. Kumari, A., Kumari, S., Prasad, G. S., and Pinnaka, A. K. (2021) Production of Sophorolipid Biosurfactant by Insect Derived Novel Yeast Metschnikowia churdharensis f.a., sp. nov., and Its Antifungal Activity Against Plant and Human Pathogens Frontiers in Microbiology **12**, 13 10.3389/fmicb.2021.678668

62. Lathwal, A., Kumar, R., and Raghava, G. P. S. (2021) In-silico identification of subunit vaccine candidates against lung cancer-associated oncogenic viruses Computers in Biology and Medicine **130**, 9 10.1016/j.compbiomed.2021.104215

63. Loharch, S., Chhabra, S., Kumar, A., Swarup, S., and Parkesh, R. (2021) Discovery and characterization of small molecule SIRT3-specific inhibitors as revealed by mass spectrometry Bioorganic Chemistry **110**, 12 10.1016/j.bioorg.2021.104768

64. Mahajan, S., Sunsunwal, S., Gautam, V., Singh, M., and Ramya, T. N. C. (2021) Biofilm inhibitory effect of alginate lyases on mucoid P. aeruginosa from a cystic fibrosis patient Biochemistry and Biophysics Reports **26**, 4 10.1016/j.bbrep.2021.101028

65. Mahey, N., Tambat, R., Chandal, N., Verma, D. K., Thakur, K. G., and Nandanwar, H. (2021) Repurposing Approved Drugs as Fluoroquinolone Potentiators to Overcome Efflux Pump Resistance in Staphylococcus aureus Microbiology Spectrum **9**, 19 10.1128/Spectrum.00951-21

66. Mahey, N., Tambat, R., Verma, D. K., Chandal, N., Thakur, K. G., and Nandanwar, H. (2021) Antifungal Azoles as Tetracycline Resistance Modifiers in Staphylococcus aureus Applied and Environmental Microbiology **87**, 20 10.1128/aem.00155-21

67. Malladi, S. K., Patel, U. R., Rajmani, R. S., Singh, R., Pandey, S., Kumar, S. *et al.* (2021) Immunogenicity and Protective Efficacy of a Highly Thermotolerant, Trimeric SARS-CoV-2 Receptor Binding Domain Derivative Acs Infectious Diseases **7**, 2546-2564 10.1021/acsinfecdis.1c00276

68. Mathur, D., Kaur, H., Dhall, A., Sharma, N., and Raghava, G. P. S. (2021) SAPdb: A database of short peptides and the corresponding nanostructures formed by self-assembly Computers in Biology and Medicine **133**, 9 10.1016/j.compbiomed.2021.104391

69. Maurya, R. K., Alam, M. A., Ahamad, N., Kishore, K., Prajesh, R., Choudhary, M. *et al.* (2021) Sensitivity Enhancement of Electrochemical Biosensor for Point of Care (POC) Applications: Vi Antigen Detection as a Case Study Journal of the Electrochemical Society **168**, 8 10.1149/1945-7111/abd929

70. Mishra, R. C., Kalra, R., Dilawari, R., Deshmukh, S. K., Barrow, C. J., and Goel, M. (2021) Characterization of an Endophytic Strain Talaromyces assiutensis, CPEF04 With Evaluation of Production Medium for Extracellular Red Pigments Having Antimicrobial and Anticancer Properties Frontiers in Microbiology **12**, 16 10.3389/fmicb.2021.665702

71. Mittal, A., Garg, R., Bahl, A., and Khullar, M. (2021) Molecular Mechanisms and Epigenetic Regulation in Diabetic Cardiomyopathy Frontiers in Cardiovascular Medicine **8**, 13 10.3389/fcvm.2021.725532

72. Mullick, R., Sutar, J., Hingankar, N., Deshpande, S., Thakar, M., Sahay, S. *et al.* (2021) Neutralization diversity of HIV-1 Indian subtype C envelopes obtained from cross sectional and followed up individuals against broadly neutralizing monoclonal antibodies having distinct gp120 specificities Retrovirology **18**, 13 10.1186/s12977-021-00556-2

73. Muthukrishnan, S. (2021) The evolutionary relationship of S15/NS1RNA binding domains with a similar protein domain pattern-A computational approach. Informatics in Medicine Unlocked **24** 100611, 10.1016/j.imu.2021.10061

74. Naushin, S., Sardana, V., Ujjainiya, R., Bhatheja, N., Kutum, R., Bhaskar, A. K. *et al.* (2021) Insights from a Pan India Sero-Epidemiological survey (Phenome-India Cohort) for SARS-CoV2 Elife **10**, 13 10.7554/eLife.66537

75. Negi, S., Saini, S., Tandel, N., Sahu, K., Mishra, R. P. N., and Tyagi, R. K. (2021) Translating Treg Therapy for Inflammatory Bowel Disease in Humanized Mice Cells **10**, 28 10.3390/cells10081847

76. Pal, S., Sharma, G., and Subramanian, S. (2021) Complete genome sequence and identification of polyunsaturated fatty acid biosynthesis genes of the myxobacterium Minicystis rosea DSM 24000^T Bmc Genomics **22**, 15 10.1186/s12864-021-07955-x

77. Pandiyan, K., Kushwaha, P., Bagul, S. Y., Chakdar, H., Madhaiyan, M., Krishnamurthi, S. *et al.* (2021) Halomonas icarae sp. nov., a moderately halophilic bacterium isolated from beach soil in India International Journal of Systematic and Evolutionary Microbiology **71**, 9 10.1099/ijsem.0.004611

78. Patil, P. P., Kumar, S., Kaur, A., Midha, S., Bansal, K., and Patil, P. B. (2021) Global transcriptome analysis of Stenotrophomonas maltophilia in response to growth at human body temperature Microbial Genomics **7**, 14 10.1099/mgen.0.000600

79. Patil, V. S., Lugani, Y., Chaudhari, R. D., Karodi, P. P., Mane, P. C., Mehrotra, P. *et al.* (2021) Description and genomic insights into a multidrug resistant novel bacterium Savagea serpentis sp. nov., isolated from the scats of a vine snake (Ahaetulla nasuta) Antonie Van Leeuwenhoek International Journal of General and Molecular Microbiology **114**, 687-696 10.1007/s10482-021-01549-z

80. Pinnaka, A. K., Tanuku, N. R. S., Gupta, V., Vasudeva, G., Pydi, S., Kashyap, N. *et al.* (2021) Marinobacterium alkalitolerans sp. nov., with nitrate reductase and urease activity isolated from green algal mat collected from a solar saltern Antonie Van Leeuwenhoek International Journal of General and Molecular Microbiology **114**, 1117-1130 10.1007/s10482-021-01582-y

81. Pradhan, G., Sneha, J. M., Sonwane, B. P., Santhakumari, B., Rao, A., and Kulkarni, M. J. (2021) Multiple-parallel-protease digestion coupled with high-resolution mass spectrometry: An approach towards comprehensive peptide mapping of therapeutic mAbs Journal of Proteomics **232**, 12 10.1016/j.jprot.2020.104053

82. Prajesh, R., Goyal, V., Kakkar, S., Sharma, J., Alam, M. A., Maurya, R. K. *et al.* (2021) Polysilicon Field Effect Transistor Biosensor for the Detection of Cardiac Troponin-I (cTnI) Journal of the Electrochemical Society **168**, 7 10.1149/1945-7111/abdde6

83. Prasad, B., Richter, P., Vadakedath, N., Haag, F. W. M., Strauch, S. M., Mancinelli, R. *et al.* (2021) How the space environment influences organisms: an astrobiological perspective and review International Journal of Astrobiology **20**, 159-177 10.1017/s1473550421000057

84. Puri, A., Singh, P., Kumar, N., Kumar, R., and Sharma, D. (2021) Tah1, A Key Component of R2TP Complex that Regulates Assembly of snoRNP, is Involved in De Novo Generation and Maintenance of Yeast Prion URE3 Journal of Molecular Biology **433**, 20 10.1016/j.jmb.2021.166976

85. Rajeev, R., Dwivedi, A. P., Sinha, A., Agarwaal, V., Dev, R. R., Kar, A. *et al.* (2021) Epigenetic interaction of microbes with their mammalian hosts Journal of Biosciences **46**, 31 10.1007/s12038-021-00215-w

86. Rajput, A., Kumar, A., Megha, K., Thakur, A., and Kumar, M. (2021) DrugRepV: a compendium of repurposed drugs and chemicals targeting epidemic and pandemic viruses Briefings in Bioinformatics **22**, 1076-1084 10.1093/bib/bbaa421

87. Rajput, A., Thakur, A., Mukhopadhyay, A., Kamboj, S., Rastogi, A., Gautam, S. *et al.* (2021) Prediction of repurposed drugs for Coronaviruses using artificial intelligence and machine learning Computational and Structural Biotechnology Journal **19**, 3133-3148 10.1016/j.csbj.2021.05.037

88. Rajput, A., Thakur, A., Rastogi, A., Choudhury, S., and

Kumar, M. (2021) Computational identification of repurposed drugs against viruses causing epidemics and pandemics via drug-target network analysis Computers in Biology and Medicine **136**, 16 10.1016/j.compbiomed. 2021.104677

89. Randhawa, V., and Kumar, M. (2021) Analysis of aging-related protein interactome and cross-network module comparisons across tissues provide new insights into aging Computational Biology and Chemistry **92**, 8 10.1016/j.compbiolchem.2021.107506

90. Randhawa, V., and Kumar, M. (2021) An integrated network analysis approach to identify potential key genes, transcription factors, and microRNAs regulating human hematopoietic stem cell aging Molecular Omics **17**, 967-984 10.1039/d1mo00199j

91. Rathore, Y., Shukla, J., Mittal, B. R., Singh, G., Gopal, K., Kumar, R. *et al.* (2021) Radiolabelled trastuzumab Fab as a theranostic molecule for HER2 positive breast cancers Annals of Oncology **32**, S55-S56 10.1016/j.annonc. 2021.03.094

92. Roychowdhury, R., Srivastava, N., Kumari, S., Pinnaka, A. K., and Choudhury, A. R. (2021) Isolation of an exopolysaccharide from a novel marine bacterium Neorhizobium urealyticum sp. nov. and its utilization in nanoemulsion formation for encapsulation and stabilization of astaxanthin Lwt-Food Science and Technology **151**, 15 10.1016/j.lwt.2021.112105

93. Sapra, D., Kaur, H., Dhall, A., and Raghava, G. P. S. (2021) ProCanBio: A Database of Manually Curated Biomarkers for Prostate Cancer Journal of Computational Biology **28**, 1248-1257 10.1089/cmb.2021.0348

94. Sharma, A., Kumar, G., Sharma, S., Walia, K., Chouhan, P., Mandal, B. *et al.* (2021) Methods for binding analysis of small GTP-binding proteins with their effectors In Biomolecular Interactions, Pt A, Shukla AK, ed. Elsevier Academic Press Inc, San Diego 235-250

95. Sharma, P., Tripathi, S., Vadakedath, N., and Chandra, R. (2021) In-situ toxicity assessment of pulp and paper industry wastewater on Trigonella foenum-graecum L: Potential source of cytotoxicity and chromosomal damage (vol 21, 101251, 2021) Environmental Technology & Innovation **22**, 1 10.1016/j.eti.2021. 101375

96. Sidhu, C., Saini, M. K., Tanuku, N. R. S., and Pinnaka, A. K. (2021) Arenibacter amylolyticus sp. nov., an amylase-producing bacterium of the family Flavobacteriaceae isolated from marine water in India International Journal of Systematic and Evolutionary Microbiology **71**, 7 10.1099/ijsem.0.004664

97. Singh, K., and Rao, A. (2021) Probiotics: A potential immunomodulator in COVID-19 infection management Nutrition Research **87**, 1-12 10.1016/j.nutres. 2020. 12. 014

98. Singh, M., Thakur, M., Mishra, M., Yadav, M., Vibhuti, R., Menon, A. M. *et al.* (2021) Gene regulation of intracellular adhesion molecule-1 (ICAM-1): A molecule with multiple functions Immunology Letters **240**, 123-136 10.1016/ j.imlet.2021.10.007

99. Singh, R. P., Bashir, H., and Kumar, R. (2021) Emerging role of microbiota in immunomodulation and cancer immunotherapy Seminars in Cancer Biology **70**, 37-52 10.1016/j.semcancer.2020.06.008

100. Singh, R. P., Saini, N., Sharma, G., Rahisuddin, R., Patel, M., Kaushik, A. *et al.* (2021) Moonlighting Biochemistry of Cysteine Synthase: A Species-specific Global Regulator Journal of Molecular Biology **433**, 19 10.1016/j.jmb. 2021.167255

101. Singh, S. S., Akhtar, M. N., Sharma, D., Mandal, S. M., and Korpole, S. (2021) Characterization of Iturin V, a Novel Antimicrobial Lipopeptide from a Potential Probiotic Strain Lactobacillus sp. M31 Probiotics and Antimicrobial Proteins **13**, 1766-1779 10.1007/s12602-021-09796-2

102. Singh, S. S., Sharma, D., Baindara, P., Choksket, S., Harshvardhan, Mandal, S. M. *et al.* (2021) Characterization and Antimicrobial Studies of Iturin-Like and Bogorol-Like Lipopeptides From Brevibacillus spp. Strains GI9 and SKDU10 Frontiers in Microbiology **12**, 14 10.3389/fmicb.2021.729026

103. Singh, V., and Rao, A. (2021) Distribution and diversity of glycocin biosynthesis gene clusters beyond Firmicutes Glycobiology **31**, 89-102 10.1093/glycob/cwaa061

104. Srivastava, N., and Choudhury, A. R. (2021) Green Synthesis of pH-Responsive, Self-Assembled, Novel Polysaccharide Composite Hydrogel and Its Application in Selective Capture of Cationic/Anionic Dyes Frontiers in Chemistry **9**, 16 10.3389/fchem.2021.761682

105. Srivastava, N., Richa, and Choudhury, A. R. (2021) Recent advances in composite hydrogels prepared solely from polysaccharides Colloids and Surfaces B-Biointerfaces **205**, 15 10.1016/j.colsurfb.2021.111891

106. Srivastava, S., Kaur, S., Verma, H. K., Rani, S., Thakur, M., Haldar, S. *et al.* (2021) Reciprocal relation between reporter gene transcription and translation efficiency in fission yeast Plasmid **115**, 10 10.1016/j.plasmid. 2021. 102557

107. Sundararaman, A., Bansal, K., Sidhic, J., Patil, P., and Halami, P. M. (2021) Genome of Bifidobacterium longum NCIM 5672 provides insights into its acid-tolerance mechanism and probiotic properties Archives of Microbiology **203**, 6109-6118 10.1007/s00203-021-02573-3

108. Taggar, R., Jangra, M., Dwivedi, A., Bansal, K., Patil, P. B., Bhattacharyya, M. S. *et al.* (2021) Bacteriocin isolated from the natural inhabitant of Allium cepa against Staphylococcus aureus World Journal of Microbiology & Biotechnology **37**, 16 10.1007/s11274-020-02989-x

109. Taggar, R., Singh, S., Bhalla, V., Bhattacharyya, M. S., and Sahoo, D. K. (2021) Deciphering the Antibacterial Role of Peptide From Bacillus subtilis subsp. spizizenii Ba49 Against Staphylococcus aureus Frontiers in Microbiology **12**, 14 10.3389/fmicb.2021.708712

110. Tamrakar, A., Singh, R., Kumar, A., Makde, R. D., Ashish, and Kodgire, P. (2021) Biophysical characterization of the homodimers of HomA and HomB, outer membrane proteins of Helicobacter pylori Scientific Reports **11**, 19 10.1038/s41598-021-04039-4

111. Thind, A. S., Monga, I., Thakur, P. K., Kumari, P., Dindhoria, K., Krzak, M. *et al.* (2021) Demystifying emerging bulk RNA-Seq applications: the application and utility of bioinformatic methodology Briefings in Bioinformatics

22,16 10.1093/bib/bbab259

112. Tiwari, D., and Gupta, P. (2021) Nuclear Receptors in Asthma: Empowering Classical Molecules Against a Contemporary Ailment Frontiers in Immunology **11**, 18 10.3389/fimmu.2020.594433

113. Tyagi, R. K. (2021) Plasmodium falciparum infected humanized mice: a viable preclinical tool Immunotherapy **13**, 10 10.2217/imt-2021-0102

114. Tyagi, R. K., Jacobse, J., Li, J., Allaman, M. M., Otipoby, K. L., Sampson, E. R. *et al.* (2021) HLA-Restriction of Human Treg Cells is Not Required for Therapeutic Efficacy of Low-Dose IL-2 in Humanized Mice Frontiers in Immunology **12**, 8 10.3389/fimmu.2021.630204

115. Vasudeva,G., Sidhu,C. Kalidas, N., Ashish, and Pinnaka, A.K. (2021) Shape-function of a novel metapyrocatechase, RW4-MPC: Metagenomics to SAXS data based insight into deciphering regulators of function International Journal of Biological Macromolecules **188**, 1012-1024 10.1016/ j.ijbiomac. 2021.08.031

116. Verma, A., Sundharam, S. S., Pal, Y., Bisht, B., Yadav, P., and Krishnamurthi, S. (2021) Yangia mangrovi sp. nov., a novel member of the Roseobacter clade isolated from mangrove soil and emended description of Yangia pacifica Dai et al. 2006 International Journal of Systematic and Evolutionary Microbiology **71**, 8 10.1099/ijsem.0.005021

117. Verma, D. K., Chaudhary, C., Singh, L., Sidhu, C., Siddhardha, B., Prasad, S. E. *et al.* (2021) Isolation and Taxonomic Characterization of Novel Haloarchaeal Isolates From Indian Solar Saltern: A Brief Review on Distribution of Bacteriorhodopsins and V-Type ATPases in Haloarchaea (vol 11, 554927, 2020) Frontiers in Microbiology **12**, 2 10.3389/fmicb.2021.713942

118. Verma, N. K., Kumar, S., Basotra, S. D., Jain, A., Vij, M., Prasad, G. S. *et al.* (2021) Biocatalytic reduction of prochiral ketones to enantiopure alcohols by novel yeast isolates from unique biodiversity Biocatalysis and Agricultural Biotechnology **31**, 8 10.1016/j.bcab. 2020. 101547

119. Yadav, A., Yadav, P., Singh, A. K., Kumar, V., Sonawane, V. C., Markandeya *et al.* (2021) Decolourisation of textile dye by laccase: Process evaluation and assessment of its degradation bioproducts Bioresource Technology **340**, 10 10.1016/j.biortech.2021.125591

120. Yadav, P., Sharma, S., Bhattarai, T., Sreerama, L., Prasad, G. S., Sahni, G. *et al.* (2021) Whole-Genome Sequence Data Analysis of Anoxybacillus kamchatkensis NASTPD13 Isolated from Hot Spring of Myagdi, Nepal Biomed Research International **2021**, 11 10.1155/2021/ 1869748

121. Zahoor, I., Jan, F., Sharma, U., Sahu, K. K., Sharma, A., Pareek, S. *et al.* (2021) Viburnum nervosum Leaf Extract Mediated Green Synthesis of Silver Nanoparticles: A Viable Approach to Increase the Efficacy of an Anticancer Drug Anti-Cancer Agents in Medicinal Chemistry **21**, 1266-1274 10.2174/1871520620 999201001201230

2022

1. Akhtar, M. N., Kumar, S., and Sen, P. (2022) Leishmania donovani Impedes Antileishmanial Immunity by Suppressing Dendritic Cells via the TIM-3 Receptor Mbio **13**, 25 10.1128/mbio.03309-21

2. Arora, P., Tewary, S., Krishnamurthi, S., and Kumari, N. (2022) Development of a low-cost copper device for inactivation of microorganism in drinking water for human consumption Journal of Water Process Engineering **50**, 14 10.1016/j.jwpe.2022.103302

3. Ashish (2022) Visualizing how inclusion of higher reciprocal space in SWAXS data analysis improves shape restoration of biomolecules: case of lysozyme Journal of Biomolecular Structure & Dynamics **40**, 12975-12989 .1080/07391102.2021.1977704

4. Bansal, K., and Kumar, S. (2022) Mutational cascade of SARS-CoV-2 leading to evolution and emergence of omicron variant Virus Research **315**, 9 10.1016/ j.virusres.2022.198765

5. Bansal, K., Kumar, S., and Patil, P. B. (2022) Phylo-Taxonogenomics Supports Revision of Taxonomic Status of 20 Xanthomonas Pathovars to Xanthomonas citri Phytopathology **112**, 1201-1207 10.1094/phyto-08-21-0342-sc

6. Bansal, K., Kumar, S., Patil, P. P., Sharma, S., and Patil, P. B. (2022) Genomic data resource of type strains of genus Pseudoxanthomonas Data in Brief **42**, 6 10.1016/ j.dib.2022.108145

7. Chand, S., Mihooliya, K. N., Sahoo, D. K., Prasad, J. P., and Sharma, G. (2022) L-asparaginase from Bacillus flexus strain SS: Isolation, Screening, Production Process Optimization, Purification, and Anticancer Activity Applied Biochemistry and Microbiology **58**, 416-427 10.1134/s0003683822040032

8. Chaudhary, D., Singh, A., Marzuki, M., Ghosh, A., Kidwai, S., Gosain, T. P. *et al.* (2022) Identification of small molecules targeting homoserine acetyl transferase from Mycobacterium tuberculosis and Staphylococcus aureus Scientific Reports **12**, 16 10.1038/s41598-022-16468-w

9. Chopra, T., Sasan, S., Devi, L., Parkesh, R., and Kapoor, K.K. (2022) A comprehensive review on recent advances in copper sensor. Coordination Chemsitry Reviews **470**,

10. Das, D. K., Zafar, M. A., Nanda, S., Singh, S., Lamba, T., Bashir, H. *et al.* (2022) Targeting dendritic cells with TLR-2 ligand-coated nanoparticles loaded with Mycobacterium tuberculosis epitope induce anti-tuberculosis immunity Journal of Biological Chemistry **298**, 26 10.1016/j.jbc.2022.102596

11. Dey, P., and Chaudhuri, S. R. (2022) Cancer-Associated Microbiota: From Mechanisms of Disease Causation to Microbiota-Centric Anti-Cancer Approaches Biology-Basel **11**, 44 10.3390/biology11050757

12. Dindhoria, K., Monga, I., and Thind, A. S. (2022) Computational approaches and challenges for identification and annotation of non-coding RNAs using RNA-Seq Functional & Integrative Genomics **22**, 1105-1112 10.1007/s10142-022-00915-y

13. Farr, D., Nag, D., Chazin, W. J., Harrison, S., Thummel, R.,

Luo, X. X. *et al.* (2022) Neutrophil-Associated Responses to Vibrio cholerae Infection in a Natural Host Model Infection and Immunity **90**, 15 10.1128/iai.00466-21

14. Garg, M., Sharma, D., and Kumar, R. (2022) Analysis of the effect of 1-Allyl-3-Methylimidazolium chloride on thermodynamic stability, folding kinetics, and motional dynamics of horse cytochrome c Biophysical Chemistry **290**, 11 10.1016/j.bpc.2022.106892

15. Garg, N. K., Tandel, N., Bhadada, S. K., and Tyagi, R. K. (2022 (vol 12, 713613, 2021) Frontiers in Pharmacology **13**, 2 10.3389/fphar.2022.1002649

16. Gaur, D., Kumar, N., Ghosh, A., Singh, P., Kumar, P., Guleria, J. *et al.* (2022) Ydj1 interaction at nucleotide-binding-domain of yeast Ssa1 impacts Hsp90 collaboration and client maturation Plos Genetics **18**, 39 10.1371/journal.pgen.1010442

17. Gautam, S. S., Singh, R. P., Karsauliya, K., Sonker, A. K., Reddy, P. J., Mehrotra, D. *et al.* (2022) Label-free plasma proteomics for the identification of the putative biomarkers of oral squamous cell carcinoma Journal of Proteomics **259**, 10 10.1016/j.jprot.2022.104541

18. Ghosh, D., Whitworth, D. E., Schäfer, H., Krishnamurthi, S., and Saha, P. (2022) Editorial: Microbial mitigation of hazardous compounds in agro-ecosystems Frontiers in Microbiology **13**, 3 10.3389/fmicb.2022.1015111

19. Goar, H., Paul, P., Khan, H., and Sarkar, D. (2022) Molecular Connectivity between Extracytoplasmic Sigma Factors and PhoP Accounts for Coupled Mycobacterial Stress Response Journal of Bacteriology **204**, 21 10.1128/jb.00110-22

20. Goel, N., Dhiman, K., Kalidas, N., Mukhopadhyay, A., Ashish, F., and Bhattacharjee, S. (2022) Plasmodium falciparum Kelch13 and its artemisinin-resistant mutants assemble as hexamers in solution: a SAXS data-driven modelling study Febs Journal **289**, 4935-4962 10.1111/febs.16378

21. Gosain, T. P., Singh, M., Singh, C., Thakur, K. G., and Singh, R. (2022) Disruption of MenT2 toxin impairs the growth of Mycobacterium tuberculosis in guinea pigs Microbiology-Sgm **168**, 15 10.1099/mic.0.001246

22. 25. Gupta, A., Sharma, Y., Pawar, G. P., Ashish, Nihalani, D., and Chaudhari, V. D. (2022) An efficient and scalable synthesis of Isodesmosine Journal of Heterocyclic Chemistry **59**, 958-963 10.1002/jhet.4441

23. Gupta, A. K., and Kumar, M. (2022) Benchmarking and Assessment of Eight De Novo Genome Assemblers on Viral Next-Generation Sequencing Data, Including the SARS-CoV-2 Omics-a Journal of Integrative Biology **26**, 372-381 10.1089/omi.2022.0042

24. Kakkar, S., Chauhan, S., Bala, R., Bharti, Kumar, V., Rohit, M. *et al.* (2022) Site-directed dual bioprobes inducing single-step nano-sandwich assay for the detection of cardiac troponin I Microchimica Acta **189**, 10 10.1007/s00604-022-05461-9

25. Kalita, A., Mishra, R. K., Kumar, V., Arora, A., and Dutta, D. (2022) An Intrinsic Alkalization Circuit Turns on mntP Riboswitch under Manganese Stress in Escherichia coli Microbiology Spectrum **10**, 14 10.1128/spectrum.03368-22

26. Kamboj, S., Rajput, A., Rastogi, A., Thakur, A., and Kumar, M. (2022) Targeting non-structural proteins of Hepatitis C virus for predicting repurposed drugs using QSAR and machine learning approaches Computational and Structural Biotechnology Journal **20**, 3422-3438 10.1016/j.csbj.2022.06.060

27. Kaur, B., Kumar, N., Chawla, S., Sharma, D., Korpole, S., Sharma, R. *et al.* (2022) A comparative study of in-vitro and in-silico anti-candidal activity and GC-MS profiles of snow mountain garlic vs. normal garlic Journal of Applied Microbiology **133**, 1308-1321 10.1111/jam.15537

28. Kaur, G., Singh, S., Nanda, S., Zafar, M. A., Malik, J. A., Arshi, M. U. *et al.* (2022) Fiction and Facts about BCG Imparting Trained Immunity against COVID-19 Vaccines **10**, 20 10.3390/vaccines10071006

29. Kaur, S., Tambat, R., Pathania, V., Nandanwar, H., and Soni, S. (2022) Photo-thermally enhanced antimicrobial efficacy of silver nanoplates against Gram-negative, Gram-positive bacterial and fungal pathogens Journal of Applied Microbiology **133**, 569-578 10.1111/jam.15588

30. Khan, H., Paul, P., Sevalkar, R. R., Kachhap, S., Singh, B., and Sarkar, D. (2022) Convergence of two global regulators to coordinate expression of essential virulence determinants of Mycobacterium tuberculosis Elife **11**, 25 10.7554/eLife.80965

31. Kaur, M., Singh, R., Patil, M. T., Kumar, K., Sahoo, S. C., Singh, K. N. *et al.* (2022) Microwave-assisted Groebke-Blackburn-Bienayme multicomponent reaction to synthesize imidazo fused heterocycles via in-situ generated isocyanides from N-formylamines: An undergraduate organic laboratory experiment Journal of Heterocyclic Chemistry **59**, 319-328 10.1002/jhet.4386

32. Khatri, B., Pramanick, I., Malladi, S. K., Rajmani, R. S., Kumar, S., Ghosh, P. *et al.* (2022) A dimeric proteomimetic prevents SARS-CoV-2 infection by dimerizing the spike protein Nature Chemical Biology **18**, 1046-+ 10.1038/s41589-022-01060-0

33. Kumar, G., Chawla, P., Dhiman, N., Chadha, S., Sharma, S., Sethi, K. *et al.* (2022) RUFY3 links Arl8b and JIP4-Dynein complex to regulate lysosome size and positioning Nature Communications **13**, 21 10.1038/s41467-022-29077-y

34. Kumar, P., Verma, A., Sundharam, S. S., Ojha, A. K., and Krishnamurthi, S. (2022) Exploring Diversity and Polymer Degrading Potential of Epiphytic Bacteria Isolated from Marine Macroalgae Microorganisms **10**, 19 10.3390/microorganisms10122513

35. Kumar, S., and Bansal, K. (2022) Cross-sectional genomic perspective of epidemic waves of SARS-CoV-2: A pan India study Virus Research **308**, 7 10. 1016/j. virusres. 2021.198642

36. Kumar, S., Bansal, K., and Sethi, S. K. (2022) Reclassification of Streptococcus ilei as a later heterotypic synonym of Streptococcus koreensis based on whole-genome sequence analysis Archives of Microbiology **204**, 5 10.1007/s00203-022-02979-7

37. Kumar, S., Bansal, K., and Sethi, S. K. (2022) Comparative genomics analysis of genus Leuconostoc resolves its taxonomy and elucidates its biotechnological importance Food Microbiology **106**, 11 10.1016/j.fm.2022.104039

38. Kumar, V., Mishra, R. K., Ghose, D., Kalita, A., Dhiman, P., Prakash, A. *et al.* (2022) Free spermidine evokes superoxide radicals that manifest toxicity Elife **11**, 24 10.7554/eLife.77704

39. Mahapatra, S., Sarbahi, A., Madhu, P., Swasthi, H. M., Sharma, A., Singh, P. *et al.* (2022) Substoichiometric Hsp104 regulates the genesis and persistence of self-replicable amyloid seeds of Sup35 prion domain Journal of Biological Chemistry **298**, 15 10.1016/j. jbc.2022. 102143

40. Marepally, S., Sahu, T., and Tyagi, R. K. (2022) Editorial: Nanomedicine in Infectious Diseases: Drug Delivery and Vaccines Frontiers in Pharmacology **13**, 3 10.3389/fphar.2022.928572

41. Mishra, R. C., Kalra, R., Dilawari, R., Goel, M., and Barrow, C. J. (2022) Bio-Synthesis of Aspergillus terreus Mediated Gold Nanoparticle: Antimicrobial, Antioxidant, Antifungal and In Vitro Cytotoxicity Studies Materials **15**, 19 10.3390/ma15113877

42. Moharir, S. C., Thota, S. C., Goel, A., Thakur, B., Tandel, D., Reddy, S. M. *et al.* (2022) Detection of SARS-CoV-2 in the air in Indian hospitals and houses of COVID-19 patients Journal of Aerosol Science **164**, 10 10.1016/ j.jaerosci.2022.106002

43. Nag, D., Farr, D., Raychaudhuri, S., and Withey, J. H. (2022) An adult zebrafish model for adherent-invasive Escherichia coil indicates protection from AIEC infection by probiotic E. coil Nissle Iscience **25**, 22 10.1016/ j.isci.2022.104572

44. Nag, D., Farr, D., Raychaudhuri, S., and Withey, J. H. (2022) Using a zebrafish model to understand adherent-invasive Escherichia coli infection Star Protocols **3**, 15 10.1016/j.xpro.2022.101810

45. 49. Nalla, K., Manda, N. K., Dhillon, H. S., Kanade, S. R., Rokana, N., Hess, M. *et al.* (2022) Impact of Probiotics on Dairy Production Efficiency Frontiers in Microbiology **13**, 12 10.3389/fmicb.2022.805963

46. Nandal, J., Mihooliya, K. N., Verma, H., Kalidas, N., Ashish, F., Mishra, R. P. N. *et al.* (2022) Evaluation of physicochemical and functional similarity of a new CHO derived anti-EGFR antibody P-mAb to its reference medicinal product Artificial Cells Nanomedicine and Biotechnology **50**, 17-28 10. 1080/ 21691401.2022. 2028284

47. Negi, S., Pahari, S., Das, D. K., Khan, N., and Agrewala, J. N. (2022) Curdlan Limits Mycobacterium tuberculosis Survival Through STAT-1 Regulated Nitric Oxide Production (vol 10, 1173, 2019) Frontiers in Microbiology **13**, 3 10.3389/fmicb.2022.924981

48. Pal, Y., Mayilraj, S., and Krishnamurthi, S. (2022) Exploring the Distinct Distribution of Archaeal Communities in Sites Contaminated with Explosives Biomolecules **12**, 15 10.3390/biom12040489

49. Pal, Y., Mayilraj, S., and Krishnamurthi, S. (2022) Uncovering the structure and function of specialist bacterial lineages in environments routinely exposed to explosives Letters in Applied Microbiology **75**, 1433-1448 10.1111/lam.13810

50. Patel, N., Zinzuvadia, A., Prajapati, M., Tyagi, R. K., and Dalai, S. (2022) Swertiamarin-mediated immune modulation/adaptation confers protection a gainst Plasmodium berghei Future Microbiology **17**, 931-941 10.2217/fmb-2021-0298

51. Pathania, S., and Kumar, M. (2022) Computational identification of key genes and regulatory miRNAs responsible for differential regulation of host-pathogen response during early and late blight diseases in tomato Plant Stress **5**, 13 10.1016/j.stress.2022.100098

52. Pathania, S., and Kumar, M. (2022) An integrative computational approach to predict stress-specific candidate and shared genes in multiple plant stresses Plant Gene **30**, 13 10.1016/j.plgene.2022.100356

53. Patidar, A., Malhotra, H., Chaudhary, S., Kumar, M., Dilawari, R., Chaubey, G. K. *et al.* (2022) Host glyceraldehyde-3-phosphate dehydrogenase-mediated iron acquisition is hijacked by intraphagosomal Mycobacterium tuberculosis Cellular and Molecular Life Sciences **79**, 17 10.1007/s00018-021-04110-3

54. Pirhaghi, M., Frank, S. A., Alam, P., Nielsen, J., Sereikaite, V., Gupta, A. *et al.* (2022) A penetratin-derived peptide reduces the membrane permeabilization and cell toxicity of -synuclein oligomers Journal of Biological Chemistry **298**, 14 10.1016/j.jbc.2022.102688

55. Rajput, A., Bhamare, K. T., Thakur, A., and Kumar, M. (2022) Biofilm-I: A Platform for Predicting Biofilm Inhibitors Using Quantitative Structure-Relationship (QSAR) Based Regression Models to Curb Antibiotic Resistance Molecules **27**, 12 10.3390/molecules 27154861

56. Rajput, A., and Kumar, M. (2022) Anti-Ebola: an initiative to predict Ebola virus inhibitors through machine learning Molecular Diversity **26**, 1635-1644 10.1007/s11030-021-10291-7

57. Rajwadkar, M. V., Bhalla, L., Grover, C. N., and Sarao, D. M. S. (2022) Nosocomial Recurrent Bacterial Meningitis/Ventriculitis Postelective Surgery in a Case of Total Knee Replacement Journal of Marine Medical Society **24**, 153-157 10.4103/jmms.jmms_73_20

58. Rana, R., Madhavan, V. N., Saroha, T., Bansal, K., Kaur, A., Sonti, R. V. *et al.* (2022) Xanthomonas indica sp. nov., a Novel Member of Non-Pathogenic Xanthomonas Community from Healthy Rice Seeds Current Microbiology **79**, 10 10.1007/s00284-022-03001-5

59. Rana, V., Singh, N., Nikam, C., Kambli, P., Singh, P., Singh, U. *et al.* (2022) Molecular Epidemiology and Polymorphism Analysis in Drug-Resistant Genes in M. tuberculosis Clinical Isolates from Western and Northern India Infection and Drug Resistance **15**, 1717-1732 10.2147/ idr.S345855

60. Randhawa, V., Pathania, S., and Kumar, M. (2022) Computational Identification of Potential Multitarget Inhibitors of Nipah Virus by Molecular Docking and Molecular Dynamics Microorganisms **10**, 16 10.3390/microorganisms10061181

61. Rathore, Y., Shukla, J., Lakhanpal, T., Laroiya, I., Deep, A., Kumar, R. *et al.* (2022) Development 68Ga trastuzumab Fab and bioevaluation by PET imaging in HER2/neu-expressing breast cancer patients Annals of Oncology **33**, S1441-S1441 10.1016/j.annonc.2022.10.038

62. Rathore, Y., Shukla, J., Laroiya, I., Deep, A., Lakhanpal, T., Kumar, R. *et al.* (2022) Development 68Ga trastuzumab Fab and bioevaluation by PET imaging in HER2/neu expressing breast cancer patients Nuclear Medicine Communications **43**, 458-467 10.1097/mnm.0000000000001521

63. Richa & Choudhury, A. R. (2022). Encapsulated probiotic spores as a fortification strategy for development of novel functional beverages. Innovative Food Science & Emerging Technologies, 80, 103104. https://doi. org/10.1016/j.ifset.2022.103104.

