
M.G. Science Institute
AHMEDABAD
MICROBIOLOGY SOCIETY OF
MS
MG
M.G. SCIENCE INSTITUTE
MICROBYTE
Discover The Invisibles
VOL 3
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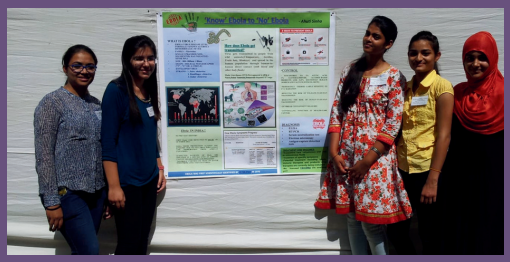
About MSMG

(Microbiology society of M.G. Science Institute)

"Together we grow, together we shine – snapshots of MSMG through the years."



What is MSMG?

MSMG is a vibrant platform created by and for the students of Microbiology at M.G. Science Institute. It serves not only as a space to hone academic skills but also as a stage for developing leadership, creativity, and teamwork. While guided by faculty, MSMG is primarily student-driven and provides opportunities to learn beyond the classroom.

Organizational Structure

- Principal – Patron
- Head of Department – Chairperson
- Senior Faculty Member – Secretary
- Faculty Member – Treasurer
- Students' Council – The heart of MSMG, run by students themselves. Members of the council elect their own leader, and also form an editorial board for the society's biannual magazine.

A Journey through time

The roots of MSMG go back to 1996, when **Dr. Vivek N. Upasani** established the Microbiology Student Society (MSS) with the encouragement of Principal **Prof. N.I. Dani** and Head of Department **Ms Umaben Desai**. Though the society flourished initially, it eventually became dormant.

In 2011, a revival took place under the leadership of **Dr. Ayesha N. Rafique** (then Head of Department) who envisioned a broader role for the society. It was renamed MSMG to reflect this expanded scope. Since 2012, MSMG has remained consistently active, thanks to the support of principals including **Dr Jain, Dr Upasani, Dr Vora and Dr J.H. Parikh**, and the tireless encouragement of faculties. Most importantly, it has been kept alive by the enthusiastic participation of students year after year.

What we do?

MSMG has become a hub of learning, exposure, and expression. Its activities include:

- Inviting eminent academicians, alumni, and industrialists for guest lectures.
- Organizing study tours that blend science with exploration.
- Preparing students to shine at state- and national-level competitions.
- Hosting in-house contests that bring out creativity and innovation.
- Screening scientific documentaries and films to inspire curiosity.

Our students, under MSMG's banner, have brought pride to the department by **winning 15 trophies at GiBioN** and excelling in prestigious competitions like **Manthan, Biocalyx**, and more.

Voices in print – The Magazine

The society has also nurtured a strong publication culture. Over the years, it has brought out student-led magazines under different names—**MICROCOSM**, **BIO&ME**, **MICROBIOME**, and today, **MICROBYTE**. Each issue captures the creativity, scientific spirit, and collective voice of our students.

Looking Ahead

MSMG continues to grow with fresh ideas and bigger dreams. Some of its upcoming goals include:

- Expanding its reach to include M.Sc. students.
- Building a strong alumni network to connect past and present students.
- Hosting GiBioN at M.G. Science Institute.
- Marking a historic milestone—celebrating 60 years of the Department of Microbiology in a truly memorable way.

At its heart, MSMG is more than a society. It is a community of learners and leaders, carrying forward the legacy of Microbiology at M.G. Science Institute while constantly reinventing itself for the future.

PERSONALIZED MEDICINE

Hope or Hype?

"Imagine walking into a clinic and walking out with a treatment plan made just for you..."

From the Desk of Dr. Noopur Goyal

As I celebrate 30 years in the field of Microbiology, I am reminded that science is not just about discovery, but about the journey of teaching, learning, and inspiring others. Over the years, my greatest joy has been guiding students to think critically, explore with curiosity, and believe in their potential.

This magazine is a reflection of that vision—a blend of knowledge, creativity, and dedication—showcasing the vibrant spirit of our department and the bright future of science at M.G. Science Institute.