64. Sarkar, A., Paul, S., Singh, C., Chowdhury, N., Nag, P., Das, S. *et al.* (2022) A novel plant lectin, NTL-125, interferes with SARS-CoV-2 interaction with hACE2 Virus Research **315**, 13 10.1016/j.virusres.2022.198768

65. Saroha, T., Chaudhry, V., and Patil, P. B. (2022) Novel insights into the role of the mobilome in ecological diversification and success of Staphylococcus haemolyticus as an opportunistic pathogen Microbial Genomics **8**, 9 10.1099/mgen.0.000755

66. Sasan, S., Chopra, T., Gupta, A., Tsering, D., Kapoor, K. K., and Parkesh, R. (2022) Fluorescence "Turn-Off" and Colorimetric Sensor for Fe2+, Fe3+, and Cu2+ Ions Based on a 2,5,7-Triarylimidazopyridine Scaffold Acs Omega **7**, 11114-11125 10.1021/acsomega.1c07193

67. Sekhon, G., Singh, B., and Singh, R. (2022) Role of Cys-298 in specific recognition of glutathione by aldose reductase Journal of Biomolecular Structure & Dynamics **40**, 6880-6888 10.1080/07391102.2021.1891138

68. Sharma, A., Martoliya, Y., and Mondal, A. K. (2022) BEM2, a RHO GTPase Activating Protein That Regulates Morphogenesis in S. cerevisiae, Is a Downstream Effector of Fungicidal Action of Fludioxonil Journal of Fungi **8**, 13 10.3390/jof8070754

69. Sharma, Y., Pawar, G. P., and Chaudhari, V. D. (2022) One-Pot Domino Reaction: Direct Access to Polysubstituted 1,4-Benzothiazine 1,1-Dioxide via Water-Gas Shift Reaction Utilizing DMF/H2O Journal of Organic Chemistry 10 10.1021/acs.joc.2c02171

70. Sharma, Y., Ahlawat, S., and Rao, A. (2022) Biochemical characterization of an inverting S/O-HexNAc-transferase and evidence of S-linked glycosylation in Actinobacteria Glycobiology **32**, 148-161 10. 1093/glycob/cwab089

71. Singh, A., Bansal, K., Kumar, S., and Patil, P. B. (2022) Deep Population Genomics Reveals Systematic and Parallel Evolution at a Lipopolysaccharide Biosynthetic Locus in Xanthomonas Pathogens That Infect Rice and Sugarcane Applied and Environmental Microbiology **88**, 15 10.1128/aem.00550-22

72. Singh, A. K., Novak, J., Kumar, A., Singh, H., Thareja, S., Pathak, P. *et al.* (2022) Gaussian field-based 3D-QSAR and molecular simulation studies to design potent pyrimidine-sulfonamide hybrids as selective BRAFV600E inhibitors Rsc Advances **12**, 30181-30200 10.1039/d2ra05751d

73. Singh, P., Ujjainiya, R., Prakash, S., Naushin, S., Sardana, V., Bhatheja, N. *et al.* (2022) A machine learning-based approach to determine infection status in recipients of BBV152 (Covaxin) whole-virion inactivated SARS-CoV-2 vaccine for serological surveys Computers in Biology and Medicine **146**, 10 10.1016/j.compbiomed.2022.105419

74. Singh, S., Maurya, S. K., Aqdas, M., Bashir, H., Arora, A., Bhalla, V. *et al.* (2022) Mycobacterium tuberculosis exploits MPT64 to generate myeloid-derived suppressor cells to evade the immune system Cellular and Molecular Life Sciences **79**, 25 10.1007/s00018-022-04596-5

75. Singh, V., Pandey, S., and Bhardwaj, A. (2022) From the reference human genome to human pangenome: Premise, promise and challenge Frontiers in Genetics **13**, 12 10.3389/fgene.2022.1042550

76. Srivastava, N., and Choudhury, A. R. (2022) Microbial Polysaccharide-Based Nanoformulations for Nutraceutical Delivery Acs Omega **7**, 40724-40739 10.1021/acsomega.2c06003

77. Srivastava, N., Kumari, S., Kurmi, S., Pinnaka, A. K., and Choudhury, A. R. (2022) Isolation, purification, and characterization of a novel exopolysaccharide isolated from marine bacteria Brevibacillus borstelensis M42 Archives of Microbiology **204**, 16 10.1007/s00203-022-02993-9

78. Svec, P., Králová, S., Stanková, E., Holochová, P., Sedlár, K., Koudelková, S. *et al.* (2022) Pedobacter fastidiosus sp. nov., isolated from glacial habitats of maritime Antarctica International Journal of Systematic and Evolutionary Microbiology **72**, 9 10.1099/ijsem.0.005309

79. Tambat, R., Mahey, N., Chandal, N., Verma, D. K., Jangra, M., Thakur, K. G. *et al.* (2022) A Microbe-Derived Efflux Pump Inhibitor of the Resistance-Nodulation-Cell Division Protein Restores Antibiotic Susceptibility in Escherichia coli and Pseudomonas aeruginosa Acs Infectious Diseases **8**, 255-270 10.1021/ acsinfecdis.1c00281

80. Tandel, N., Negi, S., and Tyagi, R. K. (2022) NKB cells: A double-edged sword against inflammatory diseases Frontiers in Immunology **13**, 9 10.3389/fimmu.2022.972435

81. Thakur, A., and Kumar, M. (2022) AntiVIRmiR: A repository of host antiviral miRNAs and their expression along with experimentally validated viral miRNAs and their targets Frontiers in Genetics **13**, 15 10.3389/fgene.2022.971852

82. Thakur, N., Sharma, A. N., Hade, M. D., Chhaya, A., Kumar, A., Jolly, R. S. *et al.* (2022) New Insights Into the Function of Flavohemoglobin in Mycobacterium tuberculosis: Role as a NADPH-Dependent Disulfide Reductase and D-Lactate-Dependent Mycothione Reductase Frontiers in Cellular and Infection Microbiology **11**, 15 10.3389/fcimb.2021.796727

83. Tiwari, D., Ahuja, N., Kumar, S., Kalra, R., Nanduri, R., Gupta, S. *et al.* (2022) Nuclear receptor Nr1d1 alleviates asthma by abating GATA3 gene expression and Th2 cell differentiation Cellular and Molecular Life Sciences **79**, 21 10.1007/s00018-022-04323-0

84. Urvashi, Gundawar, K., Sharma, S., Choksket, S., Sharma, M., Grover, V. *et al.* (2022) Lacrimispora defluvii PI-S10-B5AT sp. nov., an Obligate Anaerobe, Isolated from an Industrial Waste and Reclassification of Hungatella xylanolytica as Lacrimispora xylanolytica and Clostridium indicum as Lacrimispora indica Comb. nov Current Microbiology **79**, 9 10.1007/s00284-022-03096-w

85. Vasudeva, G., Singh, H., Paliwal, S., and Pinnaka, A. K. (2022) Metagenomics: An Approach for Unraveling the Community Structure and Functional Potential of Activated Sludge of a Common Effluent Treatment Plant Frontiers in Microbiology **13**, 18 10.3389/fmicb. 2022. 933373

86. Verma, N. K., Kumar, S., Prasad, G. S., and Bhattacharyya, M. S. (2022) Biocatalytic deracemization of racemic naphthyl alcohols by using a novel yeast isolate Rhodotorula kratochvilovae (MTCC 13029) Sustainable Chemistry and Pharmacy **26**, 12 10.1016/j.scp. 2022. 100609

87. Verma, N. K., Tan, S. J., Chen, J., Chen, H. R., Ismail, M. H., Rice, S. A. *et al.* (2022) In Phocus: Current State and Challenges of Phage Research in Singapore Phage-Therapy Applications and Research **3**, 6-11 10.1089/phage.2022.29028.nkv

88. Verma, P., Varshney, R., Yadav, S. P. S., Kar, B., Roy, P., and Sharma, A. K. (2022) SAXS Analysis and Characterization of Anticancer Activity of PNP-UDP Family Protein from Putranjiva roxburghii Protein Journal **41**, 381-393 10.1007/s10930-022-10060-x

89. Virk, K., Yonezawa, K., Choukate, K., Singh, L., Shimizu, N., and Chaudhuri, B. (2022) K-edge anomalous SAXS for protein solution structure modeling Acta Crystallographica Section D-Structural Biology **78** (pt2), 204-211 10.1107/s205979832101247x

90. Yadav, J., Das, S., Karthikeyan, D., Chug, R., Jyoti, A., Srivastava, V. K. *et al.* (2022) Identification of Protein Drug Targets of Biofilm Formation and Quorum Sensing in Multidrug Resistant Enterococcus faecalis Current Protein & Peptide Science **23**, 248-263 10.2174/ 1389203723666220526155644

91. Yadav, J., Das, S., Singh, S., Jyoti, A., Srivastava, V. K., Sharma, V. *et al.* (2022) Deciphering the Role of S-adenosyl Homocysteine Nucleosidase in Quorum Sensing Mediated Biofilm Formation Current Protein & Peptide Science **23**, 211-225 10.2174/ 1389203723-666220519152507

92. Yadav, S., Singh, R., Sundharam, S. S., Chaudhary, S., Krishnamurthi, S., and Patil, S. A. (2022) Geoalkalibacter halelectricus SAP-1 sp. nov. possessing extracellular electron transfer and mineral-reducing capabilities from a haloalkaline environment Environmental Microbiology **24**, 5066-5081 10.1111/1462-2920.16200

93. Yadav, S. P. S., Yu, A. Y., Zhao, J. F., Singh, J., Kakkar, S., Chakraborty, S. *et al.* (2022) Glycosylation of a key cubilin Asn residue results in reduced binding to albumin Journal of Biological Chemistry **298**, 17 10.1016/j.jbc 2022.102371

94. Yadav, S., Shinde, R. N., Singh, S., Karthikeyan, S., and Singh, B. (2022) Structurally disordered C-terminal residues of GTP cyclohydrolase II are essential for its enzymatic activity Journal of Biomolecular Structure & Dynamics **40**, 9318-9331 10.1080/07391102. 2021.1926326

95 Yadav, V. K., Awasthi, P., Behl, R., and Kumar, A. (2022) HSc70 interactome reveal major role of macroautophagy and minor role of chaperone mediated autophagy in K-Ras G12V cell proliferation and survival Journal of Proteomics 264, 10 10.1016/j.jprot.2022.104614

2023

1. Ahuja N, Gupta S, Arora R, Bhagyaraj E, Tiwari D, Kumar S, Gupta P. *(2023)* Nr1h4 and Thrb ameliorate ER stress and provide protection in the MPTP mouse model of Parkinson's. Life Sci Alliance. Submitted Oct 2023, Accepted Apr 12; 7(7):e202302416. doi: 10.26508/lsa.202302416

2. Akhtar, A., Lata, M., Sunsunwal, S., Yadav, A., Lnu, K., Subramanian, S. *et al.* (2023) New carbohydrate binding domains identified by phage display based functional metagenomic screens of human gut microbiota Communications Biology **6**, 15 10.1038/s42003-023-04718-0

3. Amin, T., Sharma, R. P., Mir, K. B., Slathia, N., Chhabra, S., Tsering, D. *et al.* (2023) Quinoxalinone substituted pyrrolizine (4h)-induced dual inhibition of AKT and ERK instigates apoptosis in breast and colorectal cancer by modulating mitochondrial membrane potential European Journal of Pharmacology **957**, 16 10.1016/j.ejphar.2023.175945

4. Arora, P., Tewary, S., Krishnamurthi, S., and Kumari, N. (2023) An experimental setup and segmentation method for CFU counting on agar plate for the assessment of drinking water Journal of Microbiological Methods **214**, 15 10.1016/j.mimet.2023.106829

5. Bajaj, M., Muddassir, M., Choi, B., Singh, P., Park, J. B., Singh, S. *et al.* (2023) Single-molecule analysis of osmolyte-mediated nanomechanical unfolding behavior of a protein domain International Journal of Biological Macromolecules **253**, 10 10.1016/j. ijbiomac.2023. 126849

6. Bommasamudram, J., Kumar, P., Kapur, S., Sharma, D., and Devappa, S. (2023) Development of Thermotolerant Lactobacilli Cultures with Improved Probiotic Properties Using Adaptive Laboratory Evolution Method Probiotics and Antimicrobial Proteins **15**, 832-843 10.1007/s12602-021-09892-3

7. Bansal, K., Devi, N., Aqdas, M., Kumar, M., Agrewala, J. N., Katare, O. P. *et al.* (2023) Inorganic gold nanoparticles-TAT hybrid for the effective delivery of doxorubicin into cancer cells Journal of Drug Delivery Science and Technology **88**, 12 10.1016/j.jddst.2023.104959

8. Bashir, H., Singh, S., Singh, R. P., Agrewala, J. N., and Kumar, R. (2023) Age-mediated gut microbiota dysbiosis promotes the loss of dendritic cells tolerance Aging Cell **22**, 21 10.1111/acel.13838

9. Bhardwaj, M., Kamble, P., Mundhe, P., Jindal, M., Thakur, P., and Bajaj, P. (2023) Multifaceted personality and roles of heme enzymes in industrial biotechnology 3 Biotech **13**, 16 10.1007/s13205-023-03804-8

10. Bhardwaj, T., Gadhave, K., Kapuganti, S. K., Kumar, P., Brotzakis, Z. F., Saumya, K. U. *et al.* (2023) Amyloidogenic proteins in the SARS-CoV and SARS-CoV-2 proteomes Nature Communications **14**, 16 10.1038/s41467-023-36234-4

11. Bharti, M., Khurana, H., Sharma, M., Choksket, S., Nagar, S., Yadav, S. *et al.* (2023) Taxonomic and genomic characterization of Sporosarcina cyprini sp. nov., moderately tolerant of Cr+6 and Cd+2 isolated from the

gut of invasive fish Cyprinus carpio var. communis (Linn., 1758) Antonie Van Leeuwenhoek International Journal of General and Molecular Microbiology 116, 193-206 10.1007/s10482-022-01794-w

12. Chandal, N., Tambat, R., Kalia, R., Kumar, G., Mahey, N., Jachak, S. *et al.* (2023) Efflux pump inhibitory potential of indole derivatives as an arsenal against norA over-expressing Staphylococcus aureus Microbiology Spectrum **11**, 30 10.1128/spectrum.04876-22

13. Chandrasekhar, H., Mohapatra, G., Kajal, K., Singh, M., Walia, K., Rana, S. *et al.* (2023) SifA SUMOylation governs Salmonella Typhimurium intracellular survival via modulation of lysosomal function Plos Pathogens **19**, 28 10.1371/journal.ppat.1011686

14. Chaubey, G. K., Dilawari, R., Modanwal, R., Talukdar, S., Dhiman, A., Raje, C. I. *et al.* (2023) Excess iron aggravates the severity of COVID-19 infection Free Radical Biology and Medicine **208**, 186-193 10.1016/j. freeradbiomed. 2023.08.011

15. Chauhan, N. K., Anand, A., Sharma, A., Dhiman, K., Gosain, T. P., Singh, P. *et al.* (2023) Structural and Functional Characterization of Rv0792c from Mycobacterium tuberculosis: Identifying Small Molecule Inhibitor against HutC Protein Microbiology Spectrum **11**, 22 10.1128/spectrum.01973-22

16. Choksket, S., Rana, R., Patil, P. B., and Korpole, S. (2023) Lysobacter arvi sp. nov. Isolated from Farmland Soil Current Microbiology **80**, 8 10.1007/s00284-023-03486-8

17. Choksket, S., Sharma, S., Harshvardhan, Pal, V., Jain, A., Patil, P. B. *et al.* (2023) Evaluation of Human Dental Plaque Lactic Acid Bacilli for Probiotic Potential and Functional Analysis in Relevance to Oral Health Indian Journal of Microbiology **63**, 520-532 10.1007/s12088-023-01108-2

18. Choudhary, M., Bisht, B., Saini, J. K., Bharti, Singh, P., Bhardwaj, P. *et al.* (2023) Bifunctionalized nanobioprobe based rapid color-shift assay for typhoid targeting Vi capsular polysaccharide Biosensors & Bioelectronics **228**, 8 10.1016/j.bios.2023.115195

19. Choudhury, C., Kumar, V., and Kumar, R. (2023) smProdrugs: A repository of small molecule prodrugs European Journal of Medicinal Chemistry **249**, 13 10.1016/j.ejmech.2023.115153

20. Colin, P., Ringe, R. P., Yasmeen, A., Ozorowski, G., Ketas, T. J., Lee, W. H. *et al.* (2023) Conformational antigenic heterogeneity as a cause of the persistent fraction in HIV-1 neutralization Retrovirology **20**, 20 10.1186/s12977-023-00624-9

21. Dadwal, R., Sharma, N., Kanaujia, R., Malhotra, S., Chaudhry, H., Rathore, S. *et al.* (2023) Prevalence of Trichomonas vaginalis by polymerase chain reaction-based molecular method among symptomatic women from Northern India Indian Journal of Sexually Transmitted Diseases and Aids **44**, 40-44 10.4103/ijstd.ijstd_21_22

22. Deep, A., Singh, L., Kaur, J., Velusamy, M., Bhardwaj, P., Singh, R. *et al.* (2023) Structural insights into DarT toxin neutralization by cognate DarG antitoxin: ssDNA mimicry by DarG C-terminal domain keeps the DarT toxin inhibited Structure **31**, 780-+ 10.1016/j.str.2023.04.008

23. Dey, P., and Chaudhuri, S. R. (2023) The opportunistic nature of gut commensal microbiota Critical Reviews in Microbiology **49**, 739-763 10.1080/ 1040841 x.2022.2133987

24. Dharra, R., Sharma, A. K., and Datta, S. (2023) Emerging aspects of cytokine storm in COVID-19: The role of proinflammatory cytokines and therapeutic prospects Cytokine **169**, 17 10.1016/j.cyto.2023.156287

25. Dhiman, A., Talukdar, S., Chaubey, G. K., Dilawari, R., Modanwal, R., Chaudhary, S. *et al.* (2023) Regulation of Macrophage Cell Surface GAPDH Alters LL-37 Internalization and Downstream Effects in the Cell Journal of Innate Immunity **15**, 581-598 10.1159/000530083

26. Dubey, A. K., Sharma, M., Raut, S., Gupta, P., and Khatri, N. (2023) Healing wounds, defeating biofilms: Lactiplantibacillus plantarum in tackling MRSA infections Frontiers in Microbiology **14**, 13 10.3389 / fmicb.2023.1284195

27. Espinoza-Araya, C., Starbird, R., Prasad, E. S., Renugopalakrishnan, V., Mulchandani, A., Bruce, B. D. *et al.* (2023) A bacteriorhodopsin-based biohybrid solar cell using carbon-based electrolyte and cathode components Biochimica Et Biophysica Acta-Bioenergetics **1864**, 10 10.1016/j.bbabio.2023.148985

28. Garg, H., Ringe, R. P., Das, S., Parkash, S., Thakur, B., Delipan, R. *et al.* (2023) UVC-Based Air Disinfection Systems for Rapid Inactivation of SARS-CoV-2 Present in the Air Pathogens **12**, 13 10.3390/pathogens12030419

29. Garvey, G. J., Anderson, J. K., Goodrum, P. E., Tyndall, K. H., Cox, L. A., Khatami, M. *et al.* (2023) Weight of evidence evaluation for chemical-induced immunotoxicity for PFOA and PFOS: findings from an independent panel of experts Critical Reviews in Toxicology **53**, 34-51 10.1080/10408444.2023.2194913

30. Garvey, G. J., Anderson, J. K., Goodrum, P. P., Tyndall, K. H., Cox, L. A., Khatami, M. *et al.* (2023) Response to the letter to the editor regarding the article "Weight of evidence evaluation for chemical-induced immunotoxicity for PFOA and PFOS: findings from an independent panel of experts" by Garvey et al. (2023) Critical Reviews in Toxicology 2 10.1080/10408444.2023.2240841

31. Gupta, A. K., and Kumar, M. (2023) An integrative approach toward identification and analysis of therapeutic targets involved in HPV pathogenesis with a focus on carcinomas Cancer Biomarkers **36**, 31-52 10.3233/cbm-210413

32. Hyde, K. D., Abdel-Wahab, M. A., Abdollahzadeh, J., Abeywickrama, P. D., Absalan, S., Afshari, N. *et al.* (2023) Global consortium for the classification of fungi and fungus-like taxa Mycosphere **14**, 1960-2012 10.5943/mycosphere/14/1/23

33. Janhvi, S., Saini, S., Singh, V., Sharma, T., and Rao, A. (2023) ProGlycProt V3.0: updated insights into prokaryotic glycoproteins and their glycosyltransferases Glycobiology 6 10.1093/glycob/cwad103

34. Kakkar, S., Gupta, P., Kumar, N., and Kant, K. (2023) Progress in Fluorescence Biosensing and Food Safety towards Point-of-Detection (PoD) System Biosensors-

Basel 13, 18 10.3390/bios13020249

35. Kakkar, S., Chauhan, S., Rohit, M., and Bhalla, V. (2023) Conformational switching of aptamer biointerfacing graphene-gold nanohybrid for ultrasensitive label-free sensing of cardiac Troponin I Bioelectrochemistry **150**, 10 10.1016/j.bioelechem.2022.108348

36. Kalra, R., Tiwari, D., Dkhar, H. K., Bhagyaraj, E., Kumar, R., Bhardwaj, A. *et al.* (2023) Host factors subverted by Mycobacterium tuberculosis: Potential targets for host directed therapy International Reviews of Immunology **42**, 43-70 10.1080/08830185.2021.1990277

37. Kaur, A., Rana, R., Bansal, K., Patel, H. K., Sonti, R. V., and Patil, P. B. (2023) Insights into the Diversity of Transcription Activator-Like Effectors in Indian Pathotype Strains of Xanthomonas oryzae pv. oryzae Phytopathology **113**, 953-959 10.1094/phyto-08-22-0304-sc

38. Kaur, G., Khurana, D., Pandey, R., Kumari, P., Devi, P., Swaminathan, A. *et al.* (2023) Gut microbiome signature in North Indian people with Multiple Sclerosis Multiple Sclerosis Journal **29**, 495-495,

39. Kaur, M., Arya, P., Chosyang, S., and Singh, B. (2023) Comprehending conformational changes in EmrE, multidrug transporter at different pH: insights from molecular dynamics simulations Journal of Biomolecular Structure & Dynamics 14 10.1080/07391102. 2023. 2298386

40. Kaur, M., Kumar, R., Katoch, P., and Gupta, R. (2023) Purification and characterization of extracellular lipase from a thermotolerant strain: Bacillus subtilis TTP-06 3 Biotech **13**, 13 10.1007/s13205-023-03717-6

41. Kaur, S., Dadwal, R., Nandanwar, H., and Soni, S. (2023) Limits of antibacterial activity of triangular silver nanoplates and photothermal enhancement thereof for Bacillus subtilis Journal of Photochemistry and Photobiology B-Biology **247**, 11 10.1016/j.jphotobiol. 2023.112787

42. Kaur, S., Tambat, R., Pathania, V., Nandanwar, H., and Soni, S. (2023) Photo-thermally enhanced antimicrobial efficacy of silver nanoplates against Gram-negative, Gram-positive bacterial and fungal pathogens (vol 133, pg 569, 2022) Journal of Applied Microbiology **134**, 1 10.1093/jambio/lxad184

43. Kazi, A., Ranjan, A., Kumar M.V., V., Agianian, B., Garcia Chavez, M., Vudatha, V., Wang, R., Vangipurapu, R., Chen, L., Kennedy, P., Subramanian, K., Quirke, J. C., Beato, F., Underwood, P. W., Fleming, J. B., Trevino, J., Hergenrother, P. J., Gavathiotis, E., & Sebti, S. M. (2023). Discovery of KRB-456, a KRAS G12D Switch-I/II Allosteric Pocket Binder That Inhibits the Growth of Pancreatic Cancer Patient-derived Tumors. *Cancer Research Communications*, *3*(12), 2623–2639. https://doi.org/10.1158/2767-9764.crc-23-0222

44. Khaleeq, S., Sengupta, N., Kumar, S., Patel, U. R., Rajmani, R. S., Reddy, P. *et al.* (2023) Neutralizing Efficacy of Encapsulin Nanoparticles against SARS-CoV2 Variants of Concern Viruses-Basel **15**, 17 10.3390/v15020346

45. Khan, M. S., Jakob, V., Singh, R., Rajmani, R. S., Kumar, S., Lemoine, C. *et al.* (2023) Enhancing Immunogenicity of a Thermostable, Efficacious SARS-CoV-2 Vaccine Formulation through Oligomerization and Adjuvant Choice Pharmaceutics **15**, 20 10.3390/ pharmaceutics 15122759

46. Kumar, A., Boradia, V. M., Mahajan, A., Kumaran, S., Raje, M., and Raje, C. I. (2023) Mycobacterium tuberculosis H37Rv enolase (Rv1023)- expression, characterization and effect of host dependent modifications on protein functionality Biochimie **214**, 102-113 10.1016/j.biochi. 2023.06.012

47. Kumar, A., Loharch, S., Kumar, S., Ringe, R. P., and Parkesh, R. (2023) Exploiting cheminformatic and machine learning to navigate the available chemical space of potential small molecule inhibitors of SARS-CoV-2 (vol 19, pg. 424, 2021) Computational and Structural Biotechnology Journal **21**, 4408-4408 10.1016/j.csbj. 2023.09.002

48. Kumar, I., Sagar, A., Dhiman, K., Bethel, C. R., Hujer, A. M., Carifi, J. *et al.* (2023) Insights into dynamic changes in ADC-7 and P99 cephalosporinases using small angle x-ray scattering (SAXS) Journal of Biomolecular Structure & Dynamics 13 10.1080/07391102.2023.2240427

49. Kumar, N., Taily, I. M., Singh, C., Kumar, S., Rajmani, R. S., Chakraborty, D. *et al.* (2023) Identification of diphenylurea derivatives as novel endocytosis inhibitors that demonstrate broad-spectrum activity against SARS-CoV-2 and influenza A virus both in vitro and in vivo Plos Pathogens **19**, 34 10.1371/journal.ppat.1011358

50. Kumar, P., Kaur, J., Kumari, S., Paliwal, S., Berry, S., Pinnaka, A. K. *et al.* (2023) Aroyl-isothiocyanates /isoselenocyanates as precursors to obtain novel cis-3-aroyl-thiourea/urea-β-lactams: design, synthesis, docking and biological evaluation New Journal of Chemistry **48**, 67-78 10.1039/d3nj04485h

51. Kumar, R., Pathania, V., Kumar, S., Kumar, M., Nandanwar, H., and Maurya, S. K. (2023) Synthesis of novel ciprofloxacin-avibactam conjugates for the development of second-generation non-/3-lactam-/3-lactamase inhibitors Bioorganic & Medicinal Chemistry Letters **88**, 6 10.1016/j.bmcl.2023.129308

52. Kumar, R., Srivastava, Y., Maji, S., Siddiqui, S., Tyagi, R. K., Muthuramalingam, P. *et al.* (2023) In silico evaluation of natural compounds to confirm their anti-DNA gyrase activity Nucleus-India **66**, 167-182 10.1007/s13237-023-00426-6

53. Kumar, R., Srivastava, Y., Muthuramalingam, P., Singh, S. K., Verma, G., Tiwari, S. *et al.* (2023) Understanding Mutations in Human SARS-CoV-2 Spike Glycoprotein: A Systematic Review & Meta-Analysis Viruses-Basel **15**, 22 10.3390/v15040856

54. Kumar, S., Delipan, R., Chakraborty, D., Kanjo, K., Singh, R., Singh, N. *et al.* (2023) Mutations in S2 subunit of SARS-CoV-2 Omicron spike strongly influence its conformation, fusogenicity, and neutralization sensitivity Journal of Virology **97**, 19 10.1128/jvi.00922-23

55. Kumar, S., Verma, N. K., Basotra, S. D., Sharma, D., Prasad, G. S., and Bhattacharyya, M. S. (2023) Harnessing dual applications of a novel ascomycetes yeast, Starmerella cerana sp. nov., as a biocatalyst for stereoselective ketone reduction and biosurfactant production Frontiers in Bioengineering and Biotechnology **11**, 17 10.3389/fbioe.2023.1264826

56. Kumari, A., Mihooliya, K. N., Sahoo, D. K., Bhattacharyya, M. S., Prasad, G. S., and Pinnaka, A. K. (2023) Description of lipase producing novel yeast species Debaryomyces apis f.a., sp. nov. and a modified pH indicator dye-based method for the screening of lipase producing microorganisms Scientific Reports **13**, 12 10.1038/s41598-023-38241-3

57. Mavi, P. S., Singh, S., and Kumar, A. (2023) Media component bovine serum albumin facilitates the formation of mycobacterial biofilms in response to reductive stress Bmc Microbiology **23**, 15 10.1186/s12866-023-02853-6

58. Megha, K., Reshma, S., Amir, S., Krishnan, M. A., Shimona, A., Alka, R. *et al.* (2023) Comprehensive Risk Assessment of Infection Induced by SARS-CoV-2 Molecular Neurobiology 22 10.1007/s12035-023-03682-4

59. Menon, R. R., Kumari, S., Kumar, P., Verma, A., Krishnamurthi, S., and Rameshkumar, N. (2023) Sphingomonas pokkalii sp. nov., a novel plant associated rhizobacterium isolated from a saline tolerant pokkali rice and its draft genome analysis (vol 42, pg 334, 2019) Systematic and Applied Microbiology **46**, 1 10.1016/j.syapm.2023.126450

60. Mihooliya, K. N., Nandal, J., Kalidas, N., Ashish, Chand, S., Verma, D. K. *et al.* (2023) Assessment of structural behaviour of a new L-asparaginase and SAXS data-based evidence for catalytic activity in its monomeric form International Journal of Biological Macromolecules **253**, 13 10.1016/j.ijbiomac.2023.126803

61. Mishra, M., Yadav, M., Kumar, S., Kumar, R., and Sen, P. (2023) TIM-3 increases the abundance of type-2 dendritic cells during Leishmania donovani infection by enhancing IL-10 production via STAT3 Cell Death & Disease **14**, 18 10.1038/s41419-023-05848-3

62. Mittal, N., Kumar, S., Rajmani, R. S., Singh, R., Lemoine, C., Jakob, V. *et al.* (2023) Enhanced protective efficacy of a thermostable RBD-S2 vaccine formulation against SARS-CoV-2 and its variants Npj Vaccines **8**, 15 10.1038/s41541-023-00755-2

63. Mukhopadhyay, A., Choudhury, S., and Kumar, M. (2023) Metaviromic analyses of DNA virus community from sediments of the N-Choe stream, North India Virus Research **330**, 15 10.1016/j.virusres.2023.199110

64. Nag, D., Raychaudhuri, S., and Withey, J. (2023) An adult zebrafish model for adherent-invasive Escherichia coli indicates protection from infection by treatment with probiotic E. coli Nissle Journal of Crohns & Colitis **17**, 1025-1026,

65. Negi, S., Tandel, N., Sharma, P., Kumar, R., and Tyagi, R. K. (2023) Aceclofenac and methotrexate combination therapy could influence Th1/Th17 axis to modulate rheumatoid-arthritis-induced inflammation Drug Discovery Today **28**, 10 10.1016/j.drudis.2023.103671

66. Nimma, R., Kumar, A., Gani, Z., Gahlawat, A., Dilawari, R., Rohilla, R. K. *et al.* (2023) Characterization of the enzymatic and multifunctional properties of Acinetobacter baumannii erythrose-4-phosphate dehydrogenase (E4PDH) Microbial Pathogenesis **175**, 17 10.1016/j.micpath.2023.105992

67. Pal, M., Yadav, V. K., Pal, P., Agarwal, N., and Rao, A. (2023) The physiological effect of riml/rimJ silencing by CRISPR interference in Mycobacterium smegmatis 155 Archives of Microbiology **205**, 9 10.1007/s00203-023-03561-5

68. Pande, A., Patiyal, S., Lathwal, A., Arora, C., Kaur, D., Dhall, A. *et al.* (2023) Pfeature: A Tool for Computing Wide Range of Protein Features and Building Prediction Models Journal of Computational Biology **30**, 204-222 10.1089/cmb.2022.0241

69. Pandya, V. K., Shankar, S. S., Rajesh, S., Rathore, R., Kumaran, S., and Kulkarni, M. J. (2023) Mechanistic insights on anserine hydrolyzing activities of human carnosinases Biochimica Et Biophysica Acta-General Subjects **1867**, 9 10.1016/j.bbagen.2022.130290

70. Premkumar, M., Dhiman, R. K., Duseja, A. K., Sandhu, A., De, A., Taneja, S. *et al.* (2023) recompensation of chronic hepatitis c- related decompensated cirrhosis following direct- acting antiviral therapy: real- world data from the punjab hcv elimination model Hepatology **78**, S10-S11,

71. Premkumar, M., Dhiman, R. K., Srinivasan, R., De, A., Duseja, A. K., Gupta, P. *et al.* (2023) hepatocellular carcinoma associated with chronic hepatitis c, clinical profile, management outcomes and surveillance strategy of the punjab hcv model: real world data from the public health perspective Hepatology **78**, S724-S725,

72. Rajput, A., Bhamare, K. T., Thakur, A., and Kumar, M. (2023) Anti-Biofilm: Machine Learning Assisted Prediction of IC50 Activity of Chemicals Against Biofilms of Microbes Causing Antimicrobial Resistance and Implications in Drug Repurposing Journal of Molecular Biology **435**, 12 10.1016/j.jmb.2023.168115

73. Ramesh, D., Chattopadhyay, D., Kumari, S., Vijayakumar, B. G., Gupta, M. T., Pinnaka, A. K. *et al.* (2023) Novel pyrimidine-imines against tuberculosis: Rationale, in vitro, in silico studies and mechanistic insights Journal of Molecular Structure **1292**, 13 10.1016/j.molstruc.2023.136183

74. Rana, R., Jaiswal, G., Bansal, K., and Patil, P. B. (2023) Comparative genomics reveals the emergence of copper resistance in a non-pigmented Xanthomonas pathogen of grapevine Environmental Microbiology Reports **15**, 716-726 10.1111/1758-2229.13164

75. Ranjan, R., Chauhan, A. K., Prakash, D., Singh, R., Singh, S., and Joshi, P. (2023) Enhancing walnut (Juglans regia L.) safety and quality: Unveiling the potential of radio frequency cold plasma treatment Annals of Phyto-medicine-an International Journal **12**, 937-942 10.54085/ap.2023.12.2.111

76. Ranjan, R., Gupta, A. K., Pandiselvam, R., Chauhan, A. K., Akhtar, S., Jha, A. K. *et al.* (2023) Plasma treatment: An alternative and sustainable green approach for decontamination of mycotoxin in dried food products Journal of Agriculture and Food Research **14**, 17 10.1016/j.jafr.2023.100867