"Microbes are history's greatest architects—building life, shaping disease, and driving evolution."

~Dr. Noopur Goyal
Vice Principal and Head of the Department of Microbiology
M.G. Science Institute

Imagine leaving a clinic with a treatment designed just for you — based on your DNA, lifestyle, family history, and even your environment. That's the vision of personalized medicine, a shift from the old "one-size-fits-all" model to care that is uniquely yours. While it's celebrated as a healthcare revolution, the question remains: is it truly transformative, or still more hype than reality?

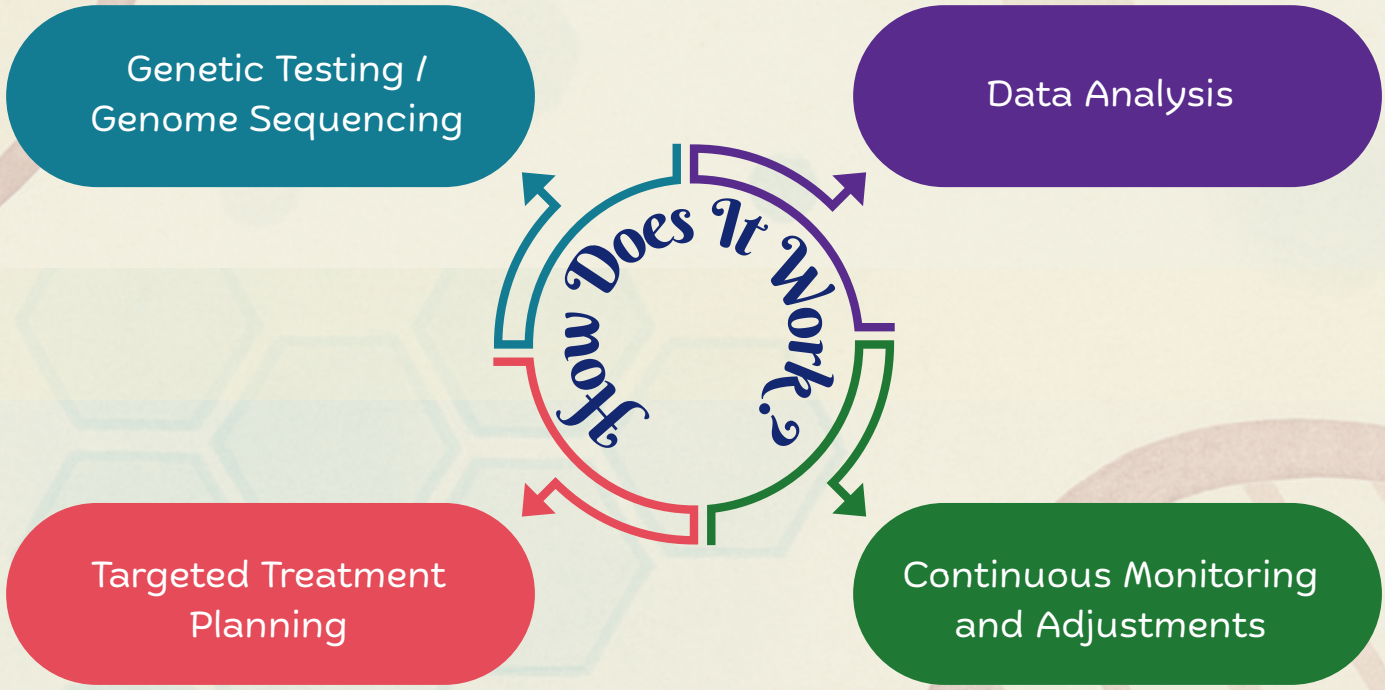
What is Personalized Medicine?

Also known as precision medicine, personalized medicine uses detailed biological and lifestyle information to guide decisions around disease prevention, diagnosis, and treatment.

"In modern healthcare, treatments are no longer given uniformly to all patients. Physicians now recognize that each person is different, and they tailor their decisions by looking at factors like:-

- Genetic makeup
- Biomarkers
- Environmental exposures
- Daily habits and lifestyle choices

This approach is especially powerful in diseases like cancer. For instance, genetic testing can uncover specific mutations that are driving a tumour's growth, allowing doctors to choose targeted therapies that are more effective — and come with fewer side effects.