77. Rawat, S., Chatterjee, D., Marwaha, R., Charak, G., Kumar, G., Shaw, S. *et al.* (2022) RUFY1 binds Arl8b and mediates endosome-to-TGN CI-M6PR retrieval for cargo sorting to lysosomes Journal of Cell Biology **222**(1), 10.1083/jcb.202108001

78. Rezgui, R., Walia, R., Sharma, J., Sidhu, D., Alshagadali, K., Chaudhuri, S. R. *et al.* (2023) Chemically Defined Lactobacillus plantarum Cell-Free Metabolites Demonstrate Cytoprotection in HepG2 Cells through

Nrf2-Dependent Mechanism Antioxidants 12, 17 10.3390/antiox12040930

79. Richa, and Choudhury, A. R. (2023) Self-assembled pH-stable gellan/?-carrageenan bigel: Rheological studies and viscosity prediction by neural network International Journal of Biological Macromolecules 237, 12 10.1016/j.ijbiomac.2023.124057

80. Ringe, R. P., Colin, P., Ozorowski, G., Allen, J. D., Yasmeen, A., Seabright, G. E. *et al.* (2023) Glycan heterogeneity as a cause of the persistent fraction in HIV-1 neutralization Plos Pathogens 19, 38 10.1371/journal.ppat.1011601

81. Saroha, T., Patil, P. P., Rana, R., Kumar, R., Kumar, S., Singhal, L. *et al.* (2023) Genomic features, antimicrobial susceptibility, and epidemiological insights into Burkholderia cenocepacia clonal complex 31 isolates from bloodstream infections in India Frontiers in Cellular and Infection Microbiology 13, 14 10.3389/fcimb.2023.1151594

82. Saroha, T., Sharma, S., Choksket, S., Korpole, S., and Patil, P. B. (2023) Limosilactobacillus walteri sp. nov., a novel probiotic antimicrobial lipopeptide-producing bacterium Fems Microbiology Letters 370, 7 10.1093/femsle/fnad004

83. Selvaraj, M. K., and Kaur, J. (2023) Computational method for aromatase-related proteins using machine learning approach Plos One 18, 18 10.1371/journal.pone.0283567

84. Selvaraj, M. K., Thakur, A., Kumar, M., Pinnaka, A. K., Suri, C. R., Siddhardha, B. *et al.* (2023) Ion-pumping microbial rhodopsin protein classification by machine learning approach Bmc Bioinformatics 24, 18 10.1186/s12859-023-05138-x

85. Sharma, D., Kumar, N., Kumari, B., Shabnam, Kumar, S., and Kumar, R. (2023) Substitution of carbonate by non-physiological synergistic anion modulates the stability and iron release kinetics of serum transferrin Biochimica Et Biophysica Acta-Proteins and Proteomics 1871, 11 10.1016/j.bbapap.2022.140856

86. Sen, H., Choudhury, G. B., Pawar, G., Sharma, Y., Bhalerao, S. E., Chaudhari, V. D. *et al.* (2023) Diversity in the ligand binding pocket of HapR attributes to its uniqueness towards several inhibitors with respect to other homologues-A structural and molecular perspective International Journal of Biological Macromolecules 233, 17 10.1016/j.ijbiomac.2023.123495

87. Sharma, T., Kumar, R., Kalra, J. S., Singh, S., Bhalla, G. S., and Bhardwaj, A. (2023) Galaxy ASIST: A web-based platform for mapping and assessment of global standards of antimicrobial susceptibility: A case study in Acinetobacter baumannii genomes Frontiers in Microbiology 13, 10 10.3389/fmicb.2022.1041847

88. Sharma, V., Jahan, K., Kumar, P., Puri, A., Sharma, V. K., Mishra, A. *et al.* (2023) Mechanistic insights into granule-bound starch synthase I (GBSSI.L539P) allele in high amylose starch biosynthesis in wheat (Triticum aestivum L.) Functional & Integrative Genomics 23, 11 10.1007/s10142-022-00923-y

89. Sharma, Y., Ahlawat, S., Ashish, and Rao, A. (2023) Global shape of SvGT, a metal-dependent bacteriocin modifying S/O-HexNActransferase from actinobacteria: c -terminal dimerization modulates the function of this GT Journal of Biomolecular Structure & Dynamics 15 10.1080/07391102.2023.2255906

90. Sharma, Y., Pawar, G. P., and Chaudhari, V. D. (2023) One-Pot Domino Reaction: Direct Access to Polysubstituted 1,4-Benzothiazine 1,1-Dioxide via Water-Gas Shift Reaction Utilizing DMF/H2O Journal of Organic Chemistry 88, 701-710 10.1021/acs.joc.2c02171

91. Shikha, S., Kumar, V., Jain, A., Dutta, D., and Bhattacharyya, M. S. (2023) Unraveling the mechanistic insights of sophorolipid-capped gold nanoparticle-induced cell death in Vibrio cholerae Microbiology Spectrum 19 10.1128/spectrum.00175-23

92. Singh, A., Kumar, S., Bansal, K., and Patil, P. B. (2023) Taxonomic and Phylogenomic Assessment Identifies Phytopathogenicity Potential of Stenotrophomonas maltophilia Complex Phytopathology 113, 1833-1838 10.1094/phyto-11-22-0434-sc

93. Singh, D., Pal, S., Subramanian, S., and Manickam, N. (2023) Comparative genomic analysis of a multidrug-resistant ExPEC strain IITR156 isolated from the confluence of three Indian rivers Journal of Hazardous Materials Advances 12, 10 10.1016/j.hazadv.2023.100364

94. Singh, P. R., Dadireddy, V., Udupa, S., Kalladi, S. M., Shee, S., Khosla, S. *et al.* (2023) The Mycobacterium tuberculosis methyltransferase Rv2067c manipulates host epigenetic programming to promote its own survival Nature Communications 14, 17 10.1038/s41467-023-43940-6

95. Singh, P. R., Goar, H., Paul, P., Mehta, K., Bamniya, B., Vijjamarri, A. K. *et al.* (2023) Dual functioning by the PhoR sensor is a key determinant to Mycobacterium tuberculosis virulence Plos Genetics 19, 30 10.1371/journal.pgen.1011070

96. Singh, R. P., Kumari, N., Gupta, S., Jaiswal, R., Mehrotra, D., Singh, S. *et al.* (2023) Intratumoral Microbiota Changes with Tumor Stage and Influences the Immune Signature of Oral Squamous Cell Carcinoma Microbiology Spectrum 11, 18 10.1128/spectrum.04596-22

97. Singh, S. S., Sharma, D., Singh, C., Kumar, S., Singh, P., Sharma, A. *et al.* (2023) Brevicillin, a novel lanthipeptide from the genus Brevibacillus with antimicrobial, antifungal, and antiviral activity Journal of Applied Microbiology 134, 15 10.1093/jambio/lxad054

98. Sood, A., Mehrotra, A., Dhawan, D. K., and Sandhir, R. (2023) Indian ginseng (Withania somnifera) supplementation ameliorates oxidative stress and mitochondrial dysfunctions in experimental model of stroke (vol 33, pg 1261, 2018) Metabolic Brain Disease 38, 2185-2186 10.1007/s11011-023-01228-0

99. Srivastava, N., Richa, and Choudhury, A. R. (2023) Enhanced encapsulation efficiency and controlled release of co-encapsulated Bacillus coagulans spores and vitamin B9 in gellan/K-carrageenan/chitosan tri-composite hydrogel International Journal of Biological Macromolecules 227, 231-240 10.1016/j.ijbiomac.2022.12.118

100. Srivastava, N., and Choudhury, A. R. (2023) Stimuli-Responsive Polysaccharide- Based Smart Hydrogels and Their Emerging Applications Industrial & Engineering Chemistry Research 62, 841-866 10.1021/acs.iecr.2c02779

101. Suresh, P. S., Thakur, K. G., and Sharma, U. (2023) Molecular docking and dynamic simulation approach to decipher steroidal sapogenins (genus Trillium) derived agonists for glucocorticoid receptor Journal of Biomolecular Structure & Dynamics **41**, 55-66 10.1080/07391102.2021.2003864

102. Tandel, N., Negi, S., Dalai, S. K., and Tyagi, R. K. (2023) Role of natural killer and B cell interaction in inducing pathogen specific immune responses International Reviews of Immunology **42**, 304-322 10.1080/08830185. 2023. 2172406

103. Tanuku, S. N. R., Pinnaka, A. K., Behera, S., Singh, A., Pydi, S., Vasudeva, G. *et al.* (2023) Marinobacterium lacunae sp. nov. isolated from estuarine sediment Archives of Microbiology **205**, 10 10.1007/s00203-023-03627-4

104. Thakur, A., and Kumar, M. (2023) Integration of Human and Viral miRNAs in Epstein-Barr Virus-Associated Tumors and Implications for Drug Repurposing Omics-a Journal of Integrative Biology **27**, 93-108 10.1089/omi.2023.0005

105. Thakur, M., Singh, M., Kumar, S., Dwivedi, V. P., Dakal, T. C., and Yadav, V. (2023) A Reappraisal of the Antiviral Properties of and Immune Regulation through Dietary Phytochemicals Acs Pharmacology & Translational Science **6**, 1600-1615 10.1021/acsptsci.3c00178

106. Vaid, P., Saini, A. K., Gupta, R. K., Sinha, E. S., Sharma, D., Alsanie, W. F. *et al.* (2023) Sustainable Nanoparticles from Stephania glabra and Analysis of Their Anticancer Potential on 2D and 3D Models of Prostate Cancer Applied Biochemistry and Biotechnology 23 10.1007/s12010-023-04700-w

107. Verma, D. K., Kapoor, S., Das, S., and Thakur, K. G. (2023) Potential Inhibitors of SARS-CoV-2 Main Protease (Mpro) Identified from the Library of FDA-Approved Drugs Using Molecular Docking Studies Biomedicines **11**, 15 10.3390/biomedicines11010085

108. Verma, G., Dhawan, M., Saied, A. A., Kumar, R., and Mishra, R. P. N. (2023) Variability of severe acute respiratory syndrome coronavirus 2 infection in children and adults International Journal of Surgery **109**, 2148-2150 10.1097/js9. 0000000000000083

109. Vij, S., Thakur, R., Singh, R. P., Kumar, R., Pathania, P., Gupta, V. *et al.* (2023) Dual immunization with CdtB protein and flagellin epitope offers augmented protection against enteric fever in mice Life Sciences **334**, 14 10.1016/j.lfs. 2023.122216

110. Vijayakumar, B. G., Ramesh, D., Kumari, S., Maity, A., Pinnaka, A. K., and Kannan, T. (2023) Enhancing antifungal properties of chitosan by attaching isatin-piperazine-sulfonyl-acetamide pendant groups via novel imidamide linkage International Journal of Biological Macromolecules **244**, 12 10.1016/j.ijbiomac.2023.125428

111. Yadav, M., Akhtar, M. N., Mishra, M., Kumar, S., Kumar, R., Nandal, A. *et al.* (2023) Leishmania donovani Attenuates Dendritic Cell Trafficking to Lymph Nodes by Inhibiting C-Type Lectin Receptor 2 Expression via Transforming Growth Factor-β Microbiology Spectrum **11**, 20 10.1128/spectrum. 04122-22

112. Yadav, V., Manjhi, A., and Vadakedath, N. (2023) Mercury remediation potential of mercury-resistant strain Rheinheimera metallidurans sp. nov. isolated from a municipal waste dumping site Ecotoxicology and Environmental Safety **257**, 12 10.1016/j.ecoenv.2023. 114888

INTELLECTUAL PROPERTY

INDIAN PATENTS FILED (2021-2023)

Title	Inventors	Filing Date	Application No.
Composition for the treatment of multi-drug resistant gram-positive bacterial infections	Hemraj Santuji Nandanwar, Krishan Gopal Thakur, Rushikesh Rajeshbhai Tambat, Dipesh Kumar Verma, Nisha Mahey, Nishtha Chandal	31-Mar-21	202111015518
Equipment design and assays for monitoring infectivity of air-borne agents	Supankar Das, Harry Garg, Subramaniam Anantha Ramakrishna, Rajesh P. Ringe, Ashwani Kumar, Sanjeev Khosla	07-Apr-21	202111016274
Substituted tricyclic heterocyclic compounds as metallo-beta-lacamase inhibitors	Vinod Dinkar Chaudhari, Pulkit Dhiman, Hemraj Santuji Nandanwar, Vikas Pathania, Krishan Gopal Thakur, Satyajeet Das	03-Jun-21	202111024755
DNA aptamers	Vijayender Bhalla, Virendra Kumar, Saloni Kakkar, Bharti	24-Sep-21	202111043591
Fusion protein for cancer therapy	Thakur Krishan Gopal, Arora Anjuman, Verma Dipesh	24-Sep-21	202117043402
Peptide to treat alpha-synuclein amyloid based disorders	Deepak Kumar Sharma, Arpit Gupta, Gajendra Pal Singh Raghava, Ankur Gautam, Anil Koul, Priyanka Singh	23-Mar-22	202211016557
Recombinant protein for management of SARS-COV-2 infection	Ravi Pratap Narayan Mishra, Reetesh Kumar, Jitender, Bhusarapu Vikram Kumar, Sneha Singh	25-May-22	202211030140
Substituted benzimidazoles for treating viral diseases	Vinod Dinkar Chaudhari, Krishan Gopal Thakur, Rajesh Ringe, Deshkanwar Singh, Simran Kaur, Ravneet Singh Chawla, Akshay Joshi	01-Aug-22	202211044091
Process for recombinant production of SARS-COV-2 spike protein	Ravi Pratap Narayan Mishra, Jitender, Reetesh Kumar, Bhusarapu Vikram Kumar, Sneha Singh	08-Sep-22	202211051218
Engineering 5' native transcript of human therapeutics for enhanced production in a heterologous expression system	Sonal Datta, Akshit Vikram Jain	26-Dec-22	202211075512
Small molecule for the treatment of mycobacterial diseases	Vinod Dinkar Chaudhari, Ashwani Kumar, Nurina Saini, Ajit Kumar Akela	02-Feb-23	202311007303
Compound for treating viral infections	Vinod Dinkar Chaudhari, Krishan Gopal Thakur, Rajesh Ringe, Simran Kaur, Manjot Kaur, Ravneet Singh Chawla, Akshay Joshi	06-Feb-23	202311007365
Dihydrochromeno-pyrrole compounds as metallo-beta-lactamase inhibitors and process for the preparation thereof	Vinod Dinkar Chaudhari, Pulkit Dhiman, Krishan Gopal Thakur, Satyajeet Das	14-Jun-23	202311041398
Benzo[de]isoquinoline-1,3-dione based compound and use thereof	Raman Parkesh, Sonali Chhabra	07-Aug-23	202311053165

FOREIGN PATENTS FILED (2021-2023)

Title	Inventors	Filing Date	Application No.	Country Code
Recombinant microbial system(s) for directed evolution of glycocins and method(s) of preparation thereof	Alka Rao, Pravinkumar Vishavanath Choudhary	26-Feb-21	17/272221	US
Recombinant microbial system(s) for directed evolution of glycocins and method(s) of preparation thereof	Alka Rao, Pravinkumar Vishavanath Choudhary	26-Feb-21	19855190.5	EP
Fibrinolytic composition and method of its preperation	Navneet Kaur, Prakash Kumar, Girish Sahni	23-Jul-21	17/425619	US
Fibrinolytic composition and method of its preperation	Navneet Kaur, Prakash Kumar, Girish Sahni	26-Jul-21	20744605.5	EP
Vector for high-expression of proteins in yeast	Sharma, Deepak Kumar, Sahoo, debendra Kumar, Kumar, Pradeep, Swami, Laxmi, Nahar, Anubhav Singh	23-Jan-22	17/629395	US
Vector for high-expression of proteins in yeast	Sharma, Deepak Kumar, Sahoo, debendra Kumar, Kumar, Pradeep, Swami, Laxmi, Nahar, Anubhav Singh	01-Feb-22	20845019.7	EP
Vector for high-expression of proteins in yeast	Sharma, Deepak Kumar, Sahoo, debendra Kumar, Kumar, Pradeep, Swami, Laxmi, Nahar, Anubhav Singh	24-Feb-22	202080060401.X	CN
Substituted tricyclic heterocyclic compounds as metallo-beta-lacamase inhibitors	Vinod Dinkar Chaudhari, Pulkit Dhiman, Hemraj Santuji Nandanwar, Vikas Pathania, Krishan Gopal Thakur, Satyajeet Das	02-Jun-22	PCT/IN2022/050513	WO
Diphenyl thiourea and diphenyl urea derivatives as inhibitors of endocytosis	Nirmal Kumar, Irshad Maajid Taily, Charandeep Singh, Anshul Sharma, Priyanka Singh, Krishna Gopal Thakur, Rajesh P Ringe, Prabal Banerjee, Indranil Banerjee	15-Sep-22	17/932386	US
Cell-penetrating peptide for the treatment of alpha-synuclein amyloid based disorders	Deepak Kumar Sharma, Arpit Gupta, Gajendra Pal Singh Raghava, Ankur Gautam, Anil Koul, Priyanka Singh	21-Mar-23	PCT/IN2023/050274	WO
Substituted benzimidazoles for treating viral diseases	Vinod Dinkar Chaudhari, Krishan Gopal Thakur, Rajesh Ringe, Deshkanwar Singh, Simran Kaur, Ravneet Singh Chawla, Akshay Joshi	01-Aug-23	PCT/IN2023/050737	WO
Process for recombinant production of sars-cov-2 spike protein	Ravi Pratap Narayan Mishra, Jitender, Reetesh Kumar, Bhusarapu Vikram Kumar, Sneha Singh	08-Sep-23	PCT/IN2023/050848	WO
Substituted tricyclic heterocyclic compounds as metallo-beta-lacamase inhibitors	Vinod Dinkar Chaudhari, Pulkit Dhiman, Hemraj Santuji Nandanwar, Vikas Pathania, Krishan Gopal Thakur, Satyajeet Das	30-Nov-23	18/565742	US
Substituted tricyclic heterocyclic compounds as metallo-beta-lacamase inhibitors	Vinod Dinkar Chaudhari, Pulkit Dhiman, Hemraj Santuji Nandanwar, Vikas Pathania, Krishan Gopal Thakur, Satyajeet Das	01-Dec-23	22815523	EP

Substituted tricyclic heterocyclic compounds as metallo-beta-lacamase inhibitors	Vinod Dinkar Chaudhari, Pulkit Dhiman, Hemraj Santuji Nandanwar, Vikas Pathania, Krishan Gopal Thakur, Satyajeet Das	01-Dec-23	2023-574339	JP
Substituted tricyclic heterocyclic compounds as metallo-beta-lacamase inhibitors	Vinod Dinkar Chaudhari, Pulkit Dhiman, Hemraj Santuji Nandanwar, Vikas Pathania, Krishan Gopal Thakur, Satyajeet Das	01-Dec-23	BR1120230253284	BR

INDIAN PATENTS GRANTED (2021-2023)

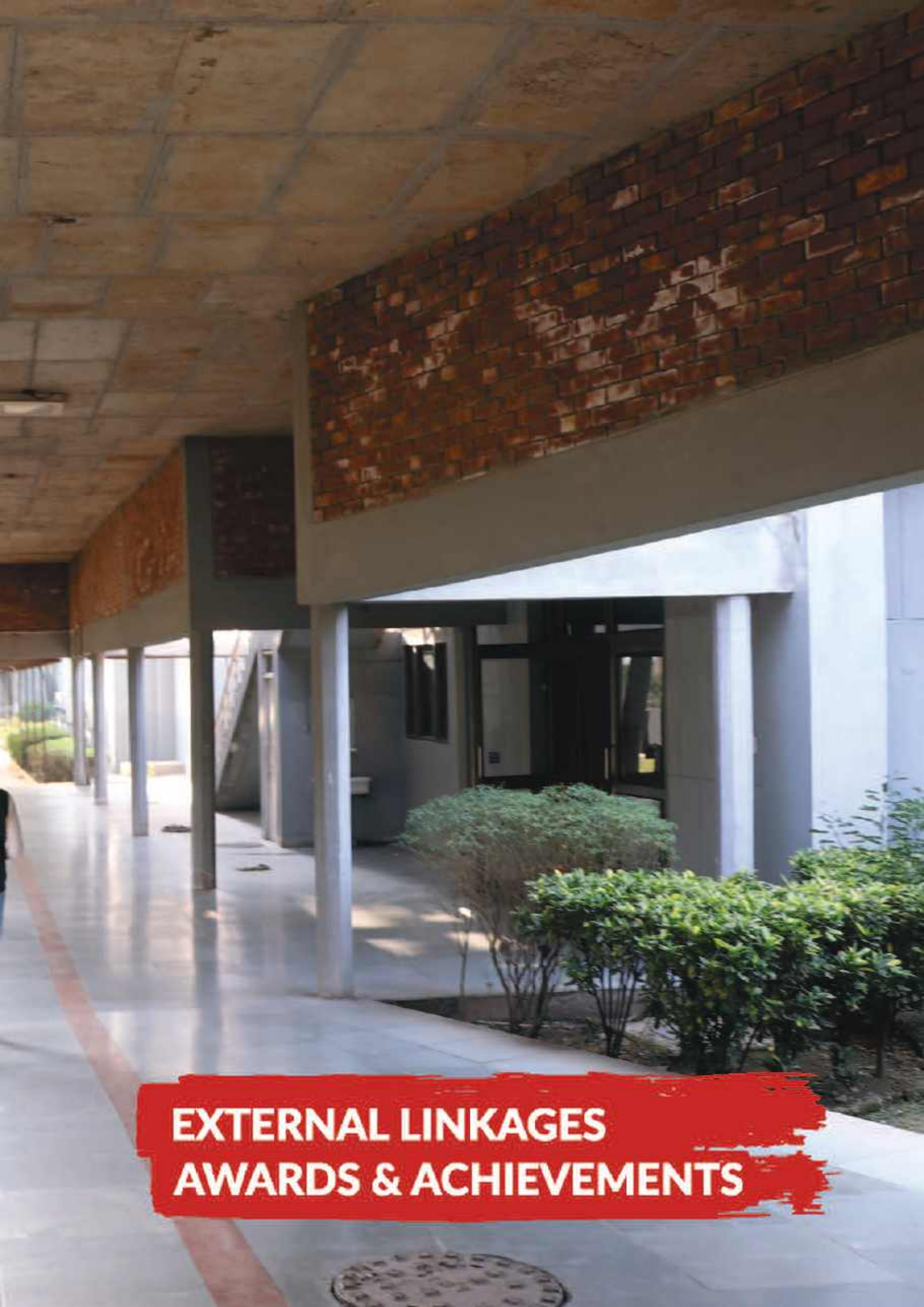
Title	Inventors	Filing Date	Application No.	Grant Date	Patent No.
Novel uricase mutant	Prasad Gandham Satyanarayana, Yelchuri Ravikumar	17-Apr-13	1145DEL2013	24-Jun-21	370160
Aptamers for purifying and quantifying gelsolin and its variants	Ashish, Renu Garg, Nagesh Peddada	07-Oct-14	2852DEL2014	29-Jul-21	373209
Metal nanoparticle synthesis by gelsolin variants	Ashish, Yogendra Singh Rathore, Nagesh Peddada, Kunzes Dolma, Renu Garg	30-Mar-15	0870DEL2015	07-Dec-21	383809
Genetically modified yeast cells and methods for expressing clot-specific streptokinase	Girish Sahni, Kishore Kumar Joshi	26-Oct-15	3448DEL2015	24-Mar-22	392822
Strain independent anti-influenza peptides for targeting a novel drug site in hemagglutinin trimer	Ashish, Pandey Kalpana, Rathore Yogendra Singh	14-Feb-12	0411DEL2012	25-Mar-22	393005
A method for O- and S-glycosylation of peptides or polypeptides using a multifunctional glycosyltransferase	Alka Rao, Rupa Nagar	05-Apr-16	201611011974	22-Aug-22	403994
A synthetic peptide antigen, process for the detection of salmonellosis and optical reader for detection thereof	Praveen Rishi, Chander Raman Suri, Priyanka Sabherwal, Rupinder Tewari, Preeti Pathania, Harmanjit Kaur	15-Jan-19	201911001767	14-Jan-23	434650
Erythropoietin variants with increased protease resistance	Sarkar Dibyendu, Samuel Jesse Sebastian, Agrewala Javed Naim, Chodisetti Sathi Babu	17-Oct-13	2403DEL2013	31-Jan-23	419846

FOREIGN PATENTS GRANTED (2021-2023)

Title	Inventors	Grant Date	Patent No.	Country Code
Aptamers for purifying and quantifying gelsolin and its variants	Ashish, Renu Garg, Nagesh Peddada	17-Feb-21	379928	MX

A method to screen cancer	Ashish, Sagar Amin, Badmalia Maulik D, Dhiman Kanika, Yadav Shiv Pratap Singh	11-Mar-21	2019246661	AU
Genetically modified cells and methods for expressing clot-specific streptokinase and methods of purifying same	Girish Sahni, Kishore Kumar Joshi	18-May-21	11008370	US
Aptamers for purifying and quantifying gelsolin and its variants	Ashish, Renu Garg, Nagesh Peddada	01-Jun-21	ZL201580049315.8	CN
In vitro method for detecting active mycobacterium tuberculosis using hair small angle X-ray scattering profile	Ashish, Ashwani Kumar, Amin Sagar	25-Jun-21	ZL 201780072315.9	CN
Cellulase derived from metagenomics	Roma Garg, Vijaya Brahma, Lata Verma, Girish Sahni	27-Jul-21	SA 8371	SA
A method for O- and S- glycosylation of peptides or polypeptides using a multifunctional glycosyltransferase	Alka Rao, Rupa Nagar	12-Apr-22	ZL201780031562.4	CN
In vitro method for detecting active mycobacterium tuberculosis using hair small angle X-ray scattering profile	Ashish, Ashwani Kumar, Amin Sagar	26-Apr-22	11313815	US
A method to screen cancer	Ashish, Sagar Amin, Badmalia Maulik D, Dhiman Kanika, Yadav Shiv Pratap Singh	27-Apr-22	3724645	GB
A method to screen cancer	Ashish, Sagar Amin, Badmalia Maulik D, Dhiman Kanika, Yadav Shiv Pratap Singh	27-Apr-22	3724645	EP
Aptamers for purifying and quantifying gelsolin and its variants	Ashish, Renu Garg, Nagesh Peddada	27-Jul-22	226/2022	QA
Cellulase derived from metagenomics	Roma Garg, Vijaya Brahma, Lata Verma, Girish Sahni	23-Aug-22	ZL 201680078419.6	CN
A method for O- and S- glycosylation of peptides or polypeptides using a multifunctional glycosyltransferase	Alka Rao, Rupa Nagar	01-Nov-22	11485991	US
Genetically modified cells and methods for expressing clot-specific streptokinase and methods of purifying same	Girish Sahni, Kishore Kumar Joshi	07-Nov-22	7171434	JP
Genetically modified cells and methods for expressing clot-specific streptokinase and methods of purifying same	Girish Sahni, Kishore Kumar Joshi	30-Nov-22	3368549	EP
Genetically modified cells and methods for expressing clot-specific streptokinase and methods of purifying same	Girish Sahni, Kishore Kumar Joshi	30-Nov-22	3368549	GB
Novel peptide as potent inhibitor of protein aggregation	Deepak Kumar Sharma, Arpit Gupta, Gajendra Pal Singh Raghava, Ankur Gautam, Manisha Kumari	13-Jan-23	7210560	JP
A method to screen cancer	Ashish, Sagar Amin, Badmalia Maulik D, Dhiman Kanika, Yadav Shiv Pratap Singh	24-Jan-23	11561187	US

Protein fusion constructs possessing thrombolytic and anticoagulant properties	Neeraj Maheshwari, Girish Sahni	28-Feb-23	2807749	CA
Genetically modified cells and methods for expressing clot-specific streptokinase and methods of purifying same	Girish Sahni, Kishore Kumar Joshi	09-May-23	ZL201680073102.3	CN
Aptamers for purifying and quantifying gelsolin and its variants	Ashish, Renu Garg, Nagesh Peddada	25-Jul-23	BR 11 2017 005141-9	BR
Granulocyte-colony stimulating factor variants and their covalently modified derivatives	Sonal Datta, Girish Sahni	22-Aug-23	11732016	US
In vitro method for detecting active mycobacterium tuberculosis using hair small angle X-ray scattering profile	Ashish, Ashwani Kumar, Amin Sagar	31-Aug-23	2017365237	AU



EXTERNAL LINKAGES AWARDS & ACHIEVEMENTS

EXTERNAL LINKAGES

EXTRAMURAL GRANTS

2020-21:

Project Leader:	Dr. S. Krishnamurthi
Title:	Understanding the role of sponge-coral-microbe interactions on reef ecosystem
Agency:	Science & Engineering Research Board (SERB)
Project Leader:	Dr. Manoj Raje
Title:	In silico, Biochemical and Structural Charecterization of the *Mycobacterium tuberculosis (M. tb)* elongation factors (EF-Tu, EF-Ts and EF-G)
Agency:	Indian Council of Medical Research (ICMR)
Project Leader:	Mr. Chander Shekhar Sharma
Title:	Science Technology and Innovation Hub in Leh, Leh Block, Leh Ladakh District, Ladakh UT
Agency:	Department of Science and Technology (DST)
Project Leader:	Dr. Ashwani Kumar (Dr. Renu Dharra under Mentorship of Dr. Ashwani Kumar for National Post – Doctoral Fellowship Scheme)
Title:	Identification of novel structural proteins and polysaccharies present in *Mycobacterium tuberculosis (Mtb)* biofilms
Agency:	DST-Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Deepak Sharma (Dr. Abhishek Sharma under Mentorship of Dr. Deepak Sharma for National Post – Doctoral Fellowship Scheme)
Title:	To illustrate the mechanism of action of Hsp40 co-chaperone in autophagy
Agency:	DST-Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Sanjeev Khosla
Title:	J.C. Bose National Fellowship
Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Krishan Gopal
Title:	Development of potential anti-cancer biotherapeutic bi-specific nanobody
Agency:	Biotechnology Industry Research Assistance Council (BIRAC)
Project Leader:	Dr. Rajni Garg under mentorship of Dr. Sanjeev Khosla
Title:	Charecterization of Rv1997 (ctpF) of *Mycobacterium tuberculosis* H37Rv
Agency:	Department of Science and Technology (DST-INSPIRE Faculty Award)
Project Leader:	Dr. Rajeev Kumar Tyagi under mentorship of Dr. Pradip Sen
Title:	Co-dilivery of pacitaxel and betacaryophyllene (BCP) through lipid-nanocarriers confers synergistic effect for treating endocrine tumors
Agency:	Indian Council of Medical Research (ICMR)
Project Leader:	Dr. Neeraj Khatri
Title:	Workshop on Ethical Contemplation of Animal Resources for Experimentation

Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Ashwani Kumar
Title:	Relevance of *Mycobacterium tuberculosis* biofilms in tuberculosis pathogenesis and drug tolerance
Agency:	DBT/Wellcome Trust India Aliance
Project Leader:	Dr. Deepak Sharma
Title:	Compounds targeting cytotoxic oligomers for diagnostic and therapy in Parkinson's Disease
Partner:	Aarhus University, Denmark (International)
Project Leader:	Dr. Deepak Sharma
Title:	ENDFLU: Evaluation of Rationally Designed Influenza Vaccines
Partner:	Indo-EU (DBT-Stiftung Tieraerztliche Hochschule Hannover, Germany) (International)

2021-22:

Project Leader:	Dr. Pawan Gupta
Title:	Exploring host nuclear receptors as targets for host directed adjunct therapy to anti-tuberculosis drugs
Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Anshu Bhardwaj
Title:	MitoInfect: An integrative Approach to Dissect Mitochondria associated Host-Pathogen Interactions
Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Neeraj Khatri
Title:	Workshop on Biosecurity, Biosafety, Capacity and Capability Building : Working with Infectious Agents (BBCCB-2022)
Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Neeraj Khatri
Title:	VRITIKA (Research Internship) on Modern Biology Technoques
Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. S. Krishnamurthi
Title:	Training and skill internship for PG level students in Microbiology (SERB VRITIKA programme)
Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Ashwani Kumar
Title:	Explore the role of microbs in enhancing crop productivity under the organic production system in Ladakh
Agency:	DRDO- Defence Institute of High Attitude Research (DRDO-DIHAR, Leh-Ladakh)

Project Leader:	Dr. P. Anil Kumar
Title:	Optimization of Microbial Resource/ Consortia and process development fbiodegradation of Ammonium Perchlorate (AP) – Part-I and Scale-up studies on biodegradation of Ammonium Perchlorate (AP)-Part-II
Partner:	ISRO-Vikram Sarabhai Space Centre (ISRO-VSSC), Trivandrum
Project Leader:	Dr. Ashwani Kumar and Dr. Deepak Sharma
Title:	Exploring the Role of Microbes in Natural Farming
Partner:	State Project Implementation Unit (SPIU) Himachal Pradesh
Project Leader:	Dr. Pradip Sen
Title:	Emerging role of TIM-3 as a new immunoregulator of dendritic cells during *Leishmania donovani* infection (Global network for Neglected Tropical Diseases)
Partner:	UK sponsored by Global Challenges Research Funds (GCRF) (University of Durham) (International)

2022-23:

Project Leader:	Dr. Raman Parkesh
Title:	Design, synthesis and biological applications of next generation cyanoimidazopyridine based fluorescent chemosensor
Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Padmani Sandhu under mentorship of Dr. S. Srikrishna
Title:	Comparative structural and functional analysis of bacterial transporter proteomes to study their evolution and role in pathogenesis
Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Karthikeyan Subramanian
Title:	Identification, Charachterization and Validation of Inhibitors that are specific to Bifunctional GTP Cyclophydrolase II/3,4 Dihydroxy0-2-Butanone-4-Phosphate Synthase of *Mycobacterium Tuberculosis*
Agency:	Indian Council of Medical Research (ICMR)
Project Leader:	Dr. Deepti Sethi under mentorship of Dr. Krishan Gopal
Title:	Structural and functional characterization of bicistronic loci Rv0461-Rv0460 (holing protein) from *Mycobacterium tuberculosis*
Agency:	Department of Science and Technology (DST)
Project Leader:	Dr. Suresh Korpole
Title:	Microbial Type Culture Collection and Gene Bank (MTCC), a Microbial Resource Centre and International Depositary Authority (IDA)
Agency:	Department of Biotechnology (DBT)
Project Leader:	Dr. Ashwani Kumar
Title:	Genomic Surveillance program for SARS-CoV-2: Consortium of India and Sri Lanka
Agency:	IGIB, New Delhi funding from Welcome Trust, UK
Project Leader:	Dr. Ramya T.N.C.
Title:	Biochemical characterization of the transfucosylation potential of microbial fucosidases for the synthesis of fucocylated human milk oligosaccharides
Agency:	Science & Engineering Research Board (DST-SERB)

Project Leader:	Dr. Amit Tuli
Title:	Molecular Mechanisms Regulating Lysosome Secretion
Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Pradip Sen
Title:	The Roll of Interleukin (IL)-35 in Dendritic Cell Suppression During *Leishmania Donovani* Infection
Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Prabhu Patil
Title:	Genetic and transcriptomic insights into anti-pathogenic activity and ecology of *Xanthomonas sontii*, a non-pathogenic species of rice microbiome
Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Pawan Gupta
Title:	Impact of Chronodisruption on Female Infertility
Agency:	Department of Biotechnology (DBT)

2023-24:

Project Leader:	Dr. Anshu Bhardwaj
Title:	Multiplayer game lab on the cloud to increase Awareness on pressing health problems like Antimicrobial Resistance
Agency:	SERB – Indian National Academy of Engineering (SERB-INAE)
Project Leader:	Dr. Deepak Sharma (Dr. Suresh Korpole & Dr. Krishnamurthi - Co-PIs)
Title:	Natural product-Based Theraputic Approach for the Treatment of Parkinson's Disease
Agency:	Indian Council of Medical Research (ICMR)
Project Leader:	Dr. Anshu Bhardwaj (Dr. S. Srikrishna - Co-PI)
Title:	Machine Learning Models to Predict MIC in Indian Priority Pathogen & Identification of Novel Antimicrobial Resistance Mechanisms
Agency:	Indian Council of Medical Research (ICMR)
Project Leader:	Dr. Anshu Bharadwaj
Title:	Unveiling the Impact of sleep Deprivation on comorbidities in the population of Chandigarh with emphasis on Awareness
Agency:	Department of Science & Technology and Renewable Energy, Chandigarh Administration (DSTRE)
Project Leader:	Dr. Dibyendu Sarkar
Title:	Probing metabolic remodelling of *Mycobacterium tuberculosis* that integrates stress response to intracellular survival
Agency:	Science & Engineering Research Board (DST-SERB)
Project Leader:	Dr. Dipak Dutta (Co-PI - Dr. Prabhu Patil)
Title:	Investigating the overlapping functions of Rho and H-NS proteins in silencing foreign DNA and virulence facrors in bacteria: the role of intrinsic pH fluctuation in the absence of optimum Rho function
Agency:	Science & Engineering Research Board (DST-SERB)

Project Leader:	Mr. Manuj Tripathi
Title:	Advancing Research & Development (R&D) through Corporate Social Responsibility (CSR)
Agency:	DBT Wellcome Trust India Alliance

MEMORANDUM OF UNDERSTANDINGS

2021

	MOU SIGNED	DATE	PURPOSE
1	Vikram Sarabhai Space Centre (VSSC), Indian Space Research Organisation, Thumba PO, Thiruvananthapuram- 695 022	04.08.2021	Optimization of Microbial Resource/ Consortia and process development for biodegradation of Ammonium Perchlorate (AP)- Part I & Scale-up studies on biodegradation of Ammonium Perchlorate (AP)- Part II
2	SPIU, Department of Agriculture, Govt. of Himachal Pradesh, Shimla	25.10.2021	Exploring the role of Microbes in Natural Farming

2022

	MOU SIGNED	DATE	PURPOSE
1	Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad	23.09.2022	Collaboration with CDFD for using their facilities and carrying out next-generation sequencing for rapid, accurate and reliable high throughput sequencing.
2	Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Chennai	14.11.2022	For various Internship training programs under Skill Development Initiative
3	ICAR- Indian Institute of Maize Research, Ludhiana	22.11.2022	Development of innovative microbial based solution for pre and post-harvest management of aflatoxin contamination of

2023

	MOU SIGNED	DATE	PURPOSE
1	CSIR-Institute of Genomics and Integrative Biology (IGIB)	10.03.2023	Genomic Surveillance program for SARS-CoV-2: Consortium of India and Sri Lanka
2	Punjab Biotechnology Incubator (PBTI), Mohali	24.06.2023	Facilitation of exchange of ideas, development of new knowledge, promote collaborative research and enhance high quality research acumen
3	Gujarat State Biotechnology Mission (GSBTM), Gandhinagar	24.06.2023	For various Internship training programs under Skill Development Initiative
4	Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Ludhiana, Punjab	24.06.2023	For various Internship training programs under Skill Development Initiative
5	Indian Sign Language Research and Training Centre (ISLRTC), New Delhi	02.11.2023	Facilitation of mutual engagements in short and long-term internship training opportunities for students and training of human resources jointly under JIGYASA (ISLEVL) and Skill

AGREEMENTS

2021

	Agreements Signed	Date	Purpose
1	Enviro AVS Solutions LLP, Delhi	04.01.2021	Testing of Anti-Viral efficacy of Nano Coat Plus solution against SARS-COV-2 virus
2	Asian Paints Limited, Mumbai	13.01.2021	Testing of Anti-Viral efficacy of Disinfectant against SARS-COV-2 virus.
3	Semper Trading and Engineering Services LLP, Bangalore	20.01.2021	Testing of Anti-Viral efficacy of Ozone based Sanitization against SARS-COV-2 virus.
4	Godrej & Boyce Manufacturing Co Limited, Mumbai	21.01.2021	Testing of Anti-Viral efficacy of COVID-19 FREE Washing Machine
5	Emcure Pharmaceuticals Ltd, Pune	22.01.2021	SAXS based characterization of Ferric Carboxymaltose samples.
6	Emcure Pharmaceuticals Ltd, Pune	02.02.2021	Solid State Characterization by TEM Analysis for Ferric Carboxymaltose samples.
7	Pidilite Industries Ltd, Mumbai	03.02.2021	Testing of Anti-Viral efficacy of Sanitizers and Coated surface against SARS-COV-2 virus.
8	National Agri Food Technology(NABI), Punjab	03.05.2021	Breeding and supply of specialized C57BL/6 mice and Sprague Dawley rats for research and experimentation purposes
9	Sri Kumaran Textiles, Coimbatore, Tamil Nadu	07.05.2021	Testing of Anti-Viral efficacy of Bale Leaf extract against SARS COV-2 virus.
10	Tristar Pharmaceuticals Pvt Ltd, Chandigarh	03.06.2021	Testing of Anti-Viral efficacy of Pentox, a Hypochlorous acid based disinfectant against SARS-COV-2 virus.
11	Taxila Technologies Pvt Ltd, New Delhi	07.06.2021	Testing of Anti-Viral efficacy of DPShield surface disinfectant against SARS-COV-2 virus.
12	Airth Research Private Ltd, New Delhi	09.06.2021	Testing of Anti-Viral efficacy of AiRTH air purifier against SARS-COV-2 virus.
13	Serum Institute of India Private Ltd (SIIPL), Pune	15.06.2021	Testing of vaccine sera to determine SARS-COV-2 pseudovirus neutralizing activity.
14	Nitya Innovations LLP, Navi Mumbai	21.06.2021	Testing of Anti-Viral efficacy of Vayutron, an air ionizer based sanitization device against SARS-COV-2 virus.
15	AAL Biosciences Research Pvt Ltd, Panchkula	05.07.2021	Testing of Virucidal efficacy for surface protectant against Pseudo Viral Particles (PSV's).
16	Sanosil Biotech Pvt Ltd, Mumbai	13.07.2021	Testing of Anti-Viral efficacy of Virosil surface disinfectant against SARS-COV-2 virus.
17	Vikram Sarabhai Space Centre(VSSC) ISRO, Trivandrum	04.08.2021	Optimization of Microbial Resource/Consortia and process development for biodegradation of Ammonium Perchlorate(AP)- Part I &
18	Airth Research Private Ltd, New Delhi	14.09.2021	Scale-up studies on biodegradation of Ammonium Testing of fungal entrapment and killing efficacy of AiRTH air purifier.
19	Shycocare Technologies Pvt Ltd, Bengaluru	15.09.2021	Testing of Anti-Viral efficacy of Shycocan virus attenuation device.
20	N9 World Technologies Pvt Ltd, Bengaluru	14.10.2021	Testing of Anti-Viral efficacy of the coating on N9 Plastix Aqua against SARS-COV-2 virus.

2022

1	Toray Industries (India) Private Limited, Andhra Pradesh	27.01.2022	Testing of Anti-Viral efficacy of Air Filter against SARS-COV-2 virus
2	Exposome Private Limited, Mumbai	01.02.2022	Studies on assessment of ideal parameters for drinking water quality, maintenance and storage in various household establishments
3	Healfo Private Limited, Chandigarh	08.02.2022	Advisory consultancy for planning and formation for company's bioprocess strategy for alternate dairy
4	Toray Industries (India) Private Limited, Andhra Pradesh	25.03.2022	Testing of Anti-Viral efficacy of Air Filter against SARS-COV-2 virus
5	Emcure Pharmaceuticals Ltd, Pune	29.03.2022	Solid State Characterization by TEM Analysis for Ferric Carboxymaltose samples.
6	Toray Industries (India) Private Limited, Andhra Pradesh	03.06.2022	Testing of Anti-Viral efficacy of Air Filter against SARS-COV-2 virus
7	National Agri Food Technology(NABI), Punjab	30.06.2022	Breeding and supply of specialized C57BL/6 mice and Sprague Dawley rats for research and experimentation purposes
8	IFB Agro Industries Ltd, Kolkata	05.08.2022	Advisory consultations for planning and installation of fermenter, downstream processing equipment and fermentation plant trial for alpha-amylase production.
9	Rallis India Ltd, Bangalore	15.09.2022	Soil microbial analysis to assess effect of cultivation of transgenic maize hybrids (Biosafety Research Level I trials)

2023

1	Healfo Private Limited, Chandigarh	08.02.2023	Precision Bioprocess optimization for in-vitro milk secretion
2	Cognnate Biotech Private Ltd, Hyderabad	05.04.2023	Advisory consultations to train and assist the microbiologists and guide the microbiological processes for improvement.
3	Fido Pharma Pvt Ltd, Panchkula	17.07.2023	Advisory consultations to design the qualitative probiotic blends for human use based on published scientific data.
4	Rallis India Ltd, Mumbai	09.11.2023	Soil microbial analysis to assess effect of cultivation of transgenic maize hybrids (BRL-I trials, 2nd year)"
5	Ind-Swift Laboratories Ltd., Chandigarh	16.11.2023	Enzymatic bioconversion of phenyl Acetone and Diketo Ester to corresponding amines as pharmaceutically important chiral intermediates
6	Revelations Biotech Pvt. Ltd., Hyderabad	06.12.2023	Screening and selection of the Carbohydrate Active

AWARDS AND HONORS

- Dr. Ashwani Kumar: Shanti Swarup Bhatnagar (SSB) Prize in Biology, 2022
- Dr. Ashwani Kumar: Fellow of the National Academy of Sciences, India (NASI), 2022
- Dr. Ashwani Kumar: Member, Guha Research Conference, 2021
- Dr. Sanjeev Khosla: J. C. Bose Fellowship, 2020
- Dr. Nithya Vadakedath: Fellowship for short stay research trip to France in 2023 funded by the French Institute in India and the Embassy of France in India. Visited the Faculté de Médecine, 22 Avenue Camille Desmoulins, 29238 Brest, France
- Dr. Alka Rao: Award of Excellence in Service (Empowering Persons With Disabilities) conferred by the Honorable Governor of Haryana and President of Society
- Dr. Alka Rao: Honorary Advisor, Science and Technology of the Haryana Welfare Society for Persons with Speech & Hearing Impairment, 2022
- Dr. Alka Rao: Council nominee, Board of Governors of the Indian Institute of Science Education & Research (IISER) Mohali, 2022
- Dr. Alka Rao: Distinguished Visiting Faculty, Department of Microbiology, MDU, Rohtak, 2022
- Dr. Neeraj Khatri: Pashudhan Samridhi India Award for recognition of outstanding professional work and significant contributions for the advancement of Livestock Sector in India, 2022
- Dr. Neeraj Khatri: Vice President, Laboratory Animal Veterinarian's Association (LAVA)-2022
- Dr. Neeraj Khatri: Member of State Expert Appraisal Committee, Chandigarh
- Dr. Neeraj Khatri: Member of Committee for the Purpose of Control and Supervision of Experiments on Animals (2021-24).
- Dr. Neeraj Khatri: Co-opted Member, SERB-Program Advisory Committee on Organismal and Evolutionary Biology (OEB)
- Dr. Neeraj Khatri: Member Task Force on SERB Intensification of Research in High Priority Areas (IRHPA) Program to establish SERB National Biosafety Level Facilities (BSL/ABSL-3)
- Dr. Neeraj Khatri: President, Laboratory Animal Science Association of India (LASAI) - 2023
- Dr. Rajeev K. Tyagi: Dr. V.P. Sharma Award for malaria and medical entomology for outstanding contributions in the field of host-malaria parasite interaction during the 15th international conference of "Medical anthropodology on control of malaria and other vector borne and zoonotic diseases: Challenges and opportunities in implementation research" organized during 12-14 December 2022 by Dept of Zoology, Osmania University, Hyderabad
- Dr. K.P.S. Sengar: Best Librarian of the Year- 2023 (Special/Research Library Category) by the Madhya Pradesh Library Association (MPLA) at Rani Durgawati University, Jabalpur (M.P.)
- Mr. Manuj Tripathi : India Research Management Initiative (IRMI) Grant Awardee under DBT/Wellcome Trust India Alliance, 2023

Ph.D. DEGREES AWARDED

2021

Name of student	Date of viva-voce	Name of the Guide(s)
Rajesh Kumar	07.01.2021	Dr. Balvinder Singh/ Dr. GPS Raghava
Harpreet Kaur	11.01.2021	Dr. Balvinder Singh/ Dr. GPS Raghava
Prabhat Ranjan Singh	19.01.2021	Dr. Dibyendu Sarkar
Pragya Priyadarshini	27.01.2021	Dr. Balvinder Singh
Pravinkumar Vishavanath Choudhary	02.02.2021	Dr. Alka Rao
Himanshu Verma	15.02.2021	Dr. Mani Shankar Bhattacharyya/ Dr. D K Sahoo
Drishti Tiwari	02.03.2021	Dr. Pawan Gupta
Manjula Ekka	23.03.2021	Dr. Saumya Ray Chaudhuri
Shekhar Kumar	24.03.2021	Dr. P. Anil Kumar
Pradeep Kumar	25.03.2021	Dr. Deepak Sharma/ Dr. D K Sahoo
Poushali Chakraborty	01.04.2021	Dr. Ashwani Kumar
Ramita Taggar	26.04.2021	Dr. Mani Shankar Bhattacharyya/Dr. D K Sahoo
Prashant Singh	28.04.2021	Dr. Deepak Sharma
Vibhuti Rana	28.05.2021	Dr. Charu Sharma
Gundawar Krishna Dhondiram	03.06.2021	Dr. Suresh Korpole
Rahisuddin	04.06.2021	Dr. S. Kumaran
Asmita	15.06.2021	Dr. Manoj Raje
Vinod Kumar	24.06.2021	Dr. Balvinder Singh/ Dr. GPS Raghava
Yogita Sharma	08.07.2021	Dr. Alka Rao
Vaidhvi Singh	08.07.2021	Dr. Alka Rao
Srajan Kapoor	22.07.2021	Dr. Krishan Gopal
Nitish Kumar Verma	28.07.2021	Dr. Mani Shankar Bhattacharyya
Kanti Nandan Mihooliya	23.08.2021	Dr. Mani Shankar Bhattacharyya/ Dr. D K Sahoo
Choukate Komal Ashok	16.09.2021	Dr. Barnali Chaudhuri
Deepjyoti Kumar Das	28.09.2021	Dr. Vijayender Bhalla / Dr. Javed N. Agrewala
Neha Saini	29.09.2021	Dr. S. Kumaran
Shelley Sardul Singh	30.09.2021	Dr. Suresh Korpole
Amit Kumar Gupta	28.10.2021	Dr. Manoj Kumar
Alka Kumari	17.11.2021	Dr. P. Anil Kumar / Dr. G. S. Prasad
Chandrabhan Dhruw	22.11.2021	Dr. Vijay Sonawane/ Dr. Manoj Kumar
Nancy Ahuja	26.11.2021	Dr. Pawan Gupta
Priyanka Singh	03.12.2021	Dr. Deepak Sharma
Anuradhika Puri	07.12.2021	Dr. Deepak Sharma
Navin Baid	16.12.2021	Dr. Ashwani Kumar
Md Naushad Akhtar	16.12.2021	Dr. Pradip Sen

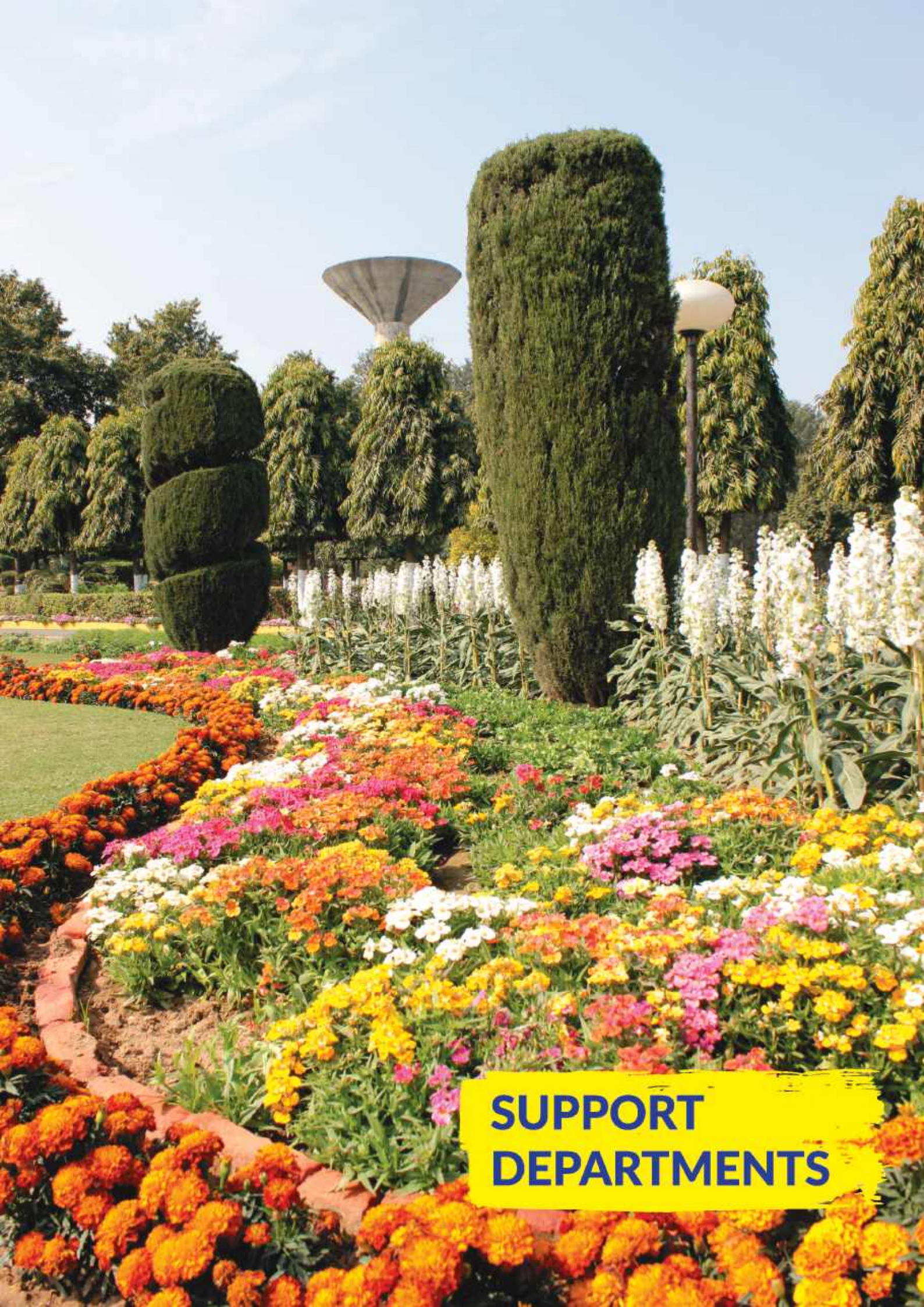
2022

Urvashi	07.01.2022	Dr. Suresh Korpole
Amandeep Kaur	09.02.2022	Dr. Prabhu b. Patil
Jitender	06.05.2022	Dr. Ravi PN Mishra/ Dr. D K Sahoo
Rakesh Kumar (AcSIR)	10.05.2022	Dr. Anshu Bhardwaj
Tina Sharma (AcSIR)	11.05.2022	Dr. Anshu Bhardwaj
Rahul Dilawari	13.05.2022	Dr. Manoj Raje
Harsh Goar	18.05.2022	Dr. Dibyendu Sarkar
Hina Khan	23.05.2022	Dr. Dibyendu Sarkar
Gunjan	30.05.2022	Dr. P. Anil Kumar
Sumeeta Kumari	8.06.2022	Dr. P. Anil Kumar
Manish Mishra	02.08.2022	Dr. Pradip Sen
Sumit Kumar	05.08.2022	Dr. Pawan Gupta
Gaurav Kumar	24.08.2022	Dr. Amit Tuli
Manisha Yadav	27.09.2022	Dr. Pradip Sen

Gaurav Kumar Chaubey	29.09.2022	Dr. Manoj Raje/ Dr. Saumya Ray Chaudhuri
Hilal Bashir	02.11.2022	Dr. Rashmi Kumar/ Dr. Javed Agrewala
Sanpreet Singh	30.11.2022	Dr. Rashmi Kumar/ Dr. Javed Agrewala
Megha Choudhary	07.12.2022	Dr. Vijayender Bhalla/ Dr. P. Anil Kumar
Saloni Kakkar	22.12.2022	Dr. Vijayender Bhalla

2023

Partha Paul	16.01.2023	Dr. Dibyendu Sarkar
Arunima Kalita	17.01.2023	Dr. Dipak Dutta
Debarghya Ghose	31.01.2023	Dr. Dipak Dutta
Sapna Bajeli	15.02.2023	Dr. Ashwani Kumar
Rajesh Kumar Mishra	27.02.2023	Dr. Dipak Dutta
Madhuri Patel	03.03.2023	Dr. S. Kumaran
Aanand Prakash	10.03.2023	Dr. Dipak Dutta
Sonali Eknath Bhalerao	14.03.2023	Dr. Saumya Ray Chaudhuri
Shalini Gupta	27.03.2023	Dr. Pawan Gupta/ Dr. Anshu Bhardwaj/ Dr. Alka Rao
Latika	03.04.2023	Dr. Krishan Gopal
Nittu Singh	21.04.2023	Dr. Charu Sharma
Radheshyam	28.04.2023	Dr. Saumya Ray Chaudhuri / Ex- Dr. Manoj Raje
Narender Kumar	12.05.2023	Dr. S. Kumaran
Sonali Sunsunwal	07.07.2023	Dr. Ramya TNC
Lucky Singh	10.07.2023	Dr. Barnali Chaudhuri
Pooja Yadav	21.07.2023	Dr. S. Krishnamurthi
Anu Singh	08.09.2023	Dr. Prabhu B. Patil
Ms. Sharmila Talukdar	13.10.2023	Dr. Saumya Ray Chaudhuri/ Dr. Manoj Raje
Nisha Mahey (AcSIR)	20.11.2023	Dr. Hemraj Nandanwar
Jagrity Choudhury	21.12.2023	Dr. Barnali Chaudhuri



SUPPORT DEPARTMENTS

DIRECTOR'S SECRETARIAT

The Director's Secretariat at CSIR-IMTECH functions as the central coordinating office, supporting the Director in administrative, strategic, and research-related activities. It serves as the primary channel of communication between the Director's Office, scientific staff, administrative divisions, and external stakeholders.

ADMINISTRATION

Administration (CoA) who is a Deputy Secretary and the designated Vigilance Officer for the institute. The CoA is assisted by an Administrative Officer (AO) who is an Under Secretary and Section Officers. The General Administration Department (GAD) manages all the administrative aspects and assists the Director with all non-R&D and allied matters. The GAD is broadly organized into the following sections, each headed by a Section Officer - Recruitment/Assessment Section, Establishment Section, Bill Section, and General Section. Apart from these four well-defined sections, the administration also deals with all legal matters, court cases, vigilance mechanisms, works, etc.

FINANCE & ACCOUNTS SECTION

The Finance and Accounts Division caters to the financial needs of the Scientific, Technical, and Administrative staff of the institute. The Division maintains the institute's accounts on behalf of the Director. The utilization of the budget allocation received from CSIR Headquarters, New Delhi, is monitored, and the division suggests remedial measures for effective utilization to the appropriate authorities. The division also handles the financial transactions relating to the budget allocated for sponsored and Grant-in-aid projects, and the charges for technical services. Other functions of the Finance & Accounts Division include coordination with the Head, PMBD in project monitoring and other project-related activities, ensuring that the economy instructions of the Government India are scrupulously followed, releasing payments to all suppliers/contractors for their services through the PFMS portal and commercial bank, representation in various Committees relating to procurement, Management Council, DPC, etc, making payment to all staff for their personal claims and advances, fixation of pay proposals and other financial matters, monitoring loans and advances paid to Staff, Govt. departments, Private parties, etc., finalization of pension and issue of pension Payment Orders, Family pension, retiring pension, Retiring Gratuity, Gratuity, Commutation, etc., liaisoning and coordinating the works related to Internal Audit and External Audit (CAG) and furnishing replies to the concerned authorities, generating various Financial Statements, Monthly Accounts, Annual Accounts, Transfer of funds statements, Monthly progressive expenditure statements, etc., render advice to the Director on all financial matters and provide support services to all Scientific staff and bench-level scientists. The Finance & Accounts Division handles its duties in a time-targeted manner to fulfill the smooth and effective attainment of its goals on the one hand with financial prudence on the other.

STORES & PURCHASE DIVISION

The unit of Stores & Purchase Division, headed by the Sr. CoSP/SPO, is exclusively engaged in the procurement of goods for CSIR-IMTECH and aims to provide an efficient and effective supply support system to facilitate the R&D objectives of the institute by employing new-age technologies and management techniques. The procurement of goods is made by adopting the CSIR Manual of Procurement of Goods (MPG) 2019, GFR 2017, and time-to-time amendments. The Stores & Purchase Division also procures annual maintenance or comprehensive contract agreement services for equipment maintenance and repairs, if any. The Stores & Purchase Division maintains an inventory system comprising a personal inventory, a divisional inventory, an institutional inventory, and a fixed asset inventory. Also, to keep the premises clean and usable, the division arranges for the timely disposal of unserviceable goods from time to time. An inventory of consumable goods repeatedly required for ongoing projects/R&D, i.e., chemicals, glassware, plasticware, commonly used stationery, and general items, as decided by the Purchase Committee, in the central Stores by this division. The division also carries out the important role of coordinating and liaising with various government agencies to file reports and returns.

PROJECT MANAGEMENT AND BUSINESS DEVELOPMENT (PMBD)

- The Project Management and Business Development (PMBD) Group is an important arm of the Research Management Group in the Institute. It is also part of the India Research Management Initiative (IRMI) network to connect and network with other research management groups nationwide. PMBD has three verticals, viz., Project & Technology Management, Business Development, and Intellectual Property Rights Management.

- The major activities of the Project & Technology Management (PTM) vertical are project monitoring of CSIR/Non-CSIR Projects, preparation of annual plans, budget documents, performance review documents, R&D progress reports for IMTECH Research Council and Management Council, and work related to GST, RTI, etc. as assigned to the group. It also prepares the technical reports sent by the Institute for use by various units of CSIR headquarters, Parliamentary Standing Committee on Science and Technology, Environment and Forests, Department of Biotechnology, Department of Science and Technology, ICMR, ICAR, DOE, various industrial houses, etc., and answers public relations, audit, and technical queries.

- The Business Development Group (BDG) vertical is mandated to interact and build partnerships with the industry for various research and development projects. It aims to strengthen industry-academia ties through MOUs, agreements, and dissemination of information regarding IMTECH's technology portfolio along with project management of all industry projects. BDG also interfaces with various media houses for press coverage, as well as print, electronic, and web portals, to improve the overall brand architecture of the institute. It also liaisons with the industries for various Corporate Social Responsibility (CSR) activities and funding. The group also occasionally provides input on the Performance Appraisal Board (PAB) evaluation parameters of the institute and other policy documents.

- The Intellectual Property Rights (IPR) Management vertical manages all matters related to Institutes Intellectual Property. It provides diligenct services for the preparation of patent case and prosecution documents. The vertical extensively corresponds with and instructs national and international Attorneys regarding patent prosecution and responds to Patent Office Actions queries from Attorney's and Examiners of worldwide patent offices. The vertical also maintains patent docketing for all domestic and international cases including patent file preparation and management.

STUDENTS AFFAIRS OFFICE

The Ph.D. program at CSIR-IMTech enables doctoral students to take up challenging projects in various areas of modern biology by strengthening their analytical thinking. The students are registered for the Ph.D. program in Biological Sciences at CSIR-IMTech and are awarded degrees by the Academy of Scientific and Innovative Research (AcSIR), Ghaziabad. The Ph.D. program is implemented by the Students Affairs Office (SAO), which consists of a Coordinator, Co-Coordinator, and support staff. All the academic activities related to the Ph.D. program starting from student admission, placement of students in the various labs, Pre-Ph.D. course work, Research/Doctoral Advisory Committee (RAC/DAC) meetings, Comprehensive Examination, Ph.D. thesis submission, Viva-voce examination, award of Doctoral Degree, issuing of Transcripts & certificates and verification thereof, organization of Academic Committee (IMTech-JNU & IMTech-AcSIR) meetings, etc. are taken care of by the SAO. The induction of students to the Ph.D. program at CSIR-IMTech takes place twice a year – in January and August. The students apply through the AcSIR web portal and are shortlisted as per published criteria. The shortlisted applicants are called for two rounds of interviews, and the placement of the selected students in the various labs is based on mutual consent of students and scientists.

Currently, 154 students are pursuing a Ph.D. program affiliated with AcSIR, and 14 students are pursuing a Ph.D. with Jawaharlal Nehru University (JNU), New Delhi. In this period, 35 students in the year 2021, 19 students in the year 2022, and 20 students in the year 2023 were awarded Ph.D. degrees and are pursuing careers in science in reputed institutions in India and abroad.

KNOWLEDGE RESOURCE CENTRE

Knowledge Resource Centre (KRC) is the primary source of research and academic information for the CSIR-IMTECH community. The KRC has a collection of bound volumes of print journals, books, e-journals, e-databases, and Ph.D. theses in the areas of microbiology, medicinal chemistry, protein engineering, bioinformatics, cell biology, biochemistry, immunology, genetics, and biotechnology to support the learning and research activities of the scientific and student community. Besides print resources, KRC provides access to more than 3000 scholarly electronic journals through the National Knowledge Resource Consortium. During the reporting period, 151 new books, including 109 Hindi books, were added to the KRC collection, and more than 370 research articles / Ph.D. thesis were added to the Digital Institutional Repository of CSIR-IMTech. A Hindi book exhibition was also organized. KRC regularly provides training on citation databases, scientific writing skills, reference management tools, literature search, prevention of plagiarism, etc. Most recently, KRC has, with the collaboration of INFLIBNET, a UGC centre, generated the IRINS profiles of CSIR-IMTech scientists.

KRC coordinates all the special seminars, workshops, training programs, mini-symposiums, lectures, etc., of the institute, and coordinates the visits of various dignitaries, such as distinguished scientists, heads of the institutes, and the top management of the corporate sector. In addition, KRC staff manages and maintains the V. C. Vora Auditorium and the Main Seminar Hall.

INFORMATION TECHNOLOGY (IT) UNIT

Information Technology (IT) UnitThe IT team in CSIR-IMTECH is Responsible for IT hardware commerce software issues and networking support. The team offers excellent e-connectivity in the institute and addresses all the major day-to-day issues of IT infrastructure and working.

INSTRUMENTATION SERVICES DIVISION (ISD)

- The Instrumentation Services Division (ISD) of CSIR-IMTECH is a supportive group that takes care of the testing, maintenance, and repair of instruments. All the small- & medium-level instruments of the Institute are repaired and maintained with minimum downtime due to the support and services provided by the group. Many of the Major Facilities of the Institute for research work are also operated by the members of the group.

- A full-fledged testing and measuring facility, which has sophisticated instruments like Digital Storage Oscilloscope, Variable Power Supply, Multimeters, Function Generator, Soldering Workstation, etc., has been set up to help in the repairs.

- The Instrumentation Services Division (ISD) also maintains the Modular Instrument Laboratories (MILs) of the Institute. The Modular Instrument Laboratories (MILs) at the Institute offer round-the-clock instrumentation services to users for carrying out experiments. Eight such MILs have been set up spread across the CSIR-IMTECH campus, providing researchers access to state-of-the-art analytical instruments to support basic and translational research in a broad range of scientific fields. The facility offers normal spectrophotometric techniques such as UV/visible spectrophotometers, spectrofluorometers, ELISA readers, centrifuges, gel-doc systems, phosphorimager, and high-end purification systems, to name a few.

ENGINEERING SERVICES DIVISION

The Engineering Services Division provides vital Engineering and Utility Services support across the wide spectrum of institutional R&D activities and national facilities of CSIR-IMTECH. This division of CSIR-IMTECH includes several areas of expertise such as electrical, civil and mechanical engineering, air conditioning and refrigeration, to cater to various specific institutional requirements.

Services Offered:

The division is equipped with basic facilities required for electrical, mechanical & HVAC maintenance as well as for metal cutting, welding, plumbing and carpentry etc. It also looks after the steam requirements of the institute through operation of oil fired and electrical boilers. Additionally, it performs specific roles in the following fields/works.

- Planning, estimation and execution of building design, layout, construction and maintenance
- Operation and maintenance of electrical services of the institute and housing which includes a 11 KV HT substation, transformers, DG sets, firefighting & detection system, electrical panels, rising mains, PDB, LDB etc.
- Operation and Maintenance of utility services like HVAC, consisting of central AC plants, AHUs, pumps, and cooling tower, looking after the utilities like air compressors, boilers, cold rooms, lifts, window & split ACs, water supply system etc.
- Operation and maintenance of the facilities of utmost importance i.e. BSL3 Lab, virology Lab, GMP and other clean room areas
- During this period, the engineering services division undertook the following major projects.
- Establishment of the BASL3
- Replacement of DG Sets and AHUs
- Renovation of Canteen, PA Mess, Toilets and Labs

HOUSEKEEPING, HORTICULTURE & GUEST HOUSE

The Housekeeping division plays an important and pivotal role in supporting the R&D activities of the researchers, and maintaining neat and clean surroundings. The Guest House at CSIR-IMTech offers a comfortable and homely space for visiting scientists and renowned dignitaries of national and international repute. The Housekeeping & Guest house services play an important & supportive role during conferences, workshops, seminars, etc. held at the institute.

The Horticulture division takes care of the development and maintenance of the horticultural and landscaping work of the campus. Thanks to the horticultural expertise of the division, CSIR-IMTech boasts a beautiful and serene environment with ornamental trees, shrubs, creepers, and ground cover, and cooler and greener climes compared to the city outside the campus. During 2021-2023, as in the past, CSIR-IMTech Gardens won appreciation and prizes in competitions of best gardens (large and small) and flower shows organized in the city.

The CSIR-IMTECH Guest house, located at a peaceful location within the institute, has 24 air conditioned rooms a common dining area with well mannered staff and Wi-fi facility and is manned by security staff round the clock. It provides a comfortable stay and an "at home" experience to the visitors on official business at CSIR-IMTECH

SECURITY

The Security branch of the institute is headed by the Security Officer and consists of 06 security supervisors and 34 security guards. The security supervisors and guards are hired through a private security agency. They provide round-the-clock security services at various vital points to ensure a safe and secure environment for the scientists, staff, students, families, and institute visitors. Not only do they work diligently towards the security of the people and the material assets of the institute, but they also contribute towards fire safety. Be it the peak of summer, heavy monsoon rains, or bone-chilling winter, the security staff stands guard at all times to keep CSIR-IMTECH safe.

CANTEEN/MESS

The spacious canteen and mess facilities on the campus offer a variety of Indian foods and snack items to the students and staff of the institute at subsidized rates with the highest quality. Our canteen and mess are blessed with a family atmosphere, with various delicious and nutritious delicacies touched by a homemade flavor, cooked to perfection, and served with great courtesy. Refreshments are available at affordable rates. Adequate seating facilities are provided to accommodate students and staff even during peak times. It is a place where students and staff unwind and relax with their colleagues to enjoy good quality, delicious, and healthy food.

OUTREACH

JIGYASA STUDENT -SCIENTIST CONNECT PROGRAMME

CSIR Jigyasa / Jigyasa 2.0 program with the concept of Virtual Lab integrated & Indian Sign Language Enabled Virtual Laboratory (ISLEVL)

The Jigyasa team at CSIR-IMTECH conducted the following activities during this period.

S. No.	Model of Engagement	No. of Programs	No. of Teachers	No. Students
1	Visits of Scientists to Schools/Outreach Programme	14	95	1428
2	Shadow A Scientist 5-Days Residential Program	1	0	14
3	Open Day-Visit to IMTECH	2	68	620
4	Training of Trainers 3 Days Program	2	292	0
5	Visit to IMTECH-Lab specific activities / Onsite Experiments Industrial Visit/ Educational Visit	17	187	1953
6	Yusuf Hamied Chemistry Camp (3 Days)/ Deaf Inclusive Proteomics Day	2	20	255
7	Visit of students to STI Hub, Ladakh	1	10	400
8	Webinars (Duration 1-4 Days)	10	292	2245
	Grand Total		964	6915

A brief of some activities is given below:

- Virtual Lab Content Development: The following virtual lab content was developed during this period.