Why the Buzz? — The Hope Behind the Hype

The Hope

More effective treatment
Fewer Side effects
Preventive power
Better Outcomes

VS

The Hurdles

High Costs
Limited Access
Privacy Concerns
Complex Diseases

Why more hope now: AI in Precision Medicine

Key Roles of AI:

- Improved Diagnostic Precision – Cuts diagnostic errors by up to 30% through advanced data analysis.
- Lower Treatment Costs – Personalized AI-driven plans reduce healthcare costs by around 30%.
- More Patient Engagement – AI portals boost patient involvement and satisfaction (up to 90%).

Future Prospect :

Personalized medicine, though still developing, holds the potential to transform healthcare by shifting the focus from simply treating diseases to truly understanding and caring for each individual.

THE POWER OF VACCINES

"A COMPREHENSIVE REVIEW OF COVID-19 VACCINES: DEVELOPMENT, MECHANISMS, EFFICACY, AND GLOBAL IMPACT"

In late 2019, COVID-19 disrupted societies worldwide. Through global collaboration and rapid biotechnology advances, vaccines were developed and granted Emergency Use Authorization (EUA) by early 2021, playing a vital role in reducing hospitalizations and deaths. Multiple platforms were used. mRNA vaccines, such as Pfizer-BioNTech's BNT162b2 and Moderna's mRNA-1273, instructed cells to produce the spike protein, generating strong immune responses. They were highly effective but required ultra-cold storage and sometimes caused short-term side effects. Viral vector vaccines, including Oxford-AstraZeneca's ChAdOx1, Johnson & Johnson's Ad26.COV2.S, and Russia's Sputnik V, used harmless viruses to deliver DNA, offering easier storage and durable immunity, though effectiveness could drop with pre-existing vector immunity. Inactivated virus vaccines, like Sinovac's CoronaVac and Sinopharm's BBIBP-CorV, relied on traditional methods but required multiple doses. Protein subunit vaccines, such as Novavax's NVX-CoV2373, used purified viral fragments with strong safety but also needed boosters. While variants like Delta and Omicron reduced protection, vaccines remained highly effective against severe disease, supported by booster doses.

Vaccines were largely well tolerated, with most people reporting only mild side effects. Rare but serious reactions included myocarditis in young males with mRNA vaccines, thrombosis with thrombocytopenia in viral vector vaccines, and anaphylaxis. Still, benefits far outweighed risks. As the virus mutated, bivalent mRNA boosters improved immune coverage against Omicron. Access, however, remained unequal: high-income nations secured doses early, while many low-income countries faced shortages, storage issues, and misinformation. Global initiatives worked to reduce these gaps but struggled with obstacles. Vaccines shaped the pandemic—saving lives, reopening societies, and restoring economies—while next-generation approaches target universal, mucosal, and thermostable designs for broader, lasting protection and future preparedness.

~ Nirav,Shivam,Siddharaj (M.Sc.. SEM-3)

TACKLING ANTIBIOTIC RESISTANCE: NEW CHALLENGES, NEW OPPORTUNITIES

~Hope in a Resistant World

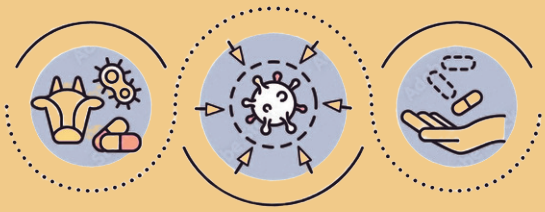
Antibiotics have long been the cornerstone of modern medicine, enabling us to combat infections that would have been fatal just a century ago. However, the world now faces a serious threat: bacteria are rapidly developing resistance to even our most advanced drugs. Experts have warned about this antibiotic crisis for years, but recent studies indicate that the situation may be even more urgent than previously thought.