S.NO	Activity Names	Content Developed
1	Animations	2
2	Videos	1
3	Games	6
4	Simulations	1
5	Interactive 360- degree Virtual Tours	4

- Immersive 3D Projection facility: One of its kind 'first in CSIR' Immersive 3D Projection facility developed at CSIR-IMTECH which enhances STEM education. It fosters experiential learning, engages students with complex concepts, and accommodates diverse learning needs, including those of students with disabilities.
- State's Largest Climate Clock Assembly and Display Event: With Energy Swaraj Foundation (ESF), organized the 'State's Largest Climate Clock Assembly' on Dec 1, 2023, with 950+ students from 31 schools to promote energy awareness.
- Training of Trainers on the Internet of Things in Healthcare: A 3-day training program was organized for Atal Tinkering Lab In-charges and school teachers from June 23-25, 2023. The training was attended by 14 participants from 9 states.
- Shadow A Scientist Program: CSIR-IMTECH's organized 'Shadow a Scientist' program, part of the 'One Week One Lab' initiative. It was a 5-day residential event to nurture curiosity, bridge theory with practice, and inspire the next generation of scientists. Dr. N. Kalaiselvi, Director General of CSIR & Secretary of DSIR, praised the program's impact on student engagement and scientific curiosity .
- Demonstration and Distribution of DIY Kits: The Milk Testing DIY Kits were demonstrated to the students of KVs, JNVs, and other state govt. schools, to promote awareness of food adulteration. More than 1000 students attended the demonstration.
- Playtests of the ArMor Game: The Playtest of the ArMor Game was conducted for over 1000 students to promote awareness of AMR.
- CSIR Jigyasa Vigyan Mahotsav 2022: Boot Camps on App Development & Animations: Two (2) boot camps were organized on Android App Development, and one (1) was organized on Animation Development.
- Schools adoption under the CSIR Jigyasa and NITI Aayog's Atal Tinkering Lab Initiative: Seven schools with ATL labs are adopted by CSIR-IMTech for mentoring through Teacher training programs & Capacity Building for students.

Indian Sign Language Enabled Virtual Laboratory (ISLEVL)

ISLEVL defines the unique vertical of the CSIR Jigyasa Virtual Laboratory initiative. It is aimed at developing specialized digital content to empower and educate the deaf by providing ISL translated content in various streams of STEM subjects. Some highlights are here below.

- CSIR-IMTECH and HWSPSHI launched India's 1st Indian Sign Language Astronomy Lab in Karnal for Divyangjan students to integrate them into science education.
- CSIR-IMTECH, with the Proteomics Society of India and CSIR Jigyasa Mission, held India's first deaf-inclusive science

outreach, attracting 225+ attendees, including 50 deaf students and teachers.

- Deaf ISLEVL members joined a workshop at HWSPSHI with Gallaudet University trainers, sharing STEM accessibility strategies, and benefiting teachers and attendees.
- CSIR IMTECH introduced India's first deaf-inclusive science outreach via ISLEVL, featuring a tailored STEM dictionary and STEM News for ongoing scientific updates, benefiting students and teachers in STEM education.
- CSIR IMTECH and the Royal Society of Chemistry UK-India organized India's first deaf-inclusive chemistry camp, attended by 450+ people, including 170 Deaf participants
- Collected feedback from HWSPSHI students and other Deaf community institutions, along with input from stakeholders and experts.
- CSIR-IMTECH completed an 11-day internship for DTISL students, emphasizing STEM exposure and sign language learning, fostering industry readiness as per the MOU signed between CSIR-IMTECH and ISLRTC.
- The deaf community embraces ISLEVL content: STEM tools. Yusuf Hamied Chemistry Camp was lauded by the Hon'ble Governor for deaf awareness. Shri Rajesh Agarwal highlighted IMTECH and RSC for their importance in Indian Sign Language.
- CSIR-IMTECH team showcased "Microbial Magic of Protein Glycosylation Explained in ISL" at Science City, Ahmedabad, drawing nationwide interest.
- Team ISLEVL's innovative concept, "Providing STEM in Signs," caught the attention of Nature. They interviewed us to showcase our methodology and raise awareness about our groundbreaking work.
- Our team spoke at a three-day Zero Project conference at the UN Office in Vienna, Austria. Dr. Rao discussed "Innovative tech solutions for sign language communication."Our team presented at a three-day conference, March 2-4, 2024, in person and virtually. A deaf instructor discussed ISL STEM lexicon development with an interpreter aid.

No.	Model of Engagement	Program Name	Duration	Exposure on (Domain)	Student Grade	No. of Teachers	No. of Students
1st April 2023-31st December 2023							
1	Yusuf Hamied Chemistry Camp(RSC)	Yusuf Hamied Chemistry Camp	3 Days	Simple chemistry & Hands-on	8th-12th	10	205
1st January 2021-31st March 2022							
2	Hybrid – Physical & Virtual	Deaf Inclusive Proteomics Day	1 Day	Protein Engineering	IX-XII	10 Teachers & Trainees	50 Deaf Students

Webinars (1st January, 2021- 31st December, 2023)

S. no	Webinar on	Speaker name and designation	Organized on	No. of Students	No. of Teachers
3	Deaf Inclusive Proteomics Day	Sh Jayant Sahasrabudhe (NOS Vibha) Prof. Unnat P Pandit (Prof. IPM Cell, JNU) Dr. Girish Sahni (Former DG, CSIR) Dr Shubhra Chakraborty (Director, NIGPR) Dr Rupa Nagar (University of Dundee, UK) Dr Sanjeev Khosla (Director, CSIR-IMTECH)	21 Mar 2022	225+	10 (Specia Educators)

Virtual Lab Content Developed

S.NO	Activity Names	Jan-March 2021	April 21 – March 22	April 22 – March 23	April 23 – Dec 23
1	Animations	-	1	3	1
2	Videos	-	45	77	50
3	Games	1	-	5	-
4	Quiz	-	2	2	2
5	Comics	-	-	28	10
6	Simulations	1	1	13	18
7	Infographics	-	-	20	5
8	Podcasts	-	-	5	4
9	STEM Dictionary	-	-	-	101
10	STEM News	-	-	-	4
11	Astronomy Lab	-	-	-	96
12	RSC content translation	-	-	-	18
13	RSC Experiments Demonstration	-	-	-	08
14	Sensitization videos for Instagram	-	-	-	43
15	Astrolab VL – ISLEVL	-	-	129	-
16	Interactive 360-degree Virtual Tours	4	-	-	-

SKILL DEVELOPMENT PROGRAMME

- **CSIR-IMTECH Training Programs under the CSIR Integrated Skill Initiative**

CSIR-IMTECH is dedicated to developing a highly specialized and skilled workforce for the life sciences industry through various training programs. These initiatives aim to equip students, researchers, and professionals with cutting-edge knowledge and practical expertise.

I. Dissertation/Internship Training Program (6 months)

This program introduces outstanding students **pursuing** B.Sc., M.Sc., M. Pharma, B. Pharma, B. Tech., and M. Tech. to fundamental biomedical research techniques through **hands-on laboratory training** over six months. Between 2021-2023, three training sessions were conducted wherein a total of **84 students** completed their dissertation training as part of their master's degree requirements.

II. Basic Training Program (1-3 months)

Designed for undergraduate students, this program provides essential training in key laboratory techniques across multiple disciplines mentored by IMTECH scientists. A total of **23 students** participated in this program, gaining valuable laboratory experience.

III. Short-term/Summer Internship Training Programs

CSIR-IMTECH has established Memorandums of Understanding (MoUs) with several institutions such as GADVASU, Ludhiana, Punjab, Gujarat Biotech Mission (GSBTM), Vel Tech University, Chennai, Tamil Nadu and Indian Sign Language Research and Training Centre (ISLRTC), New Delhi to offer specialized short-term internship programs. Additionally, the institute also offers tailored training programs for students selected by the Joint National Academies of Sciences and BITS Pilani. Under these programs, CSIR IMTECH offered internship to 52 students during the reported period.

IV. Short-Term Courses, Training, and Workshops (5-35 days)

CSIR-IMTECH conducted 14 specialized training programs that benefitted 233 trainees in areas such as bio-methodology of laboratory animals, bioinformatics, genomics, bioprocess technologies, etc.

Key Highlights:

- Basic Bio-methodology of Laboratory Animals – This program trained participants in the ethical and scientific handling of laboratory animals.
- Virtual Workshop on Ethical Contemplation of Animal Resources for Experimentation (WeCARE-2021) – Focused on the ethical considerations in animal research.
- Workshops on Bio-methodology & Ethical Use of Laboratory Animals – Provided hands-on experience in laboratory animal care.
- Era of Big Data in Genomics – A specialized workshop on genomic data analysis.
- Winter Research Internship: Microbes to Mouse (VRITIKA) – A 28-day intensive internship covering advanced biological techniques.
- KARYASHALA on Biosecurity, Biosafety & Infectious Agents (BBCCB-2023) – Designed to enhance knowledge in biosafety practices.
- GSBTM, Gujarat sponsored Skill Development Program for Animal Attendants – Targeted skill enhancement in laboratory animal care.
- Skill Vigyan Training Program (SVTP) – Conducted in collaboration with Vinoba Bhave University, Jharkhand.
- National Workshop on Advances in Bioprocess Technologies (ABT-Bio 2023) – Focused on bioprocess engineering advancements.

- Junior Software Developer Program – a 400-hour IT training program for students with 12th/ITI qualifications.
- Identification of Microbes by MALDI-MS and Microscopy – A one-day hands-on training on microbial identification techniques.

V. Cutting-Edge & High-End Skill Development Centre: Merck-IMTECH Innovation Lab

CSIR-IMTECH, in collaboration with Merck, has established a High-End Skill Development Centre at IMTECH, Chandigarh. This facility is equipped with next-generation technologies. During the reporting period, the center organized 47 training programs, benefiting 1,779 participants.

Impact:

Overall, CSIR-IMTECH under the CSIR-Integrated Skill Initiative trained **2171 participants/trainees** under various training programs, thereby, contributing significantly to the **"Skill Mission" of Government of India.**

Team: Ms. Neha Rana; Dr. Neeraj Khatri-Coordinator

Glimpses of CSIR Integrated Skill Initiatives @CSIR-IMTECH during 2021-23

INSTITUTE COMMITTEES

INSTITUTE COMMITTEES

Research Council (constituted on 1 September 2020)

Prof. UMESH VARSHNEY (Chairperson)
Department of Microbiology & Cell Biology
Indian Institute of Science
Bengaluru - 560012

Prof. SWATI SAHA (Member)
Head, Department of Microbiology
University of Delhi South Campus
Benito Juarez Road
New Delhi - 110021

Dr. RUPINDER KAUR (Member)
Staff Scientist
Centre for DNA Fingerprinting and Diagnostics (CDFD)
Inner Ring Road, Uppal Road
Hyderabad - 500039

Dr. RAJESH S. GOKHALE (Member)
Staff Scientist VII
National Institute of Immunology
Aruna Asaf Ali Marg
New Delhi - 110067

Sh. VISHAL WARKE (Member)
Director
R&D Cell Culture and Immunology
Himedia Laboratories
A-516, Swastik Disha Business Park
Via Vadhani Industrial Estate, L.B.S. Marg

Dr. VILAS SINKAR (Member)
Formal Vice President
Unilever R&D
Hindustan Unilever Research Centre
64, 2nd Main Rd, Palm Meadows, Whitefield
Bengaluru - 560066

Dr. MEENAKSHI MUNSHI
(Agency Representative)
Scientist 'G'
Department of Biotechnology (DBT)
6th-8th Floor, Block 2, CGO Complex, Lodi Road
New Delhi - 110003

Dr. ANURAG AGARWAL
(Sister Laboratory)
Director
CSIR-Institute of Genomics and Integrative Biology
Sukhdev Vihar, Mathura Road
New Delhi - 110020

Dr. SANJEEV KHOSLA
(Laboratory Director)
Director
CSIR-Institute of Microbial Technology
Sector 39
Chandigarh - 160036

Dr. R.P. SINGH
(CSIR Hqrs. Invitee)
Head, Innovation Management Directorate (IMD)
Council of Scientific & Industrial Research
2, Rafi Marg, New Delhi - 110001

Research Council (constituted on 10 July 2023)

Prof. ANURAG AGARWAL (Chairperson)
Dean
BioSciences and Health Research
Trivedi School of Biosciences
Plot No. 2, Rajiv Gandhi Education City, National Capital Region P.O. Rai, Sonepat Haryana-131029

Dr. RUPINDER KAUR (Member)
Staff Scientist
Centre for DNA Fingerprinting and Diagnostics (CDFD)
Inner Ring Road, Uppal Road
Hyderabad - 500039

Dr. AMIT SINGH (Member)
Associate Professor
Centre for Infectious Disease Research
Indian Institute of Science
Bengaluru - 560012

Sh. VISHAL WARKE (Member)
Director
R&D Cell Culture and Immunology
Himedia Laboratories Pvt. Ltd., Mumbai
Plot No. C40, Road No. 21Y, MIDC
Wagle Industrial Area,
Thane (West) - 400604

Dr. Debashis Mitra (Member)
Interim CEO
DBT/Wellcome India Alliance Trust and Professor of Eminence
SPPU Campus, Ganeshkhind Road
Pune - 411007

Dr. ANAMIKA GAMBHIR
(Agency Representative)
Scientist 'G'
Department of Biotechnology (DBT)
CGO Complex, Lodi Road
New Delhi - 110003

DIRECTOR
(Sister Laboratory)
Director
CSIR-Centre for Cellular and Molecular Biology
Uppal Road
Hyderabad - 500007

Dr. SANJEEV KHOSLA
(Laboratory Director)
Director
CSIR-Institute of Microbial Technology
Sector 39
Chandigarh - 160036

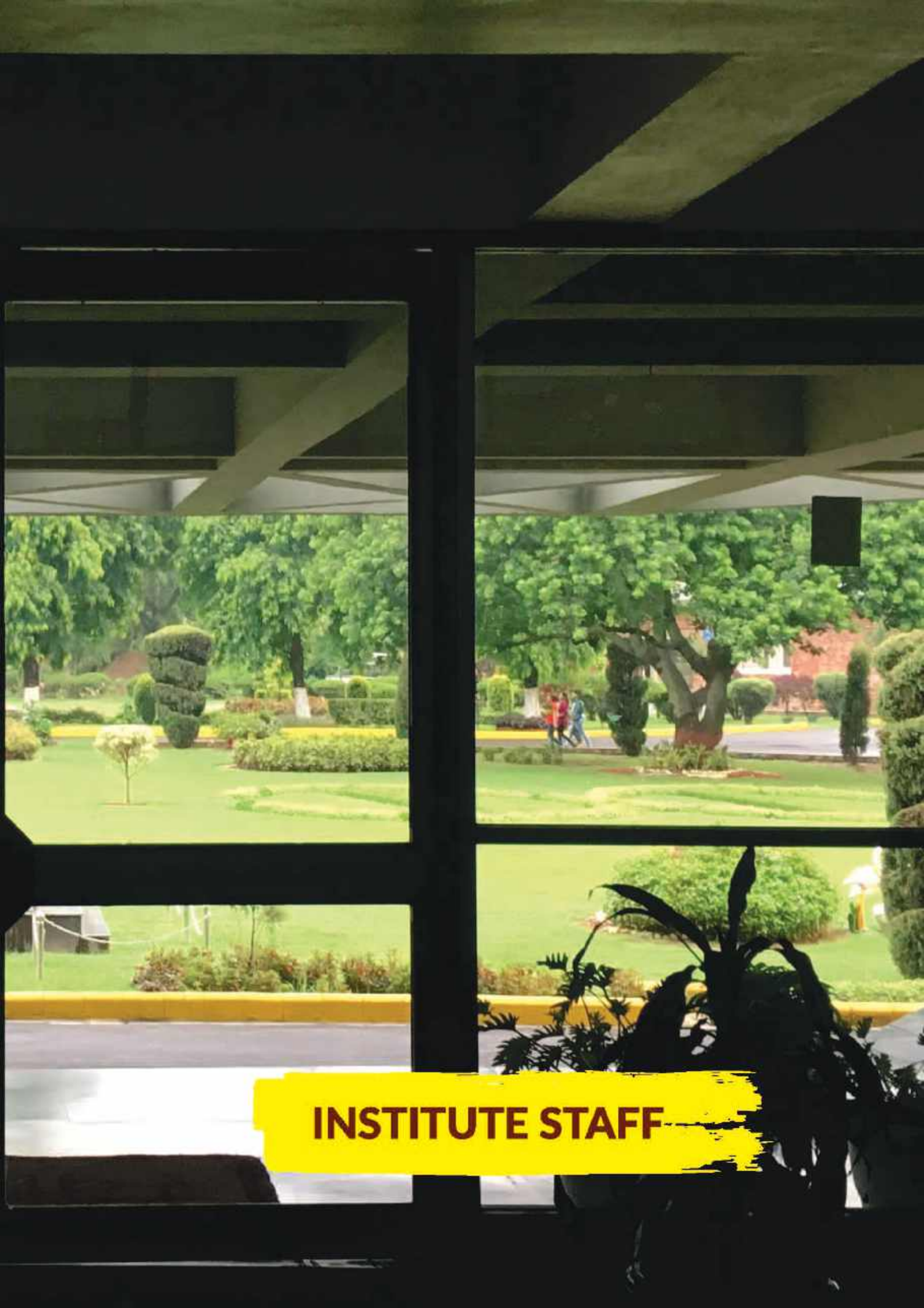
Dr. R.P. SINGH
(DG's Representative)
Head, Innovation Management Directorate (IMD)
Council of Scientific & Industrial Research
2, Rafi Marg, New Delhi - 110001

Management Council (1 January 2020 to 31 December 2021

Dr. Sanjeev Khosla, Director, CSIR-IMTECH	Chairman
Director, CSIR-CSIO, Chandigarh	Member
Shri R. Soni, Chief Scientist & Head, PTM	Member
Dr. V. C. Sonawane, Senior Principal Scientist	Member
Dr. S. Kumaran, Senior Principal Scientist	Member
Dr. P. Anil Kumar, Principal Scientist	Member
Dr. Sachin Raut, Scientist	Member
Shri H. B. K. Bhatti, Superintendent Engineer	Member
COFA/F&AO	Member
COA/AO	Member-Secretary

Management Council (1 January 2022 to 31 December 2023)

Dr. Sanjeev Khosla, Director, CSIR-IMTECH	Chairman
Director, CSIR-CSIO, Chandigarh	Member
Dr. S. Karthikeyan, Chief Scientist	Member
Dr. Ravi P. Mishra, Principal Scientist	Member
Dr. Beena Krishnan, Principal Scientist	Member
Dr. Nithya Vadakedath, Senior Scientist	Member
Shri Rajinder Dass, Principal Technical Officer	Member
Shri Kailash T. Bhamare, Principal Scientist	Member
COFA/F&AO	Member
COA/AO	Member-Secretary



INSTITUTE STAFF

SCIENTIFIC STAFF

Alka Rao
Amit Kumar
Amit Tuli
Anirban Roy Chaudhury
Anshu Bhardwaj
Ashish
Ashwani Kumar
B. Devadatta
(New joining w.e.f. 24.03.2023)
Balvinder Singh
Barnali Chaudhuri
Beena Krishnan
Chandershekhar Sharma
Charu Sharma
Deepak K. Sharma
Dibyendu Sarkar
Dipak Dutta
E. Senthil Prasad
Easa Nagamalleswari
(New joining w.e.f. 04.09.2023)
G. Rajamohan
Garry Bedi
H.S. Nandanwar
Harvinder Jassal
Imtiyaz Yaseen
(New joining w.e.f. 06.09.2023)
Kailash B.T.
Krishan Gopal
M.S. Bhattacharya
Manoj Kumar
Manoj Raje
Manuj Tripathi
Mohit Paul
Neeraj Khatri
Nithya Vadakadth
P. Anil Kumar
Pawan Gupta
Prabhu B. Patil
Pradip Sen
R.S. Shaligram
Rajendra Soni
Raman Parkesh
Ramya T.N.C.
Rashmi Kumar
Ravi Pratap N. Mishra
Risabh Verma
S. Karthikeyan
S. Krishnamurthi
S. Kumaran
S.R. Chaudhuri
Sanjeev Khosla
Srikrishna Subramanian
Suresh Korpole
Vemulari Venkata Ramana
Vijayender K. Bhalla
Vinod D. Chaudhari

TECHNICAL STAFF

Ajay Kumar
Amit Kumar
Anil Kumar Sharma
Anil Theophilus
Anjali Koundal
Anurag Kashyap
Asheesh Kumar Khare
Ashok Kumar
Bhimi Ram
Bhumika Vaidya
Bhupinder Singh Chopra
Chander Prakash Midha
Chetna
Davinder Singh
Dawinder Singh
Deepak Bhatt
Dhan Parkash
Digvijay Singh Naruka
Dinesh Kumar
Ganesh Lal Meena
Girja Kumari Ditya
Har Bhupinder Kumar
Hariom Kushwaha
Harminder Singh
Jaideep Mehta
Jankey Prasad
K.P.S. Sengar
Kewal Krishan
Malkit Singh
Md. Mustafa
Neha Rana
Nitin Sharma
Paramjeet Kaur
Paramjit Kashyap
Paramjit Lal
Pradeep Kumar Patel
R.K. Kanojia
Raj Kumar Mehta
Raj Kumar-I
Raj Kumar-II
Rajendra Dass
Rakesh Kumar Dhiman
Ramesh Chander Sharma
Ramesh Singh
Randeep Sharma
Renu
Rohtas Ranga
S. Muthu Krishnan
S.S. Bawa
Samir K. Nath
Sandeep Kumar-I
Sandeep Kumar-II
Sharanjit Kaur
Shashi Dhar
Sumit Mittal
Surinder Singh
Surjeet Singh
Upendra Singh
Vineet Kumar

ADMINISTRATIVE STAFF

Arun Khurana
Avtar Singh
Baljit Kaur
Bhupal Singh Rawat
Dharminder Kumar
Dhiraj Goswami
Farid Mohammad
Gurdeep Singh
Harnek Singh
Indu Yadav
Jitender Singh
K.S. Gaira
Kanika Goel
Kapil Verma
Karnail Singh
Kavita Kumari
Kuldip Kaur
Manish Kumar
Manoj Kumar
Manoj Rani
Nand Lal
Neeru
Nitin Kamra
Poonam
R.N. Manjhi
Ragu Nath
Rajinder Kumar
Rajinder Nautiyal
Ralla Ram
S.D. Rishi
Sana Khatun
Sandeep Kumar
Sheela Devi
Soni
Sunil Kumar
Sushil Kumar
Tajinder Kaur
Vikram Singh

PURCHASE SECTION

Arvind Kumar
Bir Singh
G.S. Verma
Kamal Kumar
Mohinder Kumar
Praveen Kumar
Ram Singh
Ravi Garg
Ravinder Singh
Tajinder Kaur
Vipan Kumar

FINANCE & ACCOUNTS SECTION

Byomkesh Pandey
H.S. Sekhon
Ishwar Dass
Raju Bansal
Rani Devi
S. K. Vohra
S. K. Vohra
Sudesh Sharma
Surinder Kumar Narad
Yash Pal

PROMOTIONS

Name of Employee & Designation	Post to which promoted	Date of Assessment Promotion
Dr. Mani Shankar Bhattacharya, Sr. Scientist	Pr. Scientist	01.03.2021
Dr. S.R.Chaudhuri, Sr. Pr. Scientist	Chief Scientist	05.03.2021
Dr. Srikrishna Subramanian, Sr. Pr. Scientist	Chief Scientist	08.03.2021
Dr. T.N.C. Ramya, Sr. Pr. Scientist	Sr. Pr. Scientist	08.03.2021
Sh. Surjeet Singh, T.O	STO (1)	11.03.2021
Sh. Paramjit Lal, T.O	STO (1)	12.03.2021
Sh. Sandeep Kumar, T.O	STO (1)	12.03.2021
Sh. Sandeep Kumar, T.O	STO (1)	16.03.2021
Sh. Asheesh Kumar Khare, T.O	STO (1)	20.03.2021
Sh. Vineet Kumar, T.O	STO (1)	23.03.2021
Sh. Sumit Mittal, T.O	STO (1)	01.04.2021
Dr. Vemulari Venkata Ramana, Sr. Sct.	Pr. Scientist	21.04.2021
Sh. Hariom Kushwaha, T.O	STO (1)	28.04.2021
Dr. Pawan Gupta, Sr. Pr. Scientist	Chief Scientist	06.05.2021
Sh. Deepak Bhatt, STO (1)	STO (2)	07.05.2021
Sh. Bhupinder Singh Chopra, T.O	STO (1)	19.06.2021
Sh. Harvinder Jassal, Sr. Scientist	Pr. Scientist	21.06.2021
Sh. Digvijay Singh Naruka, STO (1)	STO (2)	06.08.2021
Dr. Ashish, Sr. Pr. Scientist	Chief Scientist	25.08.2021
Sh. Davinder Singh, STO (1)	STO (2)	27.08.2021
Dr. Suresh Korpole, Pr. Scientist	Sr. Pr. Scientist	22.09.2021
Sh. Raju Bansal, ASO (F&A)	SO (F&A)	28.12.2021
Sh. Kamal Kumar, S.O (S&P)	SO (S&P)	28.12.2021
Ms. Tajinder Kaur, ASO (Gen.)	ASO (Gen.)	29.12.2021
Sh. Sandeep Kumar, JSA	SSA (Gen.)	01.01.2022
Sh. Garry Bedi, Principal Scientist	Sr. Pr. Scientist	13.03.2022
Sh. Chander Sekhar Sharma, Scientist	Sr. Scientist	02.05.2022
Sh. Manuj Tripathi, Sr. Scientist	Pr. Scientist	16.05.2022
Dr. Charu Sharma, Sr. Pr. Scientist	Chief Scientist	24.07.2022
Sh. Arvind Kumar, S.O (S&P)	SPO	10.11.2022
Sh. Kailash B.T.	Sr. Pr. Scientist	23.12.2022
Dr. Rashmi Kumar, Sr. Scientist	Pr. Scientist	29.12.2022
Sh. Mohinder Kumar, CoSP	Sr. CoSP	09.08.2023

TRANSFERS

Name of Employee & Designation	Lab/Instt. to which transferred	Date of Relieving
Sh. Avtar Singh, A.O	CSIR- CSIO	08.04.2021
Sh. S.K. Narad, F&AO	CSIR- CSIO	12.04.2021
Sh. Dilip Gehlot, SPO	CSIR- IIIM	09.04.2021
Sh. Byomkesh Pandey, S.O (F&A)	CSIR- CSIO	28.12.2021
Sh. Virender Lamba, S.O (Gen.)	CSIR- IHBT	16.08.2021
Sh. Gajinder Kumar, S.O (Gen.)	CSIR- III	16.08.2021
Sh. Ravinder Singh, ASO (S&P)	CSIR- IHBT	30.12.2021
Sh. Parveen Kumar, ASO (S&P)	CSIR-IIIM	25.02.2022
Sh. Ishwar Dass, CoFA	CSIR-CSIO	11.11.2022
Sh. G.S. Verma, SPO	CSIR-CDRI	25.11.2022
Sh. Manoj Kumar, S.O (Gen.)	CSIR-IIIM	13.12.2022
Sh. Vikram Singh, COA	CSIR- IIIM	25.01.2023
Sh. H.S. Sekhon, F&AO	CSIR Complex	10.07.2023
Sh. K.S. Gaira, S.O (Gen.)	CSIR- IGIB	31.07.2023
Sh. Arvind Kumar, SPO	CSIR- CSIO	14.08.2023
Mrs. Rani Devi, ASO (F&A)	CSIR- CSIO	31.08.2023
Sh. Sushil Kumar, Sr. Steno	CSIR- CSIO	30.11.2023

RESIGNATION(S)

Name of Employee & Designation	Date of resignation
Dr (Ms.) Chetna, TO	18.06.2023

RETIREMENTS

Name of Employee	Designation	Date of retirement
Sh. Raj Pal	Work Assistant	31.01.2021
Sh. Anil Theophilus	Sr. Technician	28.02.2021
Sh. Upendra Singh	Sr. Technician	31.03.2021
Sh. Gurdeep Singh	ASO (G)	30.04.2021
Sh. Malkit Singh	Sr. Technician	30.06.2021
Mrs. Sudesh Sharma	S.O (F&A)	31.07.2021
Sh. Raghu Nath	ASO	31.05.2022
Dr. Manoj Raje	Chief Scientist	31.07.2022
Sh. Raj Kumar	Sr. Technician	30.09.2022
Sh. Kewal Krishan	Sr. Technician	30.11.2022
Sh. R.K. Kanojia	STO	30.11.2022
Sh. Rajendra Soni	Chief Scientist	31.12.2022
Sh. S.S. Bawa	PTO	31.01.2023
Sh. Nand Lal	MTS	28.02.2023
Sh. Paramjit Kashyap	Sr. Technician	31.03.2023
Sh. R.N. Manjhi	MTS	30.06.2023
Sh. Ralla Ram	MTS	31.08.2023
Mrs. Baljit Kaur	Senior Stenographer	30.11.2023
Sh. Ramesh Singh	Lab Assistant	31.10.2023

TRANSFER FROM OTHER LABS/INSTT TO CSIR-IMTECH

Mrs. Kanika Goel, A.O	CSIR-HRDG	12.08.2021
Sh. Ram Singh, S.O (S&P)	CSIR-IHBT	23.08.2021
Sh. Manoj Kumar, S.O (Gen.)	CSIR-IIIM, Jammu	31.12.2021
Sh. K.S. Gaira, S.O (Gen.)	CSIR Hqrs	11.10.2021
Dr. Amit Kumar, Sr. Scientist	CSIR-IITR, Lucknow	03.05.2021
Sh. H.S. Sekhon, F&AO	CSIR-CSIO	16.04.2021
Sh. Harnek Singh, PPS	CSIR-CSIO	21.01.2022
Sh. Amit Kumar, T.O	IIIM, Jammu	04.11.2022
Sh. Arvind Kumar, SPO	CSIR-CSIO	10.11.2022
Sh. Sanjeev Kumar Vohra, Sr. CoFA	CSIR-CSIO	11.11.2022
Sh. Yashpal, F&AO	CSIR-IHBT	27.12.2022
Sh. S.D. Rishi, A.O	CSIR-CSIO	23.01.2023
Ms. Poonam, ASO	CSIR-NPL	27.03.2023
Sh. Manish Kumar, S.O (Gen.)	CSIR-CEERI-Pilani	01.08.2023
Sh. Farid Mohammad, S.O (Gen.)	CSIR-IIP, Dehradun	01.08.2023
Sh. Mohinder Kumar, Sr. CoSP	CSIR-CSIO	09.08.2023
Sh. Ravi Garg, SPO	CSIR-NIScPR	10.08.2023
Sh. Kapil Verma, PS	CSIR-CSIO	16.08.2023


EVENTS

CSIR-IMTech Foundation Day Lecture (Virtual Mode) by Dr. Manu Prakash, Professor of Bioengineering at Stanford University, California, on 25th January, 2021

Union Minister Dr. Harsh Vardhan inaugurates Bio-Innovation Centre in CSIR-IMTech on 21st March, 2021

Fit India Freedom Run/Walk (5 km) on the occasion of Gandhi Jayanti on 2nd October, 2021 at CSIR-IMTech.

CSIR Foundation Day Lecture by Prof. Dulal Panda, Director NIPER, Mohali, titled "Lessons from 55 years of tubulin research: Implications in human health and disease" at V.C. Vora Auditorium, on 30th September, 2022

CSIR-IMTech celebrated the 7th Ayurveda Day titled "Ayurveda Everyday Ayurveda Everywhere" on 20th October, 2023

CSIR-IMTech Foundation Day Lecture delivered by Prof. T. Mohapatra, Former Secretary, Dept. of Agricultural Research and Education, Govt. of India and Former Director General, Indian Council of Agricultural Research. Celebrations on 24th January, 2023

Inauguration of CSIR-IMTech's One Week One Lab (OWOL) Events (19th June -24Th June 2023) by Chief Guest, Hon'ble Governor of Punjab and Administrator, Chandigarh, Shri Banwarilal Purohit on 19th June, 2023

Inauguration of National Repository of GMP Microbial Cell Banks for Biopharmaceuticals Products (NRGCBIO) at CSIR-IMTech, Chandigarh, by Hon'ble Governor of Punjab and Administrator, Chandigarh, Shri Banwarilal Purohit in the presence of Dr. Sanjeev Khosla, Director, CSIR-IMTech, Chandigarh under CSIR-IMTECH's One Week One Lab (OWOL) Events on 19th June, 2023

Inauguration of the second bilateral meeting of INST, Mohali, and CSIR-IMTech, Chandigarh, on 8th August, 2023

CSIR-IMTech and the Royal Society of Chemistry invited Sh. Bandaru Dattatreya, Hon'ble Governor of Haryana as a Chief Guest and Sh. Rajesh Aggarwal, Secretary (DEPwD), Govt. of India as a Guest of Honour in the inauguration of Yusuf Hamid Chemistry Camp on 2nd November, 2023.

The 50th National Seminar on Crystallography (NSC50) was organized at CSIR-IMTech during November 22-24, 2023. The NSC50 was jointly organized by CSIR-IMTech and the Indian Crystallographic Association (ICA). It served as an excellent platform for crystallographers nationwide to meet and discuss their latest research findings.