New Drugs, Old Problems

Researchers have discovered that some bacteria can resist newly developed antibiotics even before these drugs are widely introduced, due to rapid bacterial evolution and the horizontal transfer of resistance genes. This insight highlights the potential of narrow-spectrum antibiotics, which target specific bacteria and may reduce the risk of widespread resistance. Scientists continue to stress the importance of early detection systems and continuous monitoring efforts to track emerging resistance patterns. A promising strategy involves pairing antibiotics with adjuvant molecules like P2-56-3, which can weaken resistant bacterial strains. In one study, researchers screened over 1.3 million combinations of antibiotics and small molecules, identifying a compound that significantly improves rifamycin's effectiveness. This rising challenge reflects the deep interconnection between science, medicine, and global public health.

Rearming Old Antibiotics

Scientists are exploring innovative ways to strengthen antibiotics by pairing them with adjuvant molecules. The aforementioned study demonstrated that P2-56-3 notably boosts the efficacy of rifamycin against some of the most dangerous bacteria. This strategy shows promise in revitalizing older drugs through smarter combinations, rather than relying solely on the development of new antibiotics. However, further testing is required to ensure the safety of such combinations for human use.



Antimicrobial Resistance

Image source: Adobe Stock

"Old drugs can be powerful allies — if we learn to work with them wisely."

The Road Ahead: Smarter, Not Harder

Antibiotic resistance is a serious global threat at the intersection of science, medicine, and public health. The misuse of antibiotics has led bacteria to evolve strong defenses. Experts emphasize the need for responsible drug development, enhanced monitoring, and innovative treatments to combat resistance and safeguard future generations.

~ Vishakha, Diane (T.Y. SEM-5)

Microbiota and The Mind

Unravel the Gut-Brain Axis

Your gut is home to over 100 trillion microorganisms—more than the stars in our galaxy. And beyond digestion, these tiny residents may be shaping your emotions, memory, and stress levels.

- **Our Brain's Secret Partner**

The gut, often called the "second brain," contains the enteric nervous system (ENS), a vast web of neurons that talks constantly with the brain through the gut–brain axis.

- **The Secret Chatroom**

This two-way conversation flows through nerves, hormones, and immune signals. Gut microbes even produce neurotransmitters like serotonin and dopamine, along with short-chain fatty acids that influence mood, inflammation, and brain health.

- **When Things Go Wrong**

Dysbiosis—when harmful microbes outnumber the good—can throw this system off balance. A "leaky" gut and rising inflammation may send scrambled signals to the brain, contributing to anxiety, depression, and even autism spectrum disorders. In fact, germ-free mice show abnormal stress responses, but when given beneficial bacteria, they become calmer.

- **Psychobiotics: Mood-Boosting Microbes**

Psychobiotics are probiotics that support mental health by restoring microbial balance. Strains like *Lactobacillus rhamnosus* and *Bifidobacterium longum* have shown promise in reducing anxiety and depression. They act by lowering stress hormones, calming inflammation, and boosting production of neurotransmitters such as GABA and serotonin. In one study, volunteers taking *Lactobacillus helveticus* reported reduced anxiety levels after just a month. Prebiotics—fibers like inulin and FOS—also play a role by feeding these microbes, and you can find them naturally in foods like garlic, onions, bananas, and oats. Together, psychobiotics and prebiotics form a powerful duo for keeping both gut and mind in balance.