SPECIAL SCIENTIFIC LECTURES AND FOUNDATION DAY LECTURES

01.01.2021 - 31.12.2023

Date	Name of Speaker	Affiliation	Title
25.01.2021	Dr. Manu Prakash	Professor of Bioengineering, Stanford University, California	Foundation Day Lecture: Fungal Science in the age of curiosity
28.02.2022	Dr. Poonam Thakur	IISER,Thiruvananthapuram	α-Synuclein fibrils induced disruption of pacemaker firing in dopamine neurons is dependent on selective K-ATP channel activation
16.03.2022	Prof. Jeffrey Withey	School of Medicine, Wayne State University, Detroit, Michigan	Zebrafish models for enteric pathogens
15.06.2022	Dr. Priyadarshan Kinatukara	Postdoctoral Research Associate, CSIR-CCMB, Hyderabad	Diversity in lipids & cellular homeostasis: Unconventional regulation of the flux of fatty acids
21.06.222	Dr. Ankisha Vijay	Postdoctoral Research Associate, Indian Institute of Technology Bombay	Bioelectrochemical systems-A sustainable approach for simultaneous waste bioremediation and energy production
06.07.2022	Dr. Manish Grover	Imperial College London, UK	HOW SPICED UP HOSTS CHIL-OUT PATHOGENS: Understanding immune signaling and recognition of oomycetes in *Caenorhabditis elegans*
07.07.2022	Dr. Meetali Singh	Postdoc, Institute Pasteur, Paris	Navigating the balance between translation and small R.N.A. biogenesis
28.07.2022	Dr. Satya Prakash	Research fellow synthetic biology, Imperial college, London	De-novo engineering of regulatory system in *E.coli*
29.07.2022	Dr. Pratik Jagtap	Research Assistant Professor, University of Minnesota, U.S.A.	Enabling Proteo-Informatics Analysis via Galaxy-P Platform
15.09.2022	Dr. Amit Dutt	Principal Investigator, Scientific Officer G, ACTREC, Navi Mumbai	Genetic Alterations and Microbial Dysbiosis Underlie Lymph Nodal Metastasis in Tongue Cancer
25.08.2022	Sh. Bhupesh Upadhyay Ms. Radha Pathak Sh. S. Bramha Sh. Ashok Sharma	Shivalik Solid Waste Management, Nalagarh, H.P./ Zirakpur, Punjab	Chemical & hazardous waste management with respect to R & D institute: Safety measures and Emergency response plan
29.09.2022	Dr. Mac Santolini	C.R.I. Research University of Paris	Network medicine in the era of big data
29.09.2022	Dr. Liubov Tupikina	University of Paris	Epidemics modeling on small networks: from S.I.S. to S.I.R. models
31.10.2022	Dr. Sandeep Kumar Dhanda	Bioinformatics Research Scientist Saint Jude Children's Research Hospital, Memphis, TN	Translational Bioinformatics
08.12.2022	Dr. Ravikanth Nanduri	Visiting Fellow, Laboratory of Metabolism, National Cancer Institute, N.I.H., U.S.A.	Epigenetic Regulation of White Adipose Tissue Plasticity and Energy Metabolism by Nucleosome Binding HMGN proteins

09.01.2023	Prof. Wolf B.	Frommer Institute of Molecular Physiology Heinrich Heine University, Germany	Healthy Crops
01.02.2023	Dr. Himani Tandon	Postdoctoral Fellow, MRC-Laboratory of Molecular Biology, Cambridge, UK.	Does mouse cell biology translate to human? - An exploration through the lens of cell reprogramming
27.02.2023	Prof. Harinder Singh	Professor & Director Center for Systems Immunology The University of Pittsburgh, U.S.A.	Gene regulatory networks orchestrating immune cell fate dynamics
10.03.2023	Dr. Vishal M. Gohil	Associate Professor, Biochemistry & Biophysics, Texas A&M University, U.S.A.	Mitochondrial Copper Biology: From Yeast Genetics to Human Disease Therapeutics
14.03.2023	Prof. P.J. Bhat	Former -Faculty, Biosciences and Bioengineering Dept., Indian Institute of Technology, Bombay	Molecular evolution of ammonium transporters: What lessons did we learn?
11.04.2023	Dr. Venkat Koushik Pulla	Senior Product Manager, Merck.	Cultivate The Reality: 2D to 3D Cell Culture
15.05.2023	Dr. Balaji Prakash	Associate Dean, Sciences, Ahmedabad University	Building universities that matter
19.05.2023	Prof. Krishanu Ray	Director of National Brain Research Centre (NBRC) Gurugram (HR)	Lipid Metabolism in the Cilia and its Impact on the Brain and Behaviour
06.07.2023	Dr. Ramesh Chandra	Asstt. Professor, Anatomy and Neurobiology Department University of Maryland, Baltimore, USA	Altered mitochondrial dynamics in brain reward circuitry in addiction
27.09.2023	Dr Raj Kumar Halder	CEO and Founder of Ruhvenile Biomedical, New Delhi, India	Biolife and its importance
11.12.2023	Prof. Ramanarayanan Krishnamurthy	The Scripps Research Institute, USA	The emergence versus origination of RNA and DNA (How versus Why) in the context of Origins of Life

CONFERENCES / WORKSHOPS / SYMPOSIUMS

Name	Title of Conference / Workshop/ Symposium	Date (from)	Date (to)
Neeraj Khatri	Virtual Workshop on Ethical Contemplation of Animal Resources for Experimentation (WeCARE-2021)	20-07-2021	26-07-2021
Manoj Kumar	Indo-US online workshop on the "Analysis of functions expressed by microbiomes"	15-11-2021	24-11-2021
Chander Shekhar	Training of Trainers on IoT and Embedded Systems	14-03-2022	16-03-2022
Venkata Ramana Vemuluri	A webinar on 'Understanding the microbes'	31-03-2022	31-03-2022
Neeraj Khatri	Skill Development program on Care and Husbandry Practices for Small Laboratory Animals	02-06-2022	08-07-2022
Neeraj Khatri	Workshop on Bio-methodology and Ethical Use of Laboratory Animals	10-10-2022	14-10-2022
Anshu Bhardwaj	Workshop on Era of Big Data in Genomics 2022	07-11-2022	12-11-2022
Neeraj Khatri	KARYASHALA:High end workshop Biosecurity, Biosafety, Capacity and Capability Building: Working with Infectious Agents (BBCCB-2023)	16-01-2023	22-01-2023
Amit Tuli	Autophagy India Network (AIN) Meeting	19-02-2023	19-02-2023
Neeraj Khatri	"Laboratory Animal Attendant" (AGR/Q4606; duration: 304 hours) course conditionally accredited by NSDC, Agriculture Skill Council of India, sponsored by GSBTM, Gujarat	20-02-2023	24-03-2023
Chander Shekhar Sharma	Open-labs' activities on National Science Week 2023	21-02-2023	24-02-2023
Amit Tuli	EMBO Young Investigator Network Meeting	01-03-2023	01-03-2023
Suresh Korpole	Workshop on Identification of Microbes by MALDI-MS and Microscopy	24-03-2023	24-03-2023
Chander Shekhar Sharma	Shadow a scientist programme.	19-06-2023	23-06-2023
Hemraj Nandanwar	Advances in Bioprocess Technologies (ABT-Bio 2023)	20-06-2023	30-06-2023
Hemraj Nandanwar	An Industry Academia Meet	20-06-2023	20-06-2023
Chander Shekhar Sharma	Training of Trainers on Internet of Things (IoT) in Healthcare	23-06-2023	25-06-2023
Ramya TNC and Vinod Chaudhari	Second bilateral meeting of INST Mohali and CSIR-IMTECH	08-08-2023	08-08-2023
Rashmi Kumar	Good Clinical Practice (GCP) Workshop	17-10-2023	17-10-2023
Karthikeyan Subramanian	50th National Seminar on Crystallography	22-11-2023	24-11-2023
Hemraj Nandanwar	Curtain Raiser for IISF-2024	15-12-2023	15-12-2023

STAFF CLUB ACTIVITIES: SPORTS

Year	Achievements
2023	Fareed Md. of CSIR -IMTECH has been nominated as the captain of CSIR National Volleyball team for the session 2023-25
	Digvijay Singh Naruka qualified for finals in the chess tournament in SSBMT(Zonal) held at CSIR -NEIST and played the finals at IMMT Bhubaneshwar.
	Women's Table Tennis team Sana, Kajal & Indu were qualified for finals in the SSBMT(Zonal) held at CSIR -NEIST and played finals at CSIR-IMMT, Bhubaneshwar.
2022	CSIR-IMTECH volleyball team stood victorious in SSBMT Zonal held at CSIR-NIEST, Jorhat and qualified for the finals and played finals at CSIR -IICT, Hyderabad.
	Kshitiz Walia was awarded the player of the match in one of the matches for his outstanding performance in the final held at CSIR-IICT, Hyderabad.
	Mr. Jaideep Mehta played in SSBMT Basketball tournament held at CSIR -NIO Goa and Selected for CSIR National Basketball team and represented the CSIR Team in Anusandhan Basketball tournament.
	Ashwani Bhardwaj was awarded the player of the tournament for his outstanding performance in the SSBMT football tournament held at CSIR-IMMT, Bhubaneshwar.





STUDENT ACTIVITIES

Student Organized Lectures on Science (SOLOS)

SOLOS is a scientific seminar series conducted monthly by the Ph.D. student community of CSIR-IMTECH. This series is an initiation from Dr. Sanjeev Khosla, Director, CSIR-IMTECH, and the first seminar was delivered by Dr. Gagandeep Kang on 6th October 2021. The fourth-year Ph.D. students of the institute organize the event with advice and support from Dr. Beena Krishnan and Dr. T.N.C Ramya. The CSIR-IMTECH SOLOS lecture series aims to bring eminent scientists and budding researchers on a single platform. The interactive lectures focus on the latest research trends and are envisioned to provide a chance for students to connect and interact with renowned scientists and researchers across the globe. Each hour-long session conducted in an online mode as a webinar or in an offline mode features a lecture by an eminent speaker followed by an interactive Q&A session. Speakers included

- **Dr. Manjula Reddy**
- **Ms. Kiran Mazumdar-Shaw**
- **Prof. Kim Lewis**
- **Dr. Priya Abraham**
- **Prof. Arun Shukla**
- **Dr. Sanjay Phogat**
- **Dr. Santosh Chauhan**
- **Dr. Sameer Velankar**
- **Prof. Kaustuv Sanyal**
- **Prof. Ullas Kolthur Seetharam**
- **Dr. Kumarswamy Thangaraj**
- **Prof. Jayanta Haldar**

CURIO-2022

The Student's Science Club members of CSIR-IMTECH organized a five-day science festival named CURIO-2022 from 21-25 March 2022. The festival aimed to promote creativity in science by blending various art and technology events. The five-day celebration included science art competitions to develop ingenious expressions of understanding of different scientific concepts, science talks by budding researchers to nurture the scientific temperament and discussions, and informative workshops from invited guest speakers to help future scientists channel their potential in the right directions. The workshops included various topics like science careers, steps towards a joyful and productive Ph.D. experience, science communication, and manuscript writing conducted by Dr. Shantala Hari Dass from India Bioscience, Dr. Mohit Kumar Jolly from IISc Bangalore, Mr. Ratneshwar Thakur from DBT-NIPGR, and Dr. Samrat Mukhopadhyay from IISER-Mohali, respectively. Dr. Vinay K. Nandicoori, Director, CSIR-CCMB, delivered a special lecture to commemorate World TB Day on 24th March. The event concluded with an exhibition of various science art entries and a prize distribution ceremony to encourage the participation of students.

WORKSHOPS AND TRAINING

2021-2023

Date	Trainer/Convener	Affiliation	Title
20.07.2021	Dr. Neeraj Khatri	Senior Principal Scientist, CSIR-Imtech	Virtual Workshop on Ethical Contemplation of Animals Resources for Experimentation (WeCARE-2021)
20-21.07.2021	Mr. Chander Shekhar	Senior Scientist, CSIR-Imtech	Workshop on futuristic technology in Agriculture (online)
14.03.2022	Mr. Chander Shekhar	Senior Scientist, CSIR-Imtech	Training of Trainers on IoT and Embedded Systems
10.10.2022	Dr. Neeraj Khatri	Senior Principal Scientist, CSIR-Imtech	Workshop on Bio-methodology and Ethical Use of Laboratory Animals
07.11.2022	Dr. Anshu Bhardwaj	Principal Scientist, CSIR-Imtech	Workshop on Era of Big Data in Genomics 2022
24.03.2023	Dr. Suresh Korpole	Senior Principal Scientist, CSIR-Imtech	Workshop on Identification of Microbes by MALDI-MS and Microscopy
22.08.2023	Dr. Manoj Kumar	Senior Principal Scientist, CSIR-Imtech	Workshop on AI/ML and Big Data Analytics
23.06.2023	Mr. Chander Shekhar	Senior Scientist, CSIR-Imtech	Training of Trainers on Internet of Things (IoT) in Healthcare

LECTURES DELIVERED & OFFICIAL VISITS ABROAD

LECTURES DELIVERED & PAPER PRESENTED

Name	Date	Title	Name of Conference/Seminar/Workshop	University/Institute/Organization, City, Country
Ramya TNC	09-02-2021	A sweet trail mix of glycans, proteins, microbes and more...	"Empowering Diversity in Science" event of IUPAC Global Women's Breakfast 2021	Online event organized by Philippine-American Academy of Science and Engineering (PAASE), Philippines
Anirban Roy Choudhury	12-02-2021	pH-responsive self-assembled novel tricomposite hydrogel of natural polysaccharides for selective adsorption and	International Online Congress on Membranes and Membrane Assisted Processes (ICMMAP 2021)	Mahatma Gandhi University, Kottayam, Kerala, India
Manoj Kumar	22-03-2021	Prediction of miRNA using bioinformatics pipeline	Skill Development on Advanced Bioinformatics in Genome Analysis of Livestock and Pets	College of Animal Biotechnology, Guru Angad Dev Veterinary and Animal Sciences University Ludhiana, Punjab, India
Manoj Kumar	25-03-2021	Viral Genomics and its Applications in Healthcare	International Webinar on 'Advances in Genomics and Gene Technology' Theme 'Microbial Genomics and Human Welfare'	Inter University Centre for Genomics and Gene technology (IUCGGT), Department of Biotechnology, University of Kerala, Kerala, India
Anirban Roy Choudhury	20-05-2021	pH-responsive adsorption and separation of organic dyes using self-assembled polysaccharide composite hydrogel for wastewater treatment	ACS Publication Symposium: The Power of Chemical Transformation	Online mode, ACS Publication Symposium
Manoj Kumar	22-07-2021	In-silico Prediction of Repurposed Drugs for Viruses	A virtual Workshop on "Ethical Contemplation of Animals Resources for Experimentation (WeCARE-2021)	ICARE, CSIR-Institute of Microbial Technology, Chandigarh, India
Pradip Sen	31-08-2021	Adalimumab, other molecules and R&D capabilities	Technology Matchmaker on Biosimilars Showcase: Biosimilar molecules and R&D capabilities	Durham University, UK TechEx.in, Venture Center, Pune, India
Hemraj Nandanwar	06-10-2021	Non-traditional approach to tackle AMR in ESKAPE pathogens.	International Conference on Emerging Trends in Combating MDR Superbugs- 2021	Abeda Inamdar Senior College, Pune, India
Manoj Kumar	17-10-2021	Development of Public domain resources in the field of viral bioinformatics	"Health Informatics Summit" from 16th to 19th October 2021	Indraprastha Institute of Information Technology (IIIT), Delhi, India
Manoj Kumar	23-10-2021	In-silico tools for screening of newer compounds and repurposed drugs against SARS-CoV-2	A Hybrid CME on "COVID-19: Human Resilience, Innovation & Hope 19: Human Resilience, Innovation & Hope"	Microbiology Department, AIIMS Raipur, Chhattisgarh, India
Hemraj Nandanwar	28-10-2021	Non-traditional approach to tackle AMR in ESKAPE pathogens	Lecture Series, NIO Goa	CSIR-NIO, Goa, India
Suresh Korpole	02-11-2021	Microbial Type Culture Collection and Gene bank, an International Depository Authority	Meeting of Member States and International Depositary Authorities under the Budapest Treaty, IDA-WIPO biannual meeting (virtual mode)	World Intellectual Property Organization (WIPO), Geneva
Hemraj Nandanwar	13-11-2021	Drug repurposing for management of community-based bacterial infections	Doctoral Consortium: CUDC-2021	Chitakara University,Chandigarh, , India
Manoj Kumar	16-11-2021	Viral metagenomics	Indo-US online workshop on the "Analysis of functions expressed by microbiomes"	CSIR-Institute of Microbial Technology (CSIR-IMTECH), Chandigarh, India, and Galaxy-P team, University of Minnesota, Minneapolis, US
Anirban Roy Choudhury	17-11-2021	Process development and scale up for production of microbial exopolysaccharides: Petri plate to pilot plant	Microbes in Sustainable Development	Indian Network for Soil Contamination Research, India
Karthikeyan Subramanian	27-11-2021	Structural and biochemical characterization of Rv1828: An essential protein in *Mycobacterium tuberculosis*	48th National Seminar on Crystallography	Indian Institute of Technology Roorkee, Roorkee, India
Manoj Kumar	03-12-2021	Role of Computational Immunology in Designing vaccines	DBT supported Skill Vigyan Program for training the faculty on "Trends in Immuno Techniques"	Department of Biochemistry, Panjab University, Chandigarh, India
Anirban Roy Choudhury	04-12-2021	Microbial polysaccharides: production and application development	Microbial Biotechnology: A New Era of Sustainable Development	Department of Biotechnology, HP University,India
Pradip Sen	08-12-2021	TIM-3: a regulator of antileishmanial immune response	GCRF Network for Neglected Tropical Diseases (online seminar series)	Durham University, UK

Hemraj Nandanwar	08-01-2022	Discovery to Development: An antibiotic against Gram negative bacterial infections	Invited Seminar	Modern College of Arts, Science and Commerce, Pune, India
Dr. Karthikeyan Subramanian	12-01-2022	Protein Structure Solution and Refinement	Protein to Structure	Tata Memorial Center, ACTREC, Navi Mumbai, India
Manoj Kumar	04-02-2022	Computational Antiviral Drug Discovery and Drug Repurposing	VIBCON2 National Conference on "Transforming Livestock Economy through Innovations in Immunology and Biotechnology" and XXVI Annual Convention of Indian Society of Veterinary Immunology and Biotechnology (ISVIB)	Guru Angad Dev Veterinary and Animal Sciences University Ludhiana, Punjab, India
Pradip Sen	09-03-2022	Runx proteins promote antileishmanial immunity	GCRF NTD Network Closing meeting and ECR conference 2022 (India Hub meeting)	Durham University, UK
Manoj Kumar	08-06-2022	Role of Artificial Intelligence and machine learning in antiviral drug discovery	the Faculty Development Programme on "Challenges in Tackling Human Diseases: A Novel Approaches"	Department of Biotechnology, CCT and Chandigarh College of Pharmacy (CCP), CGC-Landran, Mohali, Punjab, India
Ravi Mishra	21-06-2022	Advances in Bioprocess for Purification of Bioactive Protein from Inclusion Body	Hands-on training workshop organized by Centre of Excellence in Biopharmaceutical Technology (CoE-CBT), IIT Delhi	IIT-Delhi, India
Anirban Roy Choudhury	27-09-2022	Polysaccharide-based smart hydrogel for in vitro delivery of co-encapsulated bioactive compounds	Insights into the Key Trends in Biomaterial Research	DBT-Institute of Life Sciences, Bhubaneswar, Odisha, India
Manoj Kumar	11-10-2022	In-silico Prediction of Repurposed Drugs for Viruses	A Workshop on "Bio-methodology and Ethical Use of Laboratory Animals"	ICARE, CSIR-Institute of Microbial Technology, Chandigarh, India
Hemraj Nandanwar	22-10-2022	Petri Plate to Discovery: A case study for New Antibiotic	Invited Seminar	Center for Biotechnology, School of Pharmaceutical Sciences Siksha 'O' Anusandhan, Bhubaneswar, Odisha
Suresh Korpole	08-11-2022	MTCC, a Microbial Resource Centre: Role in conservation and distribution of microbial diversity	Asian Network of Research Resource Centers (ANRRC 2022), Organized by JCM-RIKEN, Japan	Japan Collection of Microorganisms (JCM) RIKEN BRC Microbe Division, Japan
Ravi Mishra	10-11-2022	Reverse Vaccinology Approach for Developing Vaccine against AMR bacterial pathogens	International Symposium on Recent Trends and Future Opportunities in Pharmaceuticals (PHARMACON-2022)	NIPER, Mohali, Punjab, India
K.P.S. Sengar	11.11.2022	An assessment of social media usage patterns among Librarians of CSIR and DST- Institute's Libraries: A Preliminary Study	16th International Conference on Webometric, Informetrics, and Scientometrics (W.I.S.) and 21st COLLNET 2022 Meeting	Chulalongkorn University, Bangkok, Thailand.
Pradip Sen	23-11-2022	TIM-3: a new immunoregulator of antileishmanial immune response	49th Annual Conference of Indian Immunological Society (IMMUNOCON-2022)	PGIMER, Chandigarh, India
Karthikeyan Subramanian	29-11-2022	A journey from Phosphatase to Mutase: In search of an essential enzyme involved in Riboflavin biosynthesis pathway of Mycobacterium tuberculosis	49th National Seminar on Crystallography	University of Jammu, Jammu, India
Hemraj Nandanwar	10-12-2022	Approaches for Screening and Characterization of Preclinical Drug Candidates (Tridecaptin M: Discovery and Preclinical studies)	A hands-on Training Program sponsored by DST STUTI	Department of Biotechnology and Bioinformatics, Jaypee University of Information Technology, Waknaghat, Solan, India
Nithya Vadakedath	12-12-2022	Antibiofilm and quorum quenching compounds from microbes/medicinal plants against multidrug resistant pathogens	Ulté de Médecine, Brest	Faculté de Médecine, 22 avenue Camille Desmoulins, 29238 Brest, France
Anirban Roy Choudhury	17-12-2022	Polysaccharide-based self-assembled smart hydrogel for in vitro delivery of co-encapsulated probiotics and folic acid	8th International Bioprocessing India Conference	CSIR-National Chemical Laboratory, Pune, India
Krishan Gopal	11-01-2023	Investigating novel Toxin-Antitoxin Systems, the molecular breaks, in Mycobacterium tuberculosis	International Conference on Recent Advancements in TB and HIV Research	Jointly organized by Ohio State University's Global Gateway (India) and the Foundation for Neglected Disease Research (FNDR), Bengaluru, India
Amit Tuli	12-01-2023	Regulation of Retrograde Transport of Lysosomes	Mini symposium: Latest in Autophagy and Lysosome Biology	CSIR-Institute of Genomics and Integrative Biology, Delhi, India
Manoj Kumar	18-01-2023	Antiviral Drug Discovery: Computational to Experimental	"High-End Workshop: Biosecurity, Biosafety, Capacity and Capability Building: Working with Infectious Agents (BBCCB-2023)"	ICARE, CSIR-Institute of Microbial Technology, Chandigarh, India
Hemraj Nandanwar	20-01-2023	Discovery and Preclinical studies of Antibiotic against Gram negative bacterial infections	Indian Pharmaceutical Congress 2023	University Department of Pharmaceutical Sciences, Rashtrasant Tukadoji Maharaj University, India
Ravi Mishra	02-02-2023	Mammalian Cell Line and bioprocess Engineering for expression of complex proteins	Biosimilar international workshop organized by ICT Mumbai, 2-3 feb., 2023, Goa	ICT-Mumbai at Goa,India

Suresh Korpole	03-02-2023	Advances in Tackling Antimicrobial Resistance and Ensuring Food Safety under One Health Perspective. Invited to discuss on usage of microbial strains by industry and benefit sharing related issues.	23rd Indian Veterinary Congress, 30th Annual Conference of IAAVR & National Symposium	College of Veterinary Science & A. H. Anand, Gujarat, India
Ravi Mishra	27-03-2023	The Next Genetation Vaccine development technologies	13th Vaccines World Summit 2023 and 2 and Biologics Festival India 2023	IMAPAC, Online mode
Anirban Roy Choudhury	28-03-2023	Polysaccharide-based self-assembled smart hydrogel for in vitro delivery of co-encapsulated probiotics and folic acid	ACS Spring 2023	ACS, Virtual mode
Suresh Korpole	23-05-2023	Unseen treasury for human welfare: Antimicrobial peptides from probiotics for biotechnological applications	Biotechnological Interventions in Animal Production and Therapeutics (BIAPT-2023)	Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar, Kashmir, India
E. Senthil Prasad	26-06-2023	Bacteriorhodopsin production and purification for therapeutic applications	ABT-Bio 2023 : National workshop on Advances in Bioprocess Technologies	CSIR-Institute of Microbial Technology,India
Hemraj Nandanwar	28-06-2023	AMR, a Slow Pandemic! Efforts to Tackle the Problem of AMR	ABT-Bio 2023 : National workshop on Advances in Bioprocess Technologies	CSIR-Institute of Microbial Technology,India
Hemraj Nandanwar	12-08-2023	Discovery and preclinical studies of antibiotic against Gram negative bacterial infections	NIPER Student Research Symposium (NSRS 2023)	NIPER, Mohali, Punjab, India
Pawan Gupta	20-09-2023	Nuclear Receptor in Modulation of Infection and Non communicable disease	Regional Young Investigator Meeting 2023 Srinagar	University of Kashmir, Srinagar, India
Rajeev K. Tyagi	05-10-2023	Autophagy circumvents anti-P. falciparum defense under oleuropein pressure	Immunocon 50	Indian Immunology Society, AIIMS, New Delhi, India
Ravi Mishra	05-10-2023	Immunological Characterization of SARS-CoV-2 Prefusion-stabilized Spike protein based antigen	Immunocon 50	Indian Immunology Society, AIIMS, New Delhi, India
Rashmi Kumar	06-10-2023	Aging mediated gut microbiota dysbiosis influences the function of dendritic cells	Immunocon 50	Indian Immunology Society, AIIMS, New Delhi, India
Rajeev K. Tyagi	09-10-2023	Co-delivery of drug nanoparticles presents an effective treatment for rheumatoid arthritis	Karyashala workshop 2023	Panjab University, Chandigarh, India
Venkata Ramana Vemuluri	10-10-2023	Exploration of photo-responsive microbial pigments for antimicrobial photodynamic therapy (aPDT)	Applied Microbiology and Beneficial Microbes	CRG Conferecnes, London, UK
Ramya TNC	08-11-2023	Presenting a sweet tag for protein Ser/Thr-O-sialylation	12th Conference of the Asian community of Glycoscience and Glycotechnology	School of Life Sciences, University of Hyderabad, Hyderabad, India
Suresh Korpole	13-11-2023	Updating MTCC culture collection and discussion on Deposit of biological materials: technology trends and emerging practices in IDAs.	Meeting of member states and IDAs under the Budapest Treaty, WIPO, Geneva, Switzerland	World Intellectual Property Organization (WIPO), Geneva, Switzerland
Mani Shankar Bhattacharyya	21-11-2023	Strain engineering strategies for enhanced production of sclareol in yeast	Yeast India 2023	Indian Institute of Science Education and Research, Mohali, India
Mani Shankar Bhattacharyya	21-11-2023	Sophorolipid and its napthyl derivative IMT-C3 mediated inhibition of polarized hyphae elongation in *Candida albicans*: Exploring the mechanism of action.	Yeast India 2023	Indian Institute of Science Education and Research, Mohali, India
Mani Shankar Bhattacharyya	21-11-2023	Tailoring novel derivatives of sophorolipid, exploring the antifungal activity and its mechanism against *Candida albicans*.	Yeast India 2023	Indian Institute of Science Education and Research, Mohali, India
Ravi Mishra	23-11-2023	Design and Development of NextGeneration Spike protein based vaccine against SARS-CoV-2	Biopharma Summit – 23-24 Nov., 2023	IIT-Bombay, India
Manoj Kumar	02-12-2023	Application of Artificial Intelligence in Drug Repurposing for Emerging and Reemerging Viruses	VIROCON – 2023: Advancements in Global Virus Research Towards One Health	ICAR-National Research Centre for Banana, Tiruchirappalli Tamil Nadu, India
Amit Tuli	05-12-2023	SARS-CoV-2 virulence factor ORF3a blocks lysosome function by modulating TBC1D5-dependent Rab7 GTPase cycle	Cell Bio 2023	American Society for Cell Biology, Boston, USA
Rashmi Kumar	08-12-2023	Intra-tumoral microbiota and immunomodulation in oral squamous cell carcinoma	Symposium on Microbiome and disease	Department of Experimental Medicine & Biotechnology, PGIMER, Chandigarh,India
Pradip Sen	20-12-2023	The role of TIM-3 receptor in immunoregulation during *Leishmania donovani* infection	India-International Science Forum (Seminar series)	Panjab University, Chandigarh, India

OFFICIAL VISITS ABROAD

Name	Date (from)	Date (to)	Venue, City, Country
Nithya Vadakedath	12-10-2022	12-12-2022	Faculté de Médecine, 22 avenue Camille Desmoulins, 29238 Brest, France
K.P.S. Sengar	09-11-2022	13-11-2022	Chulalongkorn University, Thailand
Venkata Ramana Vemuluri	07-10-2023	12-10-2023	Hyatt Place London Heathrow Airport, London, UK
Suresh Korpole	13-11-2023	15-11-2023	World Intellectual Property Organization (WIPO headquarters), Geneva, Switzerland
Rajeev K. Tyagi	16-11-2023	23-11-2023	Institute Pasteur De Lille, Lille, France
Amit Tuli	02-12-2023	06-12-2023	American Society for Cell Biology, Boston, USA


राजभाषा
गतिविधियाँ

वर्ष 2021 -2023 के दौरान राजभाषा संबंधी गतिविधियां :

संस्थान में राजभाषा हिन्दी के प्रयोग को प्रेरित एवं प्रोत्साहित करने के लिए समय-समय पर कार्यशालाओं, संगोष्ठियों तथा प्रतियोगिताओं का आयोजन किया जाता है। रिपोर्ट की अवधि के दौरान किए गए प्रमुख प्रयास इस प्रकार हैं:

1. वैज्ञानिक एवं तकनीकी संगोष्ठी

दिनांक 29 अगस्त, 2023 को संस्थान में हिन्दी में वैज्ञानिक एवं तकनीकी विषयों पर एक दिवसीय आरएंडडी संगोष्ठी का आयोजन किया गया।
इसमें नगर के 09 आरएंडडी संस्थानों से 25 प्रतिभागियों ने भाग लिया तथा कुल 19 शोध-पत्र प्रस्तुत किए।

2. हिन्दी पखवाड़ा/हिन्दी माह एवं हिन्दी दिवस

प्रतिवर्ष 14 सितम्बर को हिन्दी दिवस तथा उससे पूर्व हिन्दी पखवाड़ा/हिन्दी माह के अंतर्गत विविध प्रतियोगिताओं का आयोजन किया जाता है।
वर्ष 2021, 2022 एवं 2023 में आयोजित प्रतियोगिताओं एवं उनके विजेताओं का संक्षिप्त विवरण निम्नानुसार है:

(i) वर्ष 2021 (01–14 सितम्बर, 2021)

हिन्दी श्रुतलेख (सामान्य एवं वैज्ञानिक वर्ग), टिप्पणी एवं प्रारूप लेखन, वाद-विवाद तथा कविता पाठ प्रतियोगिताएँ आयोजित की गईं।

▶ हिन्दी श्रुतलेख प्रतियोगिता

1.	सुश्री कनिका गोयल	प्रथम
2.	सुश्री प्रियंका	द्वितीय
3.	श्री भुवनेश्वर	तृतीय
4.	सुश्री रेनू	प्रोत्साहन

▶ हिन्दी श्रुतेलख प्रतियोगिता(समस्त वैज्ञानिक वर्ग)

1.	डॉ. राम्या टीएनसी	प्रथम
2.	डॉ. बीना कृष्णन	द्वितीय
3.	डॉ. रश्मि कुमार	तृतीय

▶ हिन्दी टिप्पण एवं प्रारूप आलेखन प्रतियोगिता

1.	श्री राजेन्द्र नौटियाल	प्रथम
2.	सुश्री शिवांगी	द्वितीय
3.	श्री गणेश लाल मीणा	तृतीय

▶ वाद विवाद प्रतियोगिता

1.	श्री राघवेन्द्र	प्रथम
2.	श्री भंवर बामनियां	द्वितीय
3.	सुश्री नंदिता शर्मा	तृतीय
4.	सुश्री खुशबू मेहता	प्रोत्साहन

▶ हिन्दी कविता पाठ प्रतियोगिता

1.	सुश्री इंदिरा देवी	प्रथम
2.	श्री भंवर बामनियां	द्वितीय
3.	डॉ. मनुज त्रिपाठी	तृतीय

(ii) वर्ष 2022 (16–28 सितम्बर, 2022)

हिन्दी कविता पाठ, श्रुतलेख (सामान्य एवं वैज्ञानिक वर्ग), वाद-विवाद तथा हिन्दी टंकण प्रतियोगिताएँ करवाई गईं।

▶ हिन्दी कविता पाठ प्रतियोगिता

1.	श्री भंवर बामनियां	प्रथम
2.	सुश्री नंदिता श्रीवास्तव	द्वितीय
3.	डॉ. रवि मिश्रा	तृतीय

▶ हिन्दी श्रुतेलख प्रतियोगिता(समस्त स्टाफ के लिए)

1.	सुश्री शीतल कटिहार	प्रथम
2.	सुश्री जैनिस थापर	द्वितीय
3.	सुश्री मुमताज	तृतीय

▶ हिन्दी श्रुतेलख प्रतियोगिता(वैज्ञानिक वर्ग के लिए)

1.	श्री दिग्विजय सिंह नरूका	प्रथम
2.	सुश्री सना	द्वितीय
3.	श्री जयदीप मेहता	तृतीय

▶ हिन्दी टंकण प्रतियोगिता

1.	डॉ. चारू शर्मा	प्रथम
2.	श्री चन्द्रशेखर शर्मा	द्वितीय
3.	डॉ. राम्या टीएनसी	तृतीय

▶ हिन्दी में वाद- विवाद प्रतियोगिता

1.	श्री अरूण खुराना	प्रथम
2.	श्री हरमिन्द्र सिंह	द्वितीय
3.	श्री भूपाल सिंह रावत	तृतीय
4.	श्री संदीप कुमारा	प्रोत्साहन

(iii) वर्ष 2023 (अगस्त–20 सितम्बर, 2023)

हिन्दी कविता पाठ, श्रुतलेख (सामान्य एवं वैज्ञानिक वर्ग), वाद-विवाद, टंकण तथा टिप्पणी एवं प्रारूप लेखन प्रतियोगिताएँ आयोजित की गईं।

▶ हिन्दी कविता पाठ प्रतियोगिता

1.	श्री चंकित	प्रथम
2.	सुश्री नंदिता श्रीवास्तव	द्वितीय
3.	सुश्री सना खातून	तृतीय

▶ हिन्दी श्रुतेलख प्रतियोगिता(समस्त स्टाफ के लिए)

1.	सुश्री जैनिस थापर	प्रथम
2.	सुश्री नंदिता श्रीवास्तव	द्वितीय
3.	श्री भूपिन्द्र सिह चौपड़ा	तृतीय
4.	श्री आशिष कुमार दूबे	प्रोत्साहन

▶ हिन्दी श्रुतेलख प्रतियोगिता(वैज्ञानिक वर्ग के लिए)

1.	डॉ नीरज खत्री	प्रथम
2.	श्री चन्द्रशेखर शर्मा	द्वितीय
3.	डॉ. राम्या टीएनसी	तृतीय

▶ हिन्दी टंकण प्रतियोगिता

1.	श्री अरूण खुराना	प्रथम
2.	श्री हरमिन्द्र सिह	द्वितीय
3.	श्री संदीप कुमार	तृतीय

▶ हिन्दी में वाद- विवाद प्रतियोगिता

1.	सुश्री सुमन चौधरी	प्रथम
2.	श्री भंवर बामनियां	द्वितीय
3.	श्री जयदीप मेहता	तृतीय

▶ हिन्दी टिप्पण एवं प्रारूप लेखन प्रतियोगिता

1.	श्री राजेन्द्र नौटियाल	प्रथम
2.	श्री दिग्विजय सिह नरूका	द्वितीय
3.	श्री गणेश लाल मीणा	तृतीय

हिंदी पुस्तक प्रदर्शनी का आयोजन :

संस्थान में हिंदी माह कार्यक्रम के अंतर्गत एवं शिक्षक दिवस के अवसर पर "हिंदी पुस्तक प्रदर्शनी" का आयोजन किया गया। प्रदर्शनी में विज्ञान और प्रौद्योगिकी, साहित्य, प्रेरणादायक पुस्तकें, आत्मकथाएँ, जीवनियाँ और संस्मरण, पौराणिक ग्रंथ रखे गए।

नगर राजभाषा समिति (नराकास) गतिविधियाँ:

संस्थान नगर राजभाषा समिति, चण्डीगढ़ का सक्रिय सदस्य है।

दिनांक 22 फरवरी, 2023 को संस्थान में नगर राजभाषा अधिकारी सम्मेलन का आयोजन किया गया जिसमें लगभग 40 अधिकारियों ने भाग लिया।

वर्ष 2022-23 में राजभाषा हिन्दी के प्रयोग हेतु किए गए सराहनीय प्रयासों के लिए नगर राजभाषा कार्यान्वयन समिति द्वारा 05 दिसम्बर, 2023 को आयोजित समारोह में संस्थान को प्रथम पुरस्कार प्रदान किया गया। यह पुरस्कार संस्थान निदेशक प्रो. संजीव खोसला एवं वरिष्ठ हिन्दी अधिकारी डॉ. नीरू ने ग्रहण किया।

हिन्दी कार्यशालाएँ:

कर्मचारियों को दैनिक कार्य हिन्दी में करने में आ रही कठिनाइयों के समाधान हेतु टेबल वर्कशॉप का आयोजन किया जाता है।

इस क्रम में रिपोर्ट की अवधि के दौरान विभिन्न अनुभागों/प्रभागों के साथ चर्चा बैठकें आयोजित कर कर्मचारियों को हिन्दी प्रयोग के लिए प्रेरित किया गया।

दिनांक 05 दिसम्बर, 2023 को आयोजित नगर राजभाषा कार्यान्वयन समिति के *राजभाषा पुरस्कार वितरण समारोह* में, सीएसआईआर-इमटैक में राजभाषा के प्रयोग को बढ़ावा देने हेतु किए गए सराहनीय प्रयासों के लिए संस्थान को *प्रथम पुरस्कार* प्रदान किया गया। सीएसआईआर-इमटैक की ओर से यह पुरस्कार संस्थान निदेशक प्रो. संजीव खोसला एवं वरिष्ठ हिन्दी अधिकारी डॉ. नीरू ने शील्ड एवं प्रशस्ति पत्र स्वरूप ग्रहण किया।