- **So, Is Mental Health in the Gut?**

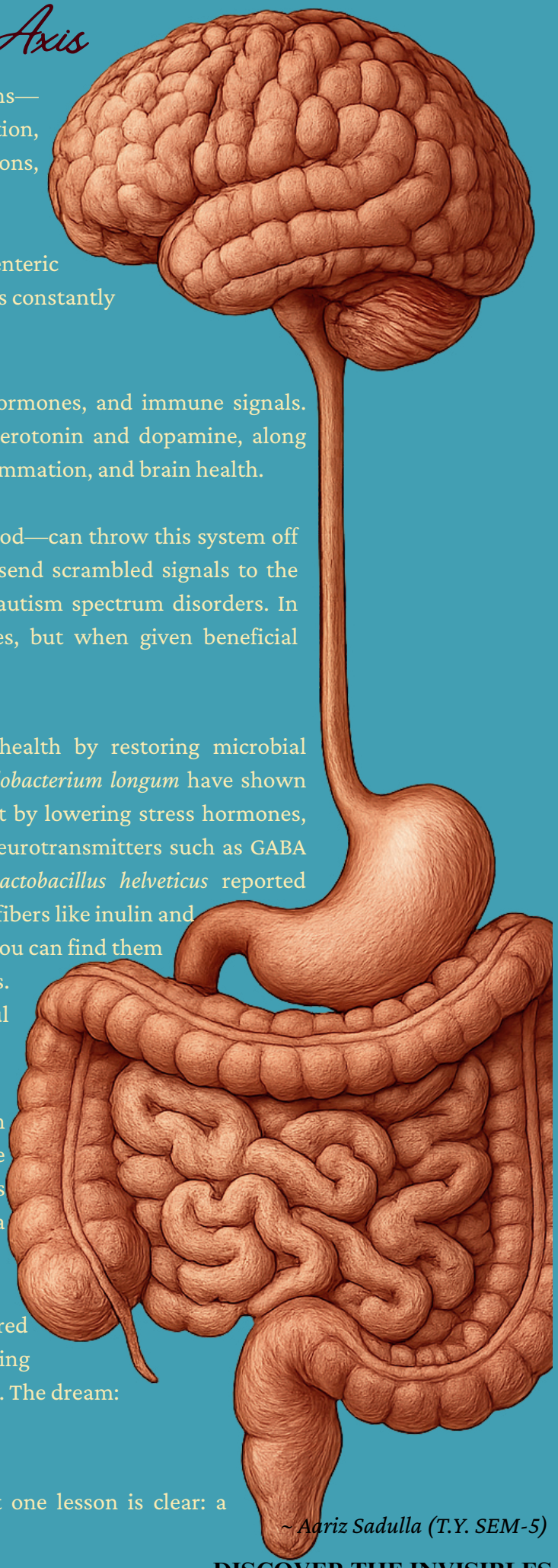
Not entirely. But the gut strongly shapes brain chemistry and emotional well-being. Small lifestyle steps—more fiber and fermented foods, stress management, and quality sleep—can make a difference.

- **The Future**

From faecal microbiota transplantation (FMT) to tailored probiotic and prebiotic therapies, scientists are exploring gut-based solutions for stress, anxiety, and depression. The dream: microbe-inspired medicines for the mind.

- **The Ending? Still Being Written**

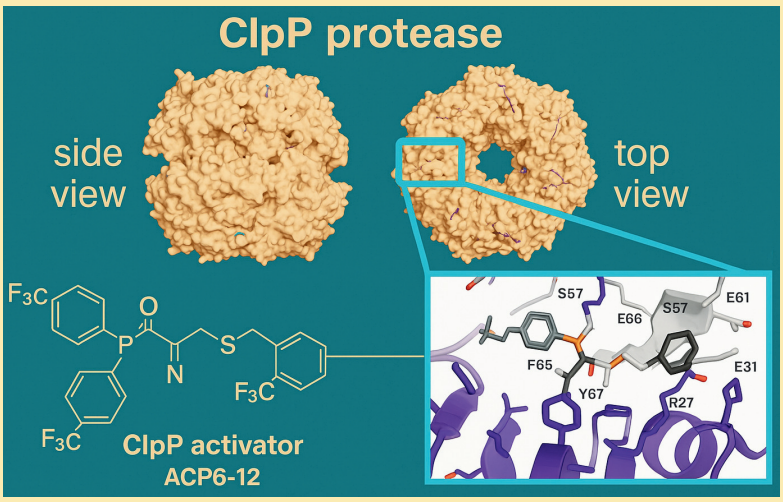
The gut–brain connection is a story in progress, but one lesson is clear: a happy gut often means a healthier mind.



~ Aariz Sadulla (T.Y. SEM-5)

The Self Destruct Drug

Bacteria Don't Stand A Chance



Credit: Journal of Medicinal Chemistry (2024)

"In the global fight against antibiotic resistance, innovation is key."