वर्ष 2021 -2023 के दौरान राजभाषा संबंधी गतिविधियां :











प्रमुख कार्यक्रम

25 जनवरी 2021 को स्टैनफोर्ड विश्वविद्यालय, कैलिफोर्निया में बायोइंजीनियरिंग के प्रोफेसर डॉ. मनु प्रकाश द्वारा सीएसआईआर-आईएमटेक स्थापना दिवस व्याख्यान (वर्चुअल मोड)।

केंद्रीय मंत्री डॉ. हर्षवर्धन 21 मार्च 2021 को सीएसआईआर-आईएमटेक में जैव-नवाचार केंद्र का उद्घाटन।

2 अक्टूबर 2021 को गांधी जयंती के अवसर पर सीएसआईआर-आईएमटेक में फिट इंडिया फ्रीडम रन/वॉक (5 किमी)।

30 सितंबर 2022 को वी.सी. वोरा ऑडिटोरियम में प्रोफेसर दुलाल पांडा, निदेशक एनआईपीईआर, मोहाली द्वारा सीएसआईआर स्थापना दिवस व्याख्यान, जिसका शीर्षक है "ट्यूबुलिन अनुसंधान के 55 वर्षों से सबक: मानव स्वास्थ्य और रोग पर प्रभाव"।

सीएसआईआर-आईएमटेक ने 20 अक्टूबर 2023 को "आयुर्वेद एवरीडे आयुर्वेद एवरीवेयर" शीर्षक से 7वां आयुर्वेद दिवस मनाया।

सीएसआईआर-आईएमटेक स्थापना दिवस व्याख्यान प्रो. टी. महापात्रा, पूर्व सचिव, कृषि अनुसंधान एवं शिक्षा विभाग, भारत सरकार तथा पूर्व महानिदेशक, भारतीय कृषि अनुसंधान परिषद द्वारा दिया गया। यह 24 जनवरी 2023 को मनाया गया।

30 जनवरी, 2023 को सीएसआईआर-आईएमटेक में डॉ. शेखर सी. मांडे, पूर्व सचिव, डीएसआईआर और डीजी-सीएसआईआर द्वारा "जीवन विज्ञान में डेटा एनालिटिक्स: ट्रेसिंग माई ओन जर्नी" शीर्षक से प्रो. बी.के. बछावत मेमोरियल व्याख्यान आयोजित किया गया।

सीएसआईआर-आईएमटेक के वन वीक वन लैब (ओडब्ल्यूओएल) कार्यक्रम (19 जून -24 जून 2023) का उद्घाटन मुख्य अतिथि, पंजाब के माननीय राज्यपाल और चंडीगढ़ के प्रशासक, श्री बनवारीलाल पुरोहित द्वारा 19 जून 2023 को किया गया।

पंजाब के माननीय राज्यपाल और चंडीगढ़ के प्रशासक श्री बनवारीलाल पुरोहित द्वारा सीएसआईआर-आईएमटेक, चंडीगढ़ में बायोफार्मास्युटिकल्स उत्पादों के लिए जीएमपी माइक्रोबियल सेल बैंकों (एनआरजीसीबीआईओ) के राष्ट्रीय भंडार का उद्घाटन सीएसआईआर-आईएमटेक के वन वीक वन लैब (ओडब्ल्यूओएल) कार्यक्रमों के तहत सीएसआईआर-आईएमटेक, चंडीगढ़ के निदेशक डॉ. संजीव खोसला की उपस्थिति में 19 जून 2023 को किया गया।

8 अगस्त 2023 को आईएनएसटी, मोहाली और सीएसआईआर-आईएमटेक, चंडीगढ़ की दूसरी द्विपक्षीय बैठक का उद्घाटन।

सीएसआईआर-आईएमटेक और रॉयल सोसाइटी ऑफ केमिस्ट्री ने 2 नवंबर 2023 को यूसुफ हामिद रसायन विज्ञान शिविर के उद्घाटन में हरियाणा के माननीय राज्यपाल श्री बंडारू दत्तात्रेय को मुख्य अतिथि के रूप में और भारत सरकार के सचिव (डीईपीडब्ल्यूडी) श्री राजेश अग्रवाल को मुख्य अतिथि के रूप में आमंत्रित किया। मुख्य आकर्षण में "हैंड्स ऑन विद स्लाइम", "घड़ी प्रतिक्रियाएं", "क्रिस्टलीकरण", "रंग प्रतिक्रियाएं", आदि जैसे कार्यक्रम शामिल थे।

क्रिस्टलोग्राफी पर 50वीं राष्ट्रीय संगोष्ठी (NSC50) 22-24 नवंबर, 2023 के दौरान सीएसआईआर-आईएमटेक में आयोजित की गई। NSC50 का आयोजन सीएसआईआर-आईएमटेक और भारतीय क्रिस्टलोग्राफिक एसोसिएशन (ICA) द्वारा संयुक्त रूप से किया गया था। यह देश भर के क्रिस्टलोग्राफरों के लिए एक बेहतरीन मंच के रूप में काम आया, जहाँ वे अपने नवीनतम शोध निष्कर्षों पर चर्चा करने के लिए एकत्रित हुए।

निदेशक सचिवालय

सीएसआईआर-इमटेक में निदेशक सचिवालय केंद्रीय समन्वय कार्यालय के रूप में कार्य करता है, जो प्रशासनिक, णनीतिक और अनुसंधान संबंधी गतिविधियों में निदेशक को सहयोग प्रदान करता है। यह निदेशक कार्यालय, वैज्ञानिक कर्मचारियों, प्रशासनिक प्रभागों और बाहरी हितधारकों के बीच संचार के प्राथमिक माध्यम के रूप में कार्य करता है।

र

प्रशासन

प्रशासन (सीओए) जो एक उप सचिव और संस्थान के लिए नामित सतर्कता अधिकारी होता है। सीओए को एक प्रशासनिक अधिकारी (एओ) द्वारा सहायता प्रदान की जाती है जो एक अवर सचिव और अनुभाग अधिकारी होता है। सामान्य प्रशासन विभाग (जीएडी) सभी प्रशासनिक पहलुओं का प्रबंधन करता है और निदेशक को सभी गैर-आरएंडडी और संबद्ध मामलों में सहायता करता है। जीएडी को मोटे तौर पर निम्नलिखित अनुभागों में संगठित किया गया है, जिनमें से प्रत्येक का नेतृत्व एक अनुभाग अधिकारी करता है - भर्ती/मूल्यांकन अनुभाग, स्थापना अनुभाग, बिल अनुभाग और सामान्य अनुभाग। इन चार सुपरिभाषित अनुभागों के अलावा, प्रशासन सभी कानूनी मामलों, अदालती मामलों, सतर्कता तंत्र, कार्यों आदि से भी निपटता है।

वित्त एवं लेखा अनुभाग

वित्त एवं लेखा प्रभाग संस्थान के वैज्ञानिक, तकनीकी एवं प्रशासनिक कर्मचारियों की वित्तीय आवश्यकताओं को पूरा करता है। प्रभाग निदेशक की ओर से संस्थान के खातों का रखरखाव करता है। सीएसआईआर मुख्यालय, नई दिल्ली से प्राप्त बजट आवंटन के उपयोग की निगरानी की जाती है, तथा प्रभाग उपयुक्त अधिकारियों को प्रभावी उपयोग के लिए उपचारात्मक उपाय सुझाता है। प्रभाग प्रायोजित एवं अनुदान सहायता परियोजनाओं के लिए आवंटित बजट से संबंधित वित्तीय लेनदेन तथा तकनीकी सेवाओं के लिए शुल्क भी संभालता है। वित्त एवं लेखा प्रभाग के अन्य कार्यों में परियोजना निगरानी एवं अन्य परियोजना-संबंधी गतिविधियों में पीएमबीडी प्रमुख के साथ समन्वय करना, यह सुनिश्चित करना कि भारत सरकार के अर्थव्यवस्था निर्देशों का ईमानदारी से पालन किया जाए, पीएफएमएस पोर्टल एवं वाणिज्यिक बैंक के माध्यम से सभी आपूर्तिकर्ताओं/ठेकेदारों को उनकी सेवाओं के लिए भुगतान जारी करना, खरीद, प्रबंधन परिषद, डीपीसी आदि से संबंधित विभिन्न समितियों में प्रतिनिधित्व, सभी कर्मचारियों को उनके व्यक्तिगत दावों एवं अग्रिमों के लिए भुगतान करना, वेतन प्रस्तावों एवं अन्य वित्तीय मामलों का निर्धारण, कर्मचारियों को दिए गए ऋण एवं अग्रिमों की निगरानी करना शामिल है। वित्त एवं लेखा प्रभाग अपने कर्तव्यों का निर्वहन समयबद्ध तरीके से करता है ताकि एक ओर अपने लक्ष्यों की सुचारू और प्रभावी प्राप्ति के साथ-साथ वित्तीय विवेक का भी ध्यान रखा जा सके।

भंडार एवं क्रय प्रभाग

सीनियर सीओएसपी/एसपीओ की अध्यक्षता में भंडार एवं खरीद प्रभाग की इकाई विशेष रूप से सीएसआईआर-आईएमटेक के लिए माल की खरीद में लगी हुई है और इसका उद्देश्य नए युग की प्रौद्योगिकियों और प्रबंधन तकनीकों को नियोजित करके संस्थान के अनुसंधान एवं विकास उद्देश्यों को सुविधाजनक बनाने के लिए एक कुशल और प्रभावी आपूर्ति सहायता प्रणाली प्रदान करना है। माल की खरीद सीएसआईआर मैनुअल ऑफ प्रोक्योरमेंट ऑफ गुड्स (एमपीजी) 2019, जीएफआर 2017 और समय-समय पर संशोधनों को अपनाकर की जाती है। भंडार एवं खरीद प्रभाग उपकरण रखरखाव और मरम्मत, यदि कोई हो, के लिए वार्षिक रखरखाव या व्यापक अनुबंध समझौता सेवाएं भी प्राप्त करता है। भंडार एवं खरीद प्रभाग एक इन्वेंट्री प्रणाली का रखरखाव करता है जिसमें एक व्यक्तिगत इन्वेंट्री, एक प्रभागीय इन्वेंट्री, एक संस्थागत इन्वेंट्री और एक अचल संपत्ति इन्वेंट्री शामिल होती है इस प्रभाग द्वारा केंद्रीय भंडार में चल रही परियोजनाओं/आरएंडडी के लिए बार-बार आवश्यक उपभोग्य वस्तुओं की सूची बनाई जाती है, जैसे कि रसायन, कांच के बने पदार्थ, प्लास्टिक के बर्तन, आम तौर पर इस्तेमाल की जाने वाली स्टेशनरी और सामान्य वस्तुएं, जैसा कि क्रय समिति द्वारा तय किया जाता है। यह प्रभाग रिपोर्ट और रिटर्न दाखिल करने के लिए विभिन्न सरकारी एजेंसियों के साथ समन्वय और संपर्क स्थापित करने की महत्वपूर्ण भूमिका भी निभाता है।

परियोजना प्रबंधन और व्यवसाय विकास (पीएमबीडी)

परियोजना प्रबंधन एवं व्यवसाय विकास (पीएमबीडी) समूह संस्थान में अनुसंधान प्रबंधन समूह की एक महत्वपूर्ण शाखा है। यह देश भर में अन्य अनुसंधान प्रबंधन समूहों से जुड़ने और नेटवर्क बनाने के लिए भारत अनुसंधान प्रबंधन पहल (आईआरएमआई) नेटवर्क का भी हिस्सा है। पीएमबीडी के तीन कार्यक्षेत्र हैं, अर्थात परियोजना एवं प्रौद्योगिकी प्रबंधन, व्यवसाय विकास और बौद्धिक संपदा अधिकार प्रबंधन। परियोजना एवं प्रौद्योगिकी प्रबंधन (पीटीएम) कार्यक्षेत्र की प्रमुख गतिविधियों में सीएसआईआर/गैर-सीएसआईआर परियोजनाओं की परियोजना निगरानी, वार्षिक योजनाओं की तैयारी, बजट दस्तावेज, प्रदर्शन समीक्षा दस्तावेज, आईएमटेक अनुसंधान परिषद और प्रबंधन परिषद के लिए अनुसंधान एवं विकास प्रगति रिपोर्ट और समूह को सौंपे गए जीएसटी, आरटीआई आदि से संबंधित कार्य शामिल हैं। यह सीएसआईआर मुख्यालय की विभिन्न इकाइयों, विज्ञान और प्रौद्योगिकी, पर्यावरण और वन संबंधी संसदीय स्थायी समिति, जैव प्रौद्योगिकी विभाग, विज्ञान और प्रौद्योगिकी विभाग, आईसीएमआर, आईसीएआर, डीओई, विभिन्न औद्योगिक घरानों आदि द्वारा उपयोग के लिए संस्थान द्वारा भेजी गई तकनीकी रिपोर्ट भी तैयार करता है और जनसंपर्क, लेखा परीक्षा और तकनीकी प्रश्नों का उत्तर देता है। बिजनेस डेवलपमेंट ग्रुप (BDG) वर्टिकल को विभिन्न शोध और विकास परियोजनाओं के लिए उद्योग के साथ बातचीत और साझेदारी बनाने का अधिकार है। इसका उद्देश्य सभी उद्योग परियोजनाओं के परियोजना प्रबंधन के साथ-साथ IMTECH के प्रौद्योगिकी पोर्टफोलियो के बारे में समझौता ज्ञापनों, समझौतों और सूचना के प्रसार के माध्यम से उद्योग-अकादमिक संबंधों को मजबूत करना है। BDG संस्थान के समग्र ब्रांड आर्किटेक्चर को बेहतर बनाने के लिए प्रेस कवरेज के साथ-साथ प्रिंट, इलेक्ट्रॉनिक और वेब पोर्टलों के लिए विभिन्न मीडिया घरानों के साथ भी संपर्क करता है। यह विभिन्न कॉर्पोरेट सामाजिक उत्तरदायित्व (CSR) गतिविधियों और फंडिंग के लिए उद्योगों के साथ संपर्क भी करता है। समूह कभी-कभी संस्थान के प्रदर्शन मूल्यांकन बोर्ड (PAB) मूल्यांकन मापदंडों और अन्य नीति दस्तावेजों पर इनपुट भी प्रदान करता है। बौद्धिक संपदा अधिकार (IPR) प्रबंधन वर्टिकल सभी IPR का प्रबंधन करता है।

छात्र मामले कार्यालय

सीएसआईआर-आईएमटेक में पीएचडी कार्यक्रम डॉक्टरेट छात्रों को उनकी विश्लेषणात्मक सोच को मजबूत करके आधुनिक जीव विज्ञान के विभिन्न क्षेत्रों में चुनौतीपूर्ण परियोजनाएं लेने में सक्षम बनाता है। छात्रों को सीएसआईआर-आईएमटेक में जैविक विज्ञान में पीएचडी कार्यक्रम के लिए पंजीकृत किया जाता है और उन्हें वैज्ञानिक और अभिनव अनुसंधान अकादमी (एसीएसआईआर), गाजियाबाद द्वारा डिग्री प्रदान की जाती है। पीएचडी कार्यक्रम छात्र मामलों के कार्यालय (एसएओ) द्वारा का र्यान्वित किया जाता है, जिसमें एक समन्वयक, सह-समन्वयक और सहायक कर्मचारी होते हैं। पीएचडी कार्यक्रम से संबंधित सभी शैक्षणिक गतिविधियाँ जैसे छात्र प्रवेश, विभिन्न प्रयोगशालाओं में छात्रों की नियुक्ति, प्री-पीएचडी कोर्स वर्क, शोध / डॉक्टरेट सलाहकार समिति (आरएसी / डीएसी) की बैठकें, व्यापक परीक्षा, पीएचडी थीसिस जमा करना, मौखिक परीक्षा, डॉक्टरेट की डिग्री प्रदान करना, प्रतिलेख और प्रमाण पत्र जारी करना और उनका सत्यापन, शैक्षणिक समिति (आईएमटेक-जेएनयू और आईएमटेक-एसीएसआईआर) की बैठकों का आयोजन आदि का ध्यान एसएओ द्वारा रखा जाता है। सीएसआईआर-आईएमटेक में पीएचडी कार्यक्रम में छात्रों का प्रवेश वर्ष में दो बार होता है - जनवरी और अगस्त में। छात्र एसीएसआईआर वेब पोर्टल के माध्यम से आवेदन करते हैं और प्रकाशित मानदंडों के अनुसार शॉर्टलिस्ट किए जाते हैं। शॉर्टलिस्ट किए गए आवेदकों को दो दौर के साक्षात्कार के लिए बुलाया जाता है, और चयनित छात्रों की विभिन्न प्रयोगशालाओं में नियुक्ति छात्रों और वैज्ञानिकों की आपसी सहमति के आधार पर होती है। वर्तमान में, 154 छात्र एसीएसआईआर से संबद्ध पीएचडी कार्यक्रम कर रहे हैं, और 14 छात्र जवाहरलाल नेहरू विश्वविद्यालय (जेएनयू), नई दिल्ली से पीएचडी कर रहे हैं। इस अवधि में, वर्ष 2021 में 35 छात्रों, वर्ष 2022 में 19 छात्रों और वर्ष 2023 में 20 छात्रों को पीएचडी की उपाधि प्रदान की गई और वे भारत और विदेशों में प्रतिष्ठित संस्थानों में विज्ञान के क्षेत्र में अपना करियर बना रहे हैं।

ज्ञान संसाधन केंद्र

ज्ञान संसाधन केंद्र (केआरसी) सीएसआईआर-आईएमटेक समुदाय के लिए अनुसंधान और शैक्षणिक जानकारी का प्राथमिक स्रोत है। केआरसी के पास वैज्ञानिक और छात्र समुदाय की सीखने और अनुसंधान गतिविधियों का समर्थन करने के लिए सूक्ष्म जीव विज्ञान, औषधीय रसायन विज्ञान, प्रोटीन इंजीनियरिंग, जैव सूचना विज्ञान, कोशिका जीव विज्ञान, जैव रसायन विज्ञान, प्रतिरक्षा विज्ञान, आनुवंशिकी और जैव प्रौद्योगिकी के क्षेत्रों में मुद्रित पत्रिकाओं, पुस्तकों, ई-पत्रिकाओं, ई-डेटाबेस और पीएचडी शोध प्रबंधों के बंधित संस्करणों का संग्रह है। प्रिंट संसाधनों के अलावा, केआरसी राष्ट्रीय ज्ञान संसाधन संघ के माध्यम से 3000 से अधिक विद्वानों की इलेक्ट्रॉनिक पत्रिकाओं तक पहुँच प्रदान करता है। रिपोर्टिंग अवधि के दौरान, 109 हिंदी पुस्तकों सहित 151 नई पुस्तकें केआरसी संग्रह में जोड़ी गईं, और सीएसआईआर-आईएमटेक के डिजिटल संस्थागत भंडार में 370 से अधिक शोध लेख / पीएचडी शोध प्रबंध जोड़े गए। एक हिंदी पुस्तक प्रदर्शनी भी आयोजित की गई। केआरसी नियमित रूप से उद्धरण डेटाबेस, वैज्ञानिक लेखन कौशल, संदर्भ प्रबंधन उपकरण, साहित्य खोज, साहित्यिक चोरी की रोकथाम आदि पर प्रशिक्षण प्रदान करता है। हाल ही में, केआरसी ने यूजीसी केंद्र इनफ्लिबनेट के सहयोग से सीएसआईआर-आईएमटेक वैज्ञानिकों की आईआरआईएनएस प्रोफाइल तैयार की है। केआरसी संस्थान के सभी विशेष सेमिनार, कार्यशालाओं, प्रशिक्षण कार्यक्रमों, लघु संगोष्ठियों, व्याख्यानों आदि का समन्वय करता है और प्रतिष्ठित वैज्ञानिकों, संस्थानों के प्रमुखों और कॉर्पोरेट क्षेत्र के शीर्ष प्रबंधन जैसे विभिन्न गणमान्य व्यक्तियों के दौरों का समन्वय करता है। इसके अलावा, केआरसी स्टाफ वी.सी. वोरा ऑडिटोरियम और मुख्य सेमिनार हॉल का प्रबंधन और रखरखाव करता है।

सूचना प्रौद्योगिकी (आईटी) इकाई

सीएसआईआर-आईएमटेक की आईटी टीम आईटी हार्डवेयर, कॉमर्स, सॉफ्टवेयर संबंधी समस्याओं और नेटवर्किंग सहायता के लिए ज़िम्मेदार है। यह टीम संस्थान में उत्कृष्ट ई-कनेक्टिविटी प्रदान करती है और आईटी अवसंरचना एवं कार्यप्रणाली से जुड़े सभी प्रमुख दैनिक मुद्दों का समाधान करती है।

इंस्ट्रूमेंटेशन सेवा प्रभाग (आईएसडी)

सीएसआईआर-आईएमटेक का इंस्ट्रूमेंटेशन सर्विसेज डिवीजन (आईएसडी) एक सहायक समूह है जो उपकरणों के परीक्षण, रखरखाव और मरम्मत का ख्याल रखता है। समूह द्वारा प्रदान की गई सहायता और सेवाओं के कारण संस्थान के सभी छोटे और मध्यम स्तर के उपकरणों की मरम्मत और रखरखाव न्यूनतम डाउनटाइम के साथ किया जाता है। अनुसंधान कार्य के लिए संस्थान की कई प्रमुख सुविधाएँ भी समूह के सदस्यों द्वारा संचालित की जाती हैं। मरम्मत में मदद करने के लिए एक पूर्ण विकसित परीक्षण और माप सुविधा स्थापित की गई है, जिसमें डिजिटल स्टोरेज ऑसिलोस्कोप, वैरिएबल पावर सप्लाई, मल्टीमीटर, फंक्शन जेनरेटर, सोल्डरिंग वर्कस्टेशन आदि जैसे परिष्कृत उपकरण हैं। इंस्ट्रूमेंटेशन सर्विसेज डिवीजन (आईएसडी) संस्थान के मॉड्यूलर इंस्ट्रूमेंट लेबोरेटरीज (एमआईएल) का भी रखरखाव करता है। संस्थान में मॉड्यूलर इंस्ट्रूमेंट लेबोरेटरीज (एमआईएल) उपयोगकर्ताओं को प्रयोग करने के लिए चौबीसों घंटे इंस्ट्रूमेंटेशन सेवाएँ प्रदान करती हैं। सीएसआईआर-आईएमटेक परिसर में आठ ऐसे एमआईएल स्थापित किए गए हैं, जो शोधकर्ताओं को वैज्ञानिक क्षेत्रों की एक विस्तृत श्रृंखला में बुनियादी और अनुवाद संबंधी शोध का समर्थन करने के लिए अत्याधुनिक विश्लेषणात्मक उपकरणों तक पहुंच प्रदान करते हैं। यह सुविधा सामान्य स्पेक्ट्रोफोटोमेट्रिक तकनीक जैसे यूवी/दृश्य स्पेक्ट्रोफोटोमीटर, स्पेक्ट्रोफ्लोरोमीटर, एलिसा रीडर, सेंट्रीफ्यूज, जेल-डॉक सिस्टम, फॉस्फोरिमेजर और उच्च-स्तरीय शुद्धिकरण प्रणाली आदि प्रदान करती है।

इंजीनियरिंग सेवा प्रभाग

इंजीनियरिंग सेवा प्रभाग सीएसआईआर-आईएमटेक की संस्थागत अनुसंधान एवं विकास गतिविधियों और राष्ट्रीय सुविधाओं के व्यापक स्पेक्ट्रम में महत्वपूर्ण इंजीनियरिंग और उपयोगिता सेवा सहायता प्रदान करता है। सीएसआईआर-आईएमटेक के इस प्रभाग में विभिन्न विशिष्ट संस्थागत आवश्यकताओं को पूरा करने के लिए इलेक्ट्रिकल, सिविल और मैकेनिकल इंजीनियरिंग, एयर कंडीशनिंग और रेफ्रिजरेशन जैसे विशेषज्ञता के कई क्षेत्र शामिल हैं।

प्रदान की जाने वाली सेवाएँ:

यह प्रभाग इलेक्ट्रिकल, मैकेनिकल और एचवीएसी रखरखाव के साथ-साथ धातु काटने, वेल्डिंग, प्लंबिंग और बढ़ईगीरी आदि के लिए आवश्यक बुनियादी सुविधाओं से सुसज्जित है। यह तेल से चलने वाले और इलेक्ट्रिकल बॉयलरों के संचालन के माध्यम से संस्थान की भाप की आवश्यकताओं को भी पूरा करता है। इसके अतिरिक्त, यह निम्नलिखित क्षेत्रों/कार्यों में विशिष्ट भूमिकाएँ निभाता है।

- भवन डिजाइन, लेआउट, निर्माण और रखरखाव की योजना, आकलन और क्रियान्वयन
- संस्थान और आवास की विद्युत सेवाओं का संचालन और रखरखाव जिसमें 11 केवी एचटी सबस्टेशन, ट्रांसफार्मर, डीजी सेट, अग्निशमन और पहचान प्रणाली, विद्युत पैनल, राइजिंग मेन, पीडीबी, एलडीबी आदि शामिल हैं।
- एचवीएसी जैसी उपयोगिता सेवाओं का संचालन और रखरखाव, जिसमें केंद्रीय एसी प्लांट, एएचयू, पंप और कूलिंग टॉवर शामिल हैं, एयर कंप्रेसर, बॉयलर, कोल्ड रूम, लिफ्ट, विंडो और स्प्लिट एसी, जल आपूर्ति प्रणाली आदि जैसी उपयोगिताओं की देखभाल करना।
- अत्यंत महत्वपूर्ण सुविधाओं जैसे बीएसएल 3 लैब, वायरोलॉजी लैब, जीएमपी और अन्य क्लीन रूम क्षेत्रों का संचालन और रखरखाव
- इस अवधि के दौरान, इंजीनियरिंग सेवा प्रभाग ने निम्नलिखित प्रमुख परियोजनाएं शुरू कीं।
- BASL3 की स्थापना
- डीजी सेट और एएचयू का प्रतिस्थापन
- कैंटीन, पीए मेस, शौचालय और प्रयोगशालाओं का नवीनीकरण
- टीम: हर भूपिंदर कुमार, अजय कुमार, नितिन शर्मा, केवल कृष्ण, रोहतास रंगा, स्वर्गीय मोहम्मद मुस्तफा, राकेश कुमार धीमान

बागवानी, हाउसकीपिंग और गेस्ट हाउस

हाउसकीपिंग प्रभाग शोधकर्ताओं की अनुसंधान एवं विकास गतिविधियों का समर्थन करने और साफ-सफाई के साथ-साथ स्वच्छ परिवेश बनाए रखने में महत्वपूर्ण और निर्णायक भूमिका निभाता है। सीएसआईआर-आईएमटेक में गेस्ट हाउस, राष्ट्रीय और अंतरराष्ट्रीय ख्याति प्राप्त वैज्ञानिकों और प्रतिष्ठित गणमान्य व्यक्तियों के लिए एक आरामदायक और घर जैसा स्थान प्रदान करता है। संस्थान में आयोजित सम्मेलनों, कार्यशालाओं, सेमिनारों आदि के दौरान हाउसकीपिंग और गेस्ट हाउस सेवाएं एक महत्वपूर्ण और सहायक भूमिका निभाती हैं। बागवानी प्रभाग परिसर के बागवानी और भूनिर्माण कार्य के विकास और रखरखाव का ख्याल रखता है। प्रभाग की बागवानी विशेषज्ञता की बदौलत, सीएसआईआर-आईएमटेक में सजावटी पेड़ों, झाड़ियों, लताओं और ग्राउंड कवर के साथ एक सुंदर और शांत वातावरण है, और परिसर के बाहर शहर की तुलना में ठंडा और हरा-भरा मौसम है। 2021-2023 के दौरान, पहले की तरह, सीएसआईआर-आईएमटेक गार्डन ने शहर में आयोजित सर्वश्रेष्ठ उद्यानों (बड़े और छोटे) और पुष्प शो की प्रतियोगिताओं में प्रशंसा और पुरस्कार जीते।

सुरक्षा

संस्थान की सुरक्षा शाखा का नेतृत्व सुरक्षा अधिकारी करते हैं और इसमें 06 सुरक्षा पर्यवेक्षक और 34 सुरक्षा गार्ड होते हैं। सुरक्षा पर्यवेक्षकों और गार्डों को एक निजी सुरक्षा एजेंसी के माध्यम से काम पर रखा जाता है। वे वैज्ञानिकों, कर्मचारियों, छात्रों, परिवारों और संस्थान के आगंतुकों के लिए एक सुरक्षित और सुरक्षित वातावरण सुनिश्चित करने के लिए विभिन्न महत्वपूर्ण बिंदुओं पर चौबीसों घंटे सुरक्षा सेवाएँ प्रदान करते हैं। वे न केवल लोगों और संस्थान की भौतिक संपत्तियों की सुरक्षा के लिए लगन से काम करते हैं, बल्कि वे अग्नि सुरक्षा में भी योगदान देते हैं। चाहे गर्मी का मौसम हो, भारी मानसून की बारिश हो या हाड़ कंपा देने वाली सर्दी, सुरक्षा कर्मचारी CSIR-IMTECH को सुरक्षित रखने के लिए हर समय पहरा देते हैं।

कैंटीन

परिसर में विशाल कैंटीन और मेस की सुविधाएं छात्रों और संस्थान के कर्मचारियों को उच्चतम गुणवत्ता के साथ रियायती दरों पर विभिन्न प्रकार के भारतीय भोजन और नाश्ते की वस्तुएं प्रदान करती हैं। हमारी कैंटीन और मेस में पारिवारिक माहौल है, जिसमें घर के बने स्वाद से भरपूर विभिन्न स्वादिष्ट और पौष्टिक व्यंजन हैं, जिन्हें पूरी तरह से पकाया जाता है और बहुत ही विनम्रता से परोसा जाता है। जलपान किफायती दरों पर उपलब्ध है। व्यस्त समय के दौरान भी छात्रों और कर्मचारियों को समायोजित करने के लिए पर्याप्त बैठने की सुविधा प्रदान की जाती है। यह एक ऐसी जगह है जहाँ छात्र और कर्मचारी अपने सहकर्मियों के साथ आराम करते हैं और अच्छी गुणवत्ता वाले, स्वादिष्ट और स्वस्थ भोजन का आनंद लेते हैं।

सीएसआईआर जिज्ञासा / जिज्ञासा 2.0 कार्यक्रम एकीकृत वर्चुअल लैब एवं भारतीय सांकेतिक भाषा समर्थित वर्चुअल प्रयोगशाला (आईएसएलईवीएल) की अवधारणा के साथ

सीएसआईआर-इमटेक की जिज्ञासा टीम ने इस अवधि के दौरान निम्नलिखित गतिविधियाँ आयोजित कीं।

कुछ गतिविधियों का संक्षिप्त विवरण नीचे दिया गया है:

- **वर्चुअल लैब सामग्री विकास:** इस अवधि के दौरान निम्नलिखित आभासी प्रयोगशाला सामग्री विकसित की गई।
- **इमर्सिव 3डी प्रोजेक्शन सुविधा:** सीएसआईआर-आईएमटेक में विकसित की गई अपनी तरह की पहली 'सीएसआईआर' इमर्सिव 3डी प्रोजेक्शन सुविधा जो STEM शिक्षा को बढ़ाती है। यह अनुभवात्मक शिक्षा को बढ़ावा देती है, छात्रों को जटिल अवधारणाओं से जोड़ती है, और विकलांग छात्रों सहित विविध शिक्षण आवश्यकताओं को पूरा करती है।
- **राज्य का सबसे बड़ा जलवायु घड़ी संयोजन और प्रदर्शन कार्यक्रम:** एनर्जी स्वराज फाउंडेशन (ESF) के साथ मिलकर 1 दिसंबर, 2023 को ऊर्जा जागरूकता को बढ़ावा देने के लिए 31 स्कूलों के 250 से अधिक छात्रों के साथ 'राज्य की सबसे बड़ी जलवायु घड़ी सभा' का आयोजन किया। साथ ही, CSIR-IMTECH की जिज्ञासा टीम गीता निकेतन आवासीय विद्यालय, कुरुक्षेत्र में "राज्य स्तरीय जलवायु घड़ी सभा और प्रदर्शन कार्यक्रम" में शामिल हुई। 20 स्कूलों के लगभग 200 छात्रों और शिक्षकों ने जलवायु घड़ियाँ इकट्ठी कीं, जिससे भविष्य में सकारात्मक बदलावों के लिए पर्यावरण जागरूकता को बढ़ावा मिला।
- **स्वास्थ्य सेवा में इंटरनेट ऑफ थिंग्स पर प्रशिक्षकों का प्रशिक्षण:** अटल टिंकरिंग लैब प्रभारियों और स्कूल शिक्षकों के लिए 23-25 जून, 2023 तक 3 दिवसीय प्रशिक्षण कार्यक्रम आयोजित किया गया। प्रशिक्षण में 9 राज्यों के 14 प्रतिभागियों ने भाग लिया।
- **छाया एक वैज्ञानिक कार्यक्रम:** सीएसआईआर-आईएमटेक ने 'शैडो ए साइंटिस्ट' कार्यक्रम का आयोजन किया, जो 'वन वीक वन लैब' पहल का हिस्सा है। यह जिज्ञासा को बढ़ावा देने, सिद्धांत को व्यवहार से जोड़ने और अगली पीढ़ी के वैज्ञानिकों को प्रेरित करने के लिए 5 दिवसीय आवासीय कार्यक्रम था। सीएसआईआर के महानिदेशक और डीएसआईआर के सचिव डॉ. एन. कलैसेलवी ने 'वन वीक वन लैब' कार्यक्रम के समापन समारोह के दौरान छात्र जुड़ाव और वैज्ञानिक जिज्ञासा पर कार्यक्रम के प्रभाव की प्रशंसा की।
- **DIY किट का प्रदर्शन और वितरण:** खाद्य पदार्थों में मिलावट के बारे में जागरूकता बढ़ाने के लिए केवी, जेएनवी और अन्य राज्य सरकार के स्कूलों के छात्रों को दूध परीक्षण DIY किट का प्रदर्शन किया गया। प्रदर्शन में 1000 से अधिक छात्रों ने भाग लिया।
- **आर्मर गेम का प्लेटेस्ट:** एएमआर के बारे में जागरूकता बढ़ाने के लिए 1000 से अधिक छात्रों के लिए आर्मोर गेम का प्लेटेस्ट आयोजित किया गया।
- **सीएसआईआर जिज्ञासा विज्ञान महोत्सव 2022:** ऐप डेवलपमेंट और एनिमेशन पर बूट कैंप: सीएसआईआर जिज्ञासा विज्ञान महोत्सव 2022 के बैनर तले बूट कैंप आयोजित किए गए। एंड्रॉइड ऐप डेवलपमेंट पर दो (2) बूट कैंप आयोजित किए गए, और एक (1) एनिमेशन डेवलपमेंट पर आयोजित किया गया।
- **सीएसआईआर जिज्ञासा और नीति आयोग की अटल टिंकरिंग लैब पहल के तहत स्कूलों को गोद लेना:** एटीएल प्रयोगशालाओं वाले सात स्कूलों को सीएसआईआर-आईएमटेक द्वारा शिक्षक प्रशिक्षण कार्यक्रमों, छात्रों के लिए क्षमता निर्माण, एटीएल डैशबोर्ड प्रदर्शन संकेतकों के अनुसार स्कूलों के निगरानी समर्थन के माध्यम से मार्गदर्शन के लिए अपनाया गया है।
-

भारतीय सांकेतिक भाषा समर्थित आभासी प्रयोगशाला (आईएसएलईवीएल)

ISLEVL, CSIR जिज्ञासा वर्चुअल प्रयोगशाला पहल के अनूठे कार्यक्षेत्र को परिभाषित करता है। इसका उद्देश्य STEM विषयों की विभिन्न धाराओं में ISL अनुवादित सामग्री प्रदान करके बधिरों को सशक्त और शिक्षित करने के लिए विशेष डिजिटल सामग्री विकसित करना है। कुछ मुख्य अंश नीचे दिए गए हैं।

- सीएसआईआर-आईएमटेक और एचडब्ल्यूएसपीएसएचआई ने दिव्यांगजन छात्रों को विज्ञान शिक्षा से जोड़ने के लिए करनाल में भारत की पहली भारतीय सांकेतिक भाषा खगोल विज्ञान प्रयोगशाला शुरू की।
- सीएसआईआर-आईएमटेक ने प्रोटिओमिक्स सोसाइटी ऑफ इंडिया और सीएसआईआर जिज्ञासा मिशन के साथ मिलकर भारत का पहला बधिर-समावेशी विज्ञान आउटरीच आयोजित किया, जिसमें 50 बधिर छात्रों और शिक्षकों सहित 225 से अधिक उपस्थित लोगों ने भाग लिया।
- बधिर ISLEVL सदस्यों ने गैलाउडेट विश्वविद्यालय के प्रशिक्षकों के साथ HWSPSHI में एक कार्यशाला में भाग लिया, जिसमें STEM पहुँच

रणनीतियों को साझा किया गया और शिक्षकों और उपस्थित लोगों को लाभान्वित किया गया।

- सीएसआईआर आईएमटेक ने ISLEVL के माध्यम से भारत का पहला बधिर-समावेशी विज्ञान आउटरीच पेश किया, जिसमें चल रहे वैज्ञानिक अपडेट के लिए एक अनुकूलित STEM शब्दकोश और STEM समाचार शामिल है, जिससे STEM शिक्षा में छात्रों और शिक्षकों को लाभ हुआ।
- सीएसआईआर आईएमटेक और रॉयल सोसाइटी ऑफ केमिस्ट्री यूके-इंडिया ने भारत का पहला बधिर-समावेशी रसायन विज्ञान शिविर आयोजित किया, जिसमें 170 बधिर प्रतिभागियों सहित 450 से अधिक लोगों ने भाग लिया। हितधारकों और विशेषज्ञों से इनपुट के साथ-साथ एचडब्ल्यूएसपीएसएचआई छात्रों और अन्य बधिर समुदाय संस्थानों से फीडबैक एकत्र किया। सीएसआईआर-आईएमटेक ने डीटीआईएसएल छात्रों के लिए 11 दिवसीय इंटर्नशिप पूरी की, जिसमें एसटीईएम एक्सपोजर और सांकेतिक भाषा सीखने पर जोर दिया गया, सीएसआईआर-आईएमटेक और आईएसएलआरटीसी के बीच हस्ताक्षरित एमओयू के अनुसार उद्योग की तत्परता को बढ़ावा दिया गया। बधिर समुदाय आईएसएलवीएल सामग्री को अपनाता है: एसटीईएम उपकरण। माननीय राज्यपाल ने बधिर जागरूकता के लिए यूसुफ हामिद रसायन विज्ञान शिविर की सराहना की। श्री राजेश अग्रवाल ने भारतीय सांकेतिक भाषा में उनके महत्व के लिए आईएमटेक और आरएससी पर प्रकाश डाला। सीएसआईआर-आईएमटेक टीम ने अहमदाबाद के साइंस सिटी में "आईएसएल में प्रोटीन ग्लाइकोसिलेशन के माइक्रोबियल जादू की व्याख्या" का प्रदर्शन किया, जिसने पूरे देश में रुचि पैदा की। टीम ISLEVL की अभिनव अवधारणा, "संकेतों में STEM प्रदान करना," ने नेचर का ध्यान आकर्षित किया। उन्होंने हमारी कार्यप्रणाली को प्रदर्शित करने और हमारे अभूतपूर्व कार्य के बारे में जागरूकता बढ़ाने के लिए हमारा साक्षात्कार लिया। हमारी टीम ने ऑस्ट्रिया के वियना में संयुक्त राष्ट्र कार्यालय में तीन दिवसीय ज़ीरो प्रोजेक्ट सम्मेलन में बात की। डॉ. राव ने "संकेत भाषा संचार के लिए अभिनव तकनीकी समाधान" पर चर्चा की। हमारी टीम ने 2-4 मार्च, 2024 को तीन दिवसीय सम्मेलन में व्यक्तिगत रूप से और वर्चुअल रूप से प्रस्तुति दी। एक बधिर प्रशिक्षक ने एक दुभाषिया सहायता के साथ ISL STEM शब्दावली विकास पर चर्चा की।

सीएसआईआर एकीकृत कौशल पहल के अंतर्गत सीएसआईआर-इमटैक प्रशिक्षण कार्यक्रम

सीएसआईआर-इमटैक विभिन्न प्रशिक्षण कार्यक्रमों के माध्यम से जीवन विज्ञान उद्योग के लिए अत्यधिक विशिष्ट और कुशल कार्यबल विकसित करने के लिए समर्पित है। इन पहलों का उद्देश्य छात्रों, शोधकर्ताओं और पेशेवरों को अत्याधुनिक ज्ञान और व्यावहारिक विशेषज्ञता से लैस करना है।

I. शोध प्रबंध/इंटर्नशिप प्रशिक्षण कार्यक्रम (6 महीने)

यह कार्यक्रम बीएससी, एमएससी, एम. फार्मा, बी. फार्मा, बी. टेक. और एम. टेक. करने वाले उत्कृष्ट छात्रों को छह महीने की अवधि में प्रयोगशाला प्रशिक्षण के माध्यम से मौलिक बायोमेडिकल अनुसंधान तकनीकों से परिचित कराता है। 2021-2023 के बीच, तीन प्रशिक्षण सत्र आयोजित किए गए, जिसमें कुल 84 छात्रों ने अपनी मास्टर डिग्री आवश्यकताओं के हिस्से के रूप में अपना शोध प्रबंध प्रशिक्षण पूरा किया।

II. बेसिक प्रशिक्षण कार्यक्रम (1-3 महीने)

स्नातक छात्रों के लिए डिज़ाइन किया गया यह कार्यक्रम इमटैक वैज्ञानिकों द्वारा निर्देशित कई विषयों में प्रमुख प्रयोगशाला तकनीकों में आवश्यक प्रशिक्षण प्रदान करता है। इस कार्यक्रम में कुल 23 छात्रों ने भाग लिया, और बहुमूल्य प्रयोगशाला अनुभव प्राप्त किया।

III. लघु अवधि/ग्रीष्मकालीन इंटर्नशिप प्रशिक्षण कार्यक्रम

सीएसआईआर-इमटैक ने विशेष अल्पकालिक इंटर्नशिप कार्यक्रम प्रदान करने के लिए जीएडीवीएएसयू, लुधियाना, पंजाब, गुजरात बायोटेक मिशन (जीएसबीटीएम) वेल टेक यूनिवर्सिटी, चेन्नई, तमिलनाडु और भारतीय सांकेतिक भाषा अनुसंधान और प्रशिक्षण केंद्र (आईएसएलआरटीसी), नई दिल्ली जैसे कई संस्थानों के साथ समझौता ज्ञापन (एमओयू) स्थापित किए हैं। इसके अतिरिक्त, संस्थान संयुक्त राष्ट्रीय विज्ञान अकादमियों और बिट्स पिलानी द्वारा चुने गए छात्रों के लिए अनुरूप प्रशिक्षण कार्यक्रम भी प्रदान करता है। इन कार्यक्रमों के तहत, सीएसआईआर इमटैक ने रिपोर्ट की गई अवधि के दौरान 52 छात्रों को इंटर्नशिप की प्रदान की।

IV. लघु अवधि पाठ्यक्रम, प्रशिक्षण और कार्यशालाएं (5-35 दिन)

सीएसआईआर-आईएमटेक ने 14 विशेष प्रशिक्षण कार्यक्रम आयोजित किए, जिनसे प्रयोगशाला पशुओं की जैव-पद्धति, जैव सूचना विज्ञान, जीनोमिक्स, जैवप्रक्रिया प्रौद्योगिकी आदि क्षेत्रों में 233 प्रशिक्षुओं को लाभ मिला।

मुख्य बातें:

- प्रयोगशाला पशुओं की बुनियादी जैव-पद्धति - इस कार्यक्रम ने प्रतिभागियों को प्रयोगशाला पशुओं के नैतिक और वैज्ञानिक संचालन में प्रशिक्षित किया।
- प्रयोग के लिए पशु संसाधनों के नैतिक चिंतन पर वर्चुअल कार्यशाला (WeCARE-2021) - पशु अनुसंधान में नैतिक विचारों पर केंद्रित।
- प्रयोगशाला पशुओं की जैव-पद्धति और नैतिक उपयोग पर कार्यशालाएँ - प्रयोगशाला पशु देखभाल में व्यावहारिक अनुभव प्रदान किया।
- जीनोमिक्स में बिग डेटा का युग - जीनोमिक डेटा विश्लेषण पर एक विशेष कार्यशाला।
- विंटर रिसर्च इंटर्नशिप: माइक्रोब्स टू माउस (वृतिका) - उन्नत जैविक तकनीकों को कवर करने वाली 28-दिवसीय गहन इंटर्नशिप।
- जैव सुरक्षा और संक्रामक एजेंटों पर कार्यशाला (बीबीसीसीबी-2023) - जैव सुरक्षा प्रथाओं में ज्ञान बढ़ाने के लिए डिज़ाइन किया गया।
- जीएसबीटीएम, गुजरात द्वारा प्रायोजित पशु परिचारकों के लिए कौशल विकास कार्यक्रम - प्रयोगशाला पशु देखभाल में लक्षित कौशल वृद्धि।
- कौशल विज्ञान प्रशिक्षण कार्यक्रम (एसवीटीपी) - विनोबा भावे विश्वविद्यालय, झारखंड के विद्यार्थियों के लिए आयोजित किया गया।
- बायोप्रोसेस टेक्नोलॉजीज में प्रगति पर राष्ट्रीय कार्यशाला (एबीटी-बायो 2023) - बायोप्रोसेस इंजीनियरिंग उन्नति पर केंद्रित।
- जूनियर सॉफ्टवेयर डेवलपर प्रोग्राम - 12वीं/आईटीआई योग्यता वाले छात्रों के लिए 400 घंटे का आईटी प्रशिक्षण कार्यक्रम।
- एमएएलडीआई-एमएस और माइक्रोस्कोपी द्वारा सूक्ष्मजीवों की पहचान - सूक्ष्मजीव पहचान तकनीकों पर एक दिवसीय व्यावहारिक प्रशिक्षण।

V. अत्याधुनिक एवं उच्चस्तरीय कौशल विकास केंद्र: मर्क-इमटैक इनोवेशन लैब

सीएसआईआर-इमटैक ने मर्क के सहयोग से चंडीगढ़ स्थित इमटैक में एक उच्च स्तरीय कौशल विकास केंद्र की स्थापना की है। यह सुविधा अगली पीढ़ी की तकनीकों से सुसज्जित है। रिपोर्टिंग अवधि के दौरान, केंद्र ने 47 प्रशिक्षण कार्यक्रम आयोजित किए, जिनसे 1,779 प्रतिभागियों को लाभ मिला।

प्रभाव:

कुल मिलाकर, सीएसआईआर-इमटैक ने सीएसआईआर-एकीकृत कौशल पहल के तहत विभिन्न प्रशिक्षण कार्यक्रमों के तहत 2171 प्रतिभागियों/प्रशिक्षुओं को प्रशिक्षित किया, जिससे भारत सरकार के "कौशल मिशन" में महत्वपूर्ण योगदान दिया गया।

टीम: सुश्री नेहा राणा; डॉ. नीरज खन्ना-समन्वयक

2021-23 के दौरान सीएसआईआर एकीकृत कौशल पहल @सीएसआईआर-आईएमटेक की झलकियां

स्टाफ क्लब की उपलब्धियाँ: खेल

Year	Achievements
2023	सीएसआईआर-आईएमटेक के फरीद मोहम्मद को सत्र 2023-25 के लिए सीएसआईआर राष्ट्रीय वॉलीबॉल टीम का कप्तान नामित किया गया है
	दिग्विजय सिंह नरुका ने सीएसआईआर-एनईआईएसटी में आयोजित एसएसबीएमटी (जोनल) शतरंज टूर्नामेंट में फाइनल के लिए अर्हता प्राप्त की और आईएमएमटी भुवनेश्वर में फाइनल खेला।
	महिला टेबल टेनिस टीम सना, काजल और इंदु ने सीएसआईआर-एनईआईएसटी में आयोजित एसएसबीएमटी (जोनल) में फाइनल के लिए क्वालीफाई किया और सीएसआईआर-आईएमएमटी, भुवनेश्वर में फाइनल खेला।
2022	सीएसआईआर-आईएमटेक वॉलीबॉल टीम सीएसआईआर-एनआईईएसटी, जोरहाट में आयोजित एसएसबीएमटी जोनल में विजयी रही और फाइनल के लिए क्वालीफाई किया और सीएसआईआर-आईआईसीटी, हैदराबाद में फाइनल खेला। सीएसआईआर-आईआईसीटी, हैदराबाद में आयोजित फाइनल में उत्कृष्ट प्रदर्शन के लिए क्षितिज वालिया को एक मैच में प्लेयर ऑफ द मैच का पुरस्कार दिया गया।
	श्री जयदीप मेहता ने सीएसआईआर-एनआईओ गोवा में आयोजित एसएसबीएमटी बास्केटबॉल टूर्नामेंट में खेला और सीएसआईआर राष्ट्रीय बास्केटबॉल टीम के लिए चुने गए और अनुसंधान बास्केटबॉल टूर्नामेंट में सीएसआईआर टीम का प्रतिनिधित्व किया।
	सीएसआईआर-आईएमएमटी, भुवनेश्वर में आयोजित एसएसबीएमटी फुटबॉल टूर्नामेंट में उत्कृष्ट प्रदर्शन के लिए अश्विनी भारद्वाज को प्लेयर ऑफ द टूर्नामेंट का पुरस्कार दिया गया।





छात्र गतिविधियाँ

विज्ञान पर छात्र द्वारा आयोजित व्याख्यान (SOLOS)

SOLOS एक वैज्ञानिक संगोष्ठी श्रृंखला है जो CSIR-IMTECH के पीएचडी छात्र समुदाय द्वारा मासिक रूप से आयोजित की जाती है। यह श्रृंखला CSIR-IMTECH के निदेशक डॉ. संजीव खोसला की पहल पर शुरू की गई है और पहली संगोष्ठी 6 अक्टूबर 2021 को डॉ. गगनदीप कांग द्वारा दी गई थी। संस्थान के चौथे वर्ष के पीएचडी छात्र डॉ. बीना कृष्णन और डॉ. टी.एन.सी. राम्या की सलाह और सहायता से इस कार्यक्रम का आयोजन करते हैं। CSIR-IMTECH SOLOS व्याख्यान श्रृंखला का उद्देश्य प्रख्यात वैज्ञानिकों और नवोदित शोधकर्ताओं को एक मंच पर लाना है। इंटरैक्टिव व्याख्यान नवीनतम शोध रुझानों पर ध्यान केंद्रित करते हैं और छात्रों को दुनिया भर के प्रसिद्ध वैज्ञानिकों और शोधकर्ताओं से जुड़ने और बातचीत करने का अवसर प्रदान करने के लिए बनाए गए हैं। वेबिनार के रूप में ऑनलाइन मोड में या ऑफ़लाइन मोड में आयोजित प्रत्येक घंटे के सत्र में एक प्रख्यात वक्ता द्वारा व्याख्यान दिया जाता है, जिसके बाद एक इंटरैक्टिव प्रश्नोत्तर सत्र होता है। वक्ताओं में डॉ. मंजुला रेड्डी, सुश्री किरण मजूमदार-शॉ, प्रो. किम लुईस, डॉ. प्रिया अब्राहम, प्रो. अरुण शुक्ला, डॉ. संजय फोगाट, डॉ. संतोष चौहान, डॉ. समीर वेलंकर, प्रो. कौस्तुव सान्याल, प्रो. उल्लास कोलथुर सीतारम, डॉ. कुमारस्वामी थंगराज और प्रो. जयंत हलदर शामिल थे।

क्यूरियो-2022

सीएसआईआर-आईएमटेक के छात्र विज्ञान क्लब के सदस्यों ने 21-25 मार्च 2022 तक CURIO-2022 नामक पांच दिवसीय विज्ञान महोत्सव का आयोजन किया। इस महोत्सव का उद्देश्य विभिन्न कला और प्रौद्योगिकी कार्यक्रमों को मिलाकर विज्ञान में रचनात्मकता को बढ़ावा देना था। पांच दिवसीय उत्सव में विभिन्न वैज्ञानिक अवधारणाओं की समझ की सरल अभिव्यक्ति विकसित करने के लिए विज्ञान कला प्रतियोगिताएं, वैज्ञानिक स्वभाव और चर्चाओं को पोषित करने के लिए नवोदित शोधकर्ताओं द्वारा विज्ञान वार्ता और भविष्य के वैज्ञानिकों को उनकी क्षमता को सही दिशा में लगाने में मदद करने के लिए आमंत्रित अतिथि वक्ताओं द्वारा सूचनात्मक कार्यशालाएं शामिल थीं। कार्यशालाओं में विज्ञान करियर, एक आनंदमय और उत्पादक पीएचडी अनुभव की ओर कदम, विज्ञान संचार और पांडुलिपि लेखन जैसे विभिन्न विषय शामिल थे, जिनका संचालन क्रमशः इंडिया बायोसाइंस से डॉ. शांतला हरि दास, आईआईएससी बैंगलोर से डॉ. मोहित कुमार जॉली, डीबीटी-एनआईपीजीआर से श्री रत्नेश्वर ठाकुर और आईआईएसईआर-मोहाली से डॉ. सम्राट मुखोपाध्याय ने किया। सीएसआईआर-सीसीएमबी के निदेशक डॉ. विनय के. नंदीकूरी ने 24 मार्च को विश्व टीबी दिवस के उपलक्ष्य में एक विशेष व्याख्यान दिया। कार्यक्रम का समापन विभिन्न विज्ञान कला प्रविष्टियों की प्रदर्शनी और छात्रों की भागीदारी को प्रोत्साहित करने के लिए पुरस्कार वितरण समारोह के साथ हुआ।

सीएसआईआर- इमटैक स्टाफ

वैज्ञानिक कर्मचारी

अलका राव
अमित कुमार
अमित तुली
अनिर्बान रॉय चौधरी
-अंशु भारद्वाज
आशीष
अश्वनी कुमार
बी. देवदत्त
(24.03.2023 से नई ज्वाइनिंग)
बलविंदर सिंह
बरनाली चौधरी
बीना कृष्णन
चन्द्रशेखर शर्मा
चारु शर्मा
दीपक के. शर्मा
दिव्येंदु सरकार
दीपक दत्ता
ई. सेंथिल प्रसाद
ईसा नागमल्लेश्वरी
(04.09.2023 से नई नियुक्ति)
जी. राजमोहन
गैरी बेदी
एच.एस. नंदनवार
हरविंदर जस्सल
इम्तियाज यासीन
(06.09.2023 से नई ज्वाइनिंग)
कैलाश बी.टी.
कृष्ण गोपाल
एमएस। भट्टाचार्य
मनोज कुमार
मनोज राजे
मनुज त्रिपाठी
मोहित पॉल
नीरज खन्ना
नित्या वदकदथ
पी. अनिल कुमार
पवन गुप्ता
प्रभु बी पाटिल
प्रदीप सेन
आर.एस शालिग्राम
राजेंद्र सोनी
रमन परकेश
राम्या टी.एन.सी
रश्मी कुमार
रवि प्रताप एन. मिश्रा
ऋषभ वर्मा
एस कार्तिकेयन
एस कृष्णमूर्ति
एस कुमारन
एस.आर. चौधरी
संजीव खोसला
श्रीकृष्ण सुब्रमण्यन
सुरेश कोरपोले
वेमुलारी वेंकट रमण
विजयेंद्र के. भल्ला
विनोद डी. चौधरी

तकनीकी कर्मचारी

अजय कुमार
अमित कुमार
अनिल कुमार शर्मा
अनिल थियोफिलस
अंजलि कौंडल
अनुराग कश्यप
आशीष कुमार खरे
अशोक कुमार
भीमी राम
भूमिका वैद्य
भूपिंदर सिंह चोपड़ा
चन्द्र प्रकाश मिढ़ा
चेतना
दविंदर सिंह
दविंदर सिंह
दीपक भट्ट
धन प्रकाश
दिग्विजय सिंह नरूका
दिनेश कुमार
गणेश लाल मीना
गिरजा कुमारी दित्या
हर भूपिंदर कुमार
हरिओम कुशवाह
हरमिंदर सिंह
जयदीप मेहता
जानकी प्रसाद
के.पी.एस. सेंगर
केवल कृष्ण
मलकीत सिंह
एमडी. मुस्तफा
नेहा राणा
नितिन शर्मा
परमजीत कौर
परमजीत कश्यप
परमजीत लाल
प्रदीप कुमार पटेल
आर के कनौजिया
राज कुमार मेहता
राज कुमार-I
राज कुमार-द्वितीय
राजेंद्र दास
राकेश कुमार धीमान
रमेश चंद्र शर्मा
रमेश सिंह
रणदीप शर्मा
रेनू
रोहतास रंगा
एस मुथु कृष्णन
एस.एस.बावा
समीर के नाथ
संदीप कुमार-I
संदीप कुमार-द्वितीय
शरणजीत कौर
शशि धर
सुमित मित्तल
सुरिंदर सिंह
सुरजीत सिंह
उपेन्द्र सिंह
विनीत कुमार

प्रशासनिक अनुभाग

अरुण खुराना
अवतार सिंह
बलजीत कौर
भूपाल सिंह रावत
धरमिंदर कुमार
धीरज गोस्वामी
फरीद मोहम्मद
गुरदीप सिंह
हरनेक सिंह
इंदु यादव
जीतेन्द्र सिंह
के.एस. गैरा
कनिका गोयल
कपिल वर्मा
करनैल सिंह
कविता कुमारी
कुलदीप कौर
मनीष कुमार
मनोज कुमार
मनोज रानी
नन्द लाल
नीरू
नितिन कामरा
पूनम
आर.एन. मांझी
रघु नाथ
राजिंदर कुमार
राजिंदर नौटियाल
रल्ला राम
एस.डी. षि
सना खातून
संदीप कुमार
शीला देवी
सोनी
सुनील कुमार
सुशील कुमार
तजिंदर कौर
विक्रम सिंह

भंडार एवं क्रय अनुभाग

अरविन्द कुमार
बीर सिंह
जी.एस.वर्मा
कमल कुमार
मोहिंदर कुमार
प्रवीण कुमार
राम सिंह
रवि गर्ग
रविंदर सिंह
तजिंदर कौर
विपन कुमार

वित्त एवं लेखा अनुभाग

ब्योमकेश पांडे
एच.एस. सेखों
ईश्वर दास
राजू बंसल
रानी देवी
एस के वोहरा
एस के वोहरा
सुदेश शर्मा
सुरिंदर कुमार नारद
यशपाल

पदोन्नति

कर्मचारी का नाम एवं पदनाम पद जिस पर पदोन्नति की गई मूल्यांकन पदोन्नति की तिथि

डॉ. मणिशंकर भट्टाचार्य, वरिष्ठ वैज्ञानिक	प्रधान वैज्ञानिक 01.03.2021
डॉ. सौम्या राय चौधरी वरिष्ठ प्रधान वैज्ञानिक	मुख्य वैज्ञानिक 05.03.2021
डॉ. श्रीकृष्ण सुन्नामण्यन, वरिष्ठ प्रधान वैज्ञानिक	मुख्य वैज्ञानिक 08.03.2021
डॉ. टी.एन.सी. राम्या, प्रधान वैज्ञानिक	वरिष्ठ प्रधान वैज्ञानिक 08.03.2021
श्री सुरजीत सिंह, तकनीकी अधिकारी	वरिष्ठ तकनीकी अधिकारी (1) 11.03.2021
श्री परमजीत लाल, तकनीकी अधिकारी	वरिष्ठ तकनीकी अधिकारी (1) 12.03.2021
श्री संदीप कुमार-I, तकनीकी अधिकारी	वरिष्ठ तकनीकी अधिकारी (1) 16.03.2021
श्री संदीप कुमार-II, तकनीकी अधिकारी	वरिष्ठ तकनीकी अधिकारी (1) 12.03.2021
श्री आशीष कुमार खरे, तकनीकी अधिकारी	वरिष्ठ तकनीकी अधिकारी (1) 20.03.2021
श्री विनीत कुमार, तकनीकी अधिकारी	वरिष्ठ तकनीकी अधिकारी (1) 23.03.2021
श्री सुमित मित्तल, तकनीकी अधिकारी	वरिष्ठ तकनीकी अधिकारी (1) 01.04.2021
डॉ. वेमुलुरी वेंकट रमण, वरिष्ठ वैज्ञानिक	प्रधान वैज्ञानिक 21.04.2021
श्री हरिओम कुशवाह, तकनीकी अधिकारी	वरिष्ठ तकनीकी अधिकारी (1) 28.04.2021
डॉ. पवन गुप्ता, वरिष्ठ प्रधान वैज्ञानिक	मुख्य वैज्ञानिक 06.05.2021
श्री दीपक भट्ट, वरिष्ठ तकनीकी अधिकारी (1)	वरिष्ठ तकनीकी अधिकारी (2) 07.05.2021
श्री भूपिंदर सिंह चोपड़ा, तकनीकी अधिकारी	वरिष्ठ तकनीकी अधिकारी (1) 19.06.2021
श्री हरविंदर जस्सल, वरिष्ठ वैज्ञानिक	प्रधान वैज्ञानिक 21.06.2021
श्री दिग्विजय सिंह नरुका, तकनीकी अधिकारी (1)	वरिष्ठ तकनीकी अधिकारी (2) 06.08.2021
डॉ. आशीष, वरिष्ठ प्रधान वैज्ञानिक	मुख्य वैज्ञानिक 25.08.2021
श्री दविंदर सिंह वरिष्ठ तकनीकी अधिकारी (1)	वरिष्ठ तकनीकी अधिकारी (2) 27.08.2021
डॉ. सुरेश कोरपोले, प्रधान वैज्ञानिक	वरिष्ठ प्रधान वैज्ञानिक 22.09.2021
श्री राजू बंसल, सहायक अनुभाग अधिकारी	अनुभाग अधिकारी (वित्त और लेखा अनुभाग) 28.12.2021
श्री कमल कुमार, सहायक अनुभाग अधिकारी	अनुभाग अधिकारी (भंडार और क्रय अनुभाग) 28.12.2021
सुश्री तजिंदर कौर, वरिष्ठ सचिवालय सहायक (सामान्य)	सहायक अनुभाग अधिकारी (सामान्य) 29.12.2021
श्री संदीप कुमार, कनिष्ठ सचिवालय सहायक (सामान्य)	वरिष्ठ सचिवालय सहायक (सामान्य) 01.01.2022
श्री गैरी बेदी, प्रधान वैज्ञानिक	वरिष्ठ प्रधान वैज्ञानिक 13.03.2022
श्री चन्द्रशेखर शर्मा, वैज्ञानिक	वरिष्ठ वैज्ञानिक 02.05.2022
श्री मनुज त्रिपाठी, वरिष्ठ वैज्ञानिक	प्रधान वैज्ञानिक 16.05.2022
डॉ.चारु शर्मा, वरिष्ठ प्रधान वैज्ञानिक	मुख्य वैज्ञानिक 24.07.2022
श्री अरविंद कुमार, अनुभाग अधिकारी, (भंडार और क्रय अनुभाग)	भंडार एवं क्रय अधिकारी 10.11.2022
श्री कैलाश टी. भामरे	वरिष्ठ प्रधान वैज्ञानिक 23.12.2023
डॉ. रश्मि कुमार, वरिष्ठ वैज्ञानिक	प्रधान वैज्ञानिक 29.12.2022
श्री मोहिंदर कुमार, भंडार एवं क्रय नियंत्रक	वरिष्ठ भंडार एवं क्रय नियंत्रक 09.08.2023

स्थानांतरण

कर्मचारी का नाम एवं पदनाम प्रयोगशाला/संस्थान जिसमें स्थानांतरण हुआ सीएसआईआर-इमटेक से कार्यमुक्ति की तिथि

श्री अवतार सिंह, प्रशासनिक अधिकारी, सीएसआईआर-सीएसआईओ, चंडीगढ़ 08.04.2021
श्री सुरिंदर कुमार नारद, वित्त एवं लेखा अधिकारी, सीएसआईआर-सीएसआईओ, चंडीगढ़ 12.04.2021
श्री दिलीप गहलोत, भंडार एवं क्रय अधिकारी, सीएसआईआर-आईआईआईएम, जम्मू 09.04.2021
श्री ब्योमकेश पांडे, सहायक अनुभाग अधिकारी (वित्त एवं लेखा अनुभाग), सीएसआईआर-सीएसआईओ, चंडीगढ़ 28.12.2021
श्री वीरेंद्र लांबा, अनुभाग अधिकारी (सामान्य), सीएसआईआर-आईएचबीटी, पालमपुर 16.08.2021
श्री गजिंदर कुमार, अनुभाग अधिकारी (सामान्य), सीएसआईआर- आईआईआईएम, जम्मू 16.08.2021
श्री रविंदर सिंह, सहायक अनुभाग अधिकारी (भंडार और क्रय अनुभाग), सीएसआईआर-आईएचबीटी, पालमपुर 30.12.2021
श्री परवीन कुमार, सहायक अनुभाग अधिकारी (भंडार और क्रय अनुभाग), सीएसआईआर- आईआईआईएम, जम्मू 25.02.2022
श्री ईश्वर दास, वित्त एवं लेखा नियंत्रक, सीएसआईआर-सीएसआईओ, चंडीगढ़ 11.11.2022
श्री जी.एस. वर्मा, भंडार एवं क्रय अधिकारी, सीएसआईआर-सीडीआरआई, लखनऊ 25.11.2022
श्री मनोज कुमार, अनुभाग अधिकारी (सामान्य), सीएसआईआर-आईआईआईएम, जम्मू 13.12.2022
श्री विक्रम सिंह, प्रशासन नियंत्रक, सीएसआईआर-आईआईआईएम, जम्मू 25.01.2023
श्री एच.एस. सेखों, वित्त एवं लेखा अधिकारी, सीएसआईआर कॉम्प्लेक्स, नई दिल्ली 10.07.2023
श्री के.एस. गैरा, अनुभाग अधिकारी (सामान्य), सीएसआईआर- आईजीआईबी, नई दिल्ली 31.07.2023
श्री अरविंद कुमार, भंडार एवं क्रय अधिकारी, सीएसआईआर-सीएसआईओ, चंडीगढ़ 14.08.2023
श्रीमती रानी देवी, सहायक अनुभाग अधिकारी (वित्त एवं लेखा), सीएसआईआर-सीएसआईओ, चंडीगढ़ 31.08.2023
श्री सुशील कुमार, वरिष्ठ आशुलिपिक, सीएसआईआर-सीएसआईओ, चंडीगढ़ 30.11.2023

इस्तीफा

कर्मचारी का नाम एवं पदनाम सीएसआईआर-इमटैक से इस्तीफे की तिथि

डॉ. (सुश्री) चेतना, तकनीकी अधिकारी 18.06.2023

सेवानिवृत्ति

कर्मचारी का नाम पदनाम सेवानिवृत्ति तिथि

श्री राज पाल, कार्य सहायक 31.01.2021
श्री अनिल थियोफिलस, वरिष्ठ तकनीशियन 28.02.2021
श्री उपेंद्र सिंह, वरिष्ठ तकनीशियन 31.03.2021
श्री गुरदीप सिंह, अनुभाग अधिकारी (सामान्य) 30.04.2021
श्री मलकीत सिंह, वरिष्ठ तकनीशियन 30.06.2021
श्रीमती. सुदेश शर्मा, अनुभाग अधिकारी (वित्त एवं लेखा) 31.07.2021
श्री रघु नाथ, सहायक अनुभाग अधिकारी 31.05.2022
डॉ. मनोज राजे, मुख्य वैज्ञानिक 31.07.2022
श्री राज कुमार-I, वरिष्ठ तकनीशियन 30.09.2022
श्री केवल कृष्ण, वरिष्ठ तकनीशियन 30.11.2022
श्री आर.के. कनौजिया, वरिष्ठ तकनीकी अधिकारी 30.11.2022
श्री राजेंद्र सोनी, मुख्य वैज्ञानिक 31.12.2022
श्री एस.एस. बावा, प्रधान तकनीकी अधिकारी 31.01.2023
श्री नंद लाल, कार्य सहायक 28.02.2023
श्री परमजीत कश्यप, वरिष्ठ तकनीशियन 31.03.2023
श्री आर.एन. मांझी, कार्य सहायक 30.06.2023
श्री रल्ला राम, कार्य सहायक 31.08.2023
श्रीमती बलजीत कौर, वरिष्ठ आशुलिपिक 30.11.2023
श्री रमेश सिंह, प्रयोगशाला सहायक 31.10.2023

सीएसआईआर की अन्य प्रयोगशालाओं/संस्थानों से सीएसआईआर-इमटैक में स्थानांतरण

श्रीमती कनिका गोयल, प्रशासनिक अधिकारी, सीएसआईआर-एचआरडीजी, गाजियाबाद 12.08.2021
श्री राम सिंह, अनुभाग अधिकारी (भंडार एवं क्रय) सीएसआईआर-आईएचबीटी, पालमपुर 23.08.2021
श्री मनोज कुमार, अनुभाग अधिकारी (सामान्य) सीएसआईआर-आईआईआईएम, जम्मू 31.12.2021
श्री के.एस. गैरा, अनुभाग अधिकारी (सामान्य) सीएसआईआर मुख्यालय, नई दिल्ली 11.10.2021
डॉ. अमित कुमार, वरिष्ठ वैज्ञानिक, सीएसआईआर-आईआईटीआर, लखनऊ 03.05.2021
श्री एच.एस. सेखों, वित्त एवं लेखा अधिकारी, सीएसआईआर-सीएसआईओ, चंडीगढ़ 16.04.2021
श्री हरनेक सिंह, प्रधान निजी सचिव, सीएसआईआर-सीएसआईओ, चंडीगढ़ 21.01.2022
श्री अमित कुमार, तकनीकी अधिकारी, सीएसआईआर- आईआईआईएम, जम्मू 04.11.2022
श्री अरविंद कुमार, भंडार एवं क्रय अधिकारी, सीएसआईआर-सीएसआईओ, चंडीगढ़ 10.11.2022
श्री संजीव कुमार वोहरा, वरिष्ठ वित्त एवं लेखा नियंत्रक, सीएसआईआर-सीएसआईओ, चंडीगढ़ 11.11.2022
श्री यशपाल, वित्त एवं लेखा अधिकारी, सीएसआईआर-आईएचबीटी, पालमपुर 27.12.2022
श्री एस.डी. ऋषि, प्रशासनिक अधिकारी, सीएसआईआर-सीएसआईओ, चंडीगढ़ 23.01.2023
सुश्री पूनम, सहायक अनुभाग अधिकारी, सीएसआईआर-एनपीएल, नई दिल्ली 27.03.2023
श्री मनीष कुमार, अनुभाग अधिकारी (सामान्य), सीएसआईआर-सीरी-पिलानी 01.08.2023
श्री फ़रीद मोहम्मद, अनुभाग अधिकारी (सामान्य), सीएसआईआर-आईआईपी, देहरादून 01.08.2023
श्री मोहिन्द्र कुमार, वरिष्ठ भंडार एवं क्रय नियंत्रक, सीएसआईआर-सीएसआईओ, चंडीगढ़ 09.08.2023
श्री रवि गर्ग, भंडार एवं क्रय अधिकारी, सीएसआईआर-एनआईएससीपीआर, नई दिल्ली 10.08.2023
श्री कपिल वर्मा, निजी सचिव, सीएसआईआर-सीएसआईओ, चंडीगढ़ 16.08.2023

Design, Concept & Creative Photography : Sh. Garry Bedi

CSIR - Institute of Microbial Technology
Sector 39-A, Chandigarh- 160 036, India
Phone: +91 172 2880201
Fax: +91 172 2690585
www.imtech.res.in