As traditional antibiotics lose their power, scientists are exploring fresh strategies to outsmart harmful microbes. Drawing inspiration from cancer research, a team from the University of Toronto has made a groundbreaking discovery: a new class of compounds that causes bacteria to self-destruct, offering a promising solution to a growing medical crisis.

The new form of antibiotics is designed to target a naturally occurring enzyme—caseinolytic protease proteolytic subunit, ClpP, for short—which chews up old or defective proteins and plays an essential role in cellular housekeeping. The new compound kicks the ClpP enzyme into overdrive, so it begins chewing up proteins that it is not supposed to, eventually killing its own cell from the inside out.

"Most antibiotics inhibit a process," says Dr. Walid A. Houry, professor of biochemistry at the University of Toronto. "With this approach, we are dysregulating a process, and this allows us to develop this new class of compounds that we eventually hope to get into a clinic." Houry worked closely with Dr. Robert Batey and colleagues to build upon their previous work in this area.

"It turns out that the [enzyme] present in cancer cells is also present in bacteria. For this project, the tricky thing was trying to find a way to hit the bacterial ClpP, but not the human ClpP," Houry adds.

The Canadian Light Source (CLS) at the University of Saskatchewan's (USask) CMCF beamlines enabled Houry's team to visualize the structural differences between human and bacterial ClpP, and understand how their new compounds behaved when attacking ClpP. The group capitalized on the minor structural differences between the human and bacterial enzymes to design compounds that could target harmful bacteria without damaging human cells along the way.

This new approach to antibiotics, says Houry, holds great potential for treating bacterial infections such as meningitis and gonorrhea.

~ Aashvi Bhatt (T.Y. SEM-5)

When Aerospace Meets Microbiology

Smarter Fermentation

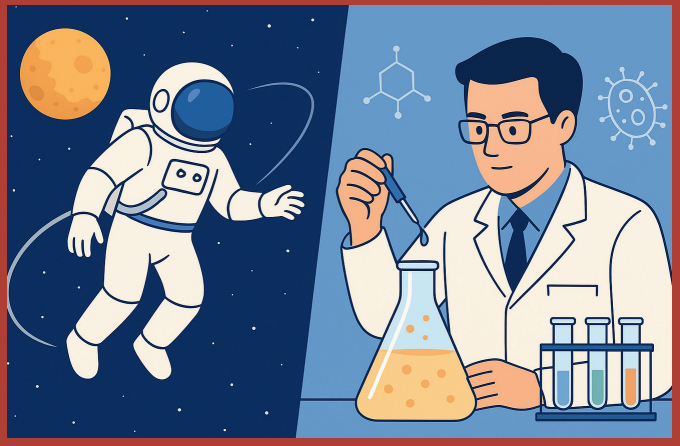
Microbial fermentation plays a vital role in the food, agricultural, and pharmaceutical industries. However, traditional fermentation processes face challenges such as extended processing times, low product yields, and limited stress resistance.

Role of Aerospace Technology in Fermentation

Advances in aerospace technology—especially studies of microorganisms in microgravity and cosmic radiation are revealing new insights into microbial behavior and metabolism. These findings are helping scientists develop improved fermentation processes with applications in medicine, agriculture, industry, and space exploration.

An Interesting Case Study

Space microbiology experiments, such as China's Shenzhou VIII mission, showed engineered yeast producing more health-promoting metabolites for better beer flavor. Other studies reported higher antibiotic yields, enhanced enzyme secretion, and reduced biofilm formation in space.



Effects of Space Environment on Microorganisms

Space conditions like microgravity, cosmic rays, and vacuum, induce stable genome-wide mutations in microorganisms, enhancing growth, enzyme activity, stress resistance, metabolite production, and even the quality of fermented products.

Advantages	Challenges
Cells remain suspended without shear forces.	Challenges in temperature regulation under zero gravity.
Sedimentation is reduced.	Difficulties with gas handling.
Potential to harness solar energy instead of electricity.	Risk of harmful or antibiotic-resistant mutants.

Conclusion

Aerospace technology can boost microbial fermentation, but realizing its full potential requires overcoming risks through ongoing research.

~ Miral Raiyani (T.Y. SEM-5)

MEET YOUR MICROBIAL RESIDENTS

Allies in Every Pore

The recent study of the human skin microbiome has led to several groundbreaking discoveries, each expanding our understanding of the skin's microbial ecosystem and its potential for future medical advances.

Unprecedented Discovery of Novel Species:

Researchers analysed nearly 600 skin samples from 12 healthy individuals, using a combination of laboratory culturing and advanced metagenomic sequencing. This approach led to the identification of 174 previously unknown bacterial species—a 26% increase in known skin bacterial diversity—as well as three new fungal species. Some of these newly discovered bacteria, such as *Candidatus Pellibacterium*, had never before been associated with human skin. Additionally, the genus *Corynebacterium* was found to contain the highest number of newly identified skin species. These findings significantly broaden the catalog of microbes known to inhabit the skin.

Cataloging the Skin Microbiome:

The researchers compiled their findings into the Skin Microbial Genome Collection (SMGC), a comprehensive reference catalog encompassing 622 prokaryotic species, multiple fungal genomes, and viral sequences. This resource now enables scientists to identify approximately 85% of the microorganisms present in any given skin sample, greatly improving the accuracy and depth of future skin microbiome studies. The SMGC is expected to facilitate research into the roles these microbes play in health and disease.

Stability of Microbial Communities:

Analysis of the skin microbiome shows that, despite some variability between individuals and body sites, microbial composition remains relatively stable over time, particularly in oily and dry regions. Species like *Cutibacterium acnes* and *Lawsonella clevelandensis A* were consistently abundant. About 50 species were shared by all participants, forming a core set of microbes in healthy skin.

"Jumbo Viruses" on Skin:

The study also uncovered the first examples of jumbo phages—viruses with genomes three to five times larger than typical viruses—that specifically infect skin-dwelling bacteria. A total of 20 new jumbo phages were identified, most commonly found on the hands and feet. These areas are frequently in contact with diverse environments, which likely contributes to the higher viral diversity observed. The presence of these large viruses adds a new layer of complexity to the skin microbiome, highlighting intricate interactions between bacteria and their viral predators.

Potential for Therapeutic Applications:

The expanded knowledge of skin microbial diversity and the availability of the SMGC open new avenues for therapeutic interventions. Understanding the roles of newly identified bacteria, fungi, and viruses could lead to treatments that modulate the skin microbiome to benefit acne, eczema, wound healing, and other dermatological diseases. The authors emphasize the potential for isolating and characterizing these species to better understand their functions and interactions within the skin ecosystem.

~ Dhruvi Katara (S.Y. SEM-3)

Synthetic Microbiome: The Future of Biotechnology

Microorganisms are vital to ecosystems, health, and industry. With biotechnology, scientists now engineer synthetic microbiomes—custom microbial communities for specific functions—opening new frontiers in science and innovation.

What is a Synthetic Microbiome?

A synthetic microbiome is a carefully designed community of microbes, sometimes genetically engineered, that interact in controlled ways to achieve specific goals. Unlike natural microbiomes, they are built using synthetic biology, CRISPR, and computational modeling to optimize interactions, enhance benefits, and suppress harmful traits. Researchers select strains, engineer functions, and predict behaviors with simulations and machine learning, creating microbiomes that can remain stable, adapt to stress, or perform entirely new biochemical functions.

Applications across multiple sectors:

MEDICINE & HEALTHCARE

- Boost cancer immunotherapy
- Enable targeted drug delivery
- Support mental health (gut-brain axis)

AGRICULTURE

- Promote plant growth & yield
- Biocontrol of pests & pathogens
- Seed coatings for early growth & resistance

ENVIRONMENTAL SOLUTIONS

- Degrade plastics, oil spills & pollutants
- Detoxify heavy metals in water
- Convert waste into bioenergy/compost

INDUSTRIAL BIOTECHNOLOGY

- Produce biofuels (ethanol, biodiesel)
- Create biodegradable bioplastics
- Manufacture drugs, vitamins & enzymes

SPACE EXPLORATION

- Recycle waste in closed systems
- Produce food & nutrients
- Enable sustainable long-term missions

Challenges and Concerns

Synthetic microbiomes pose biosafety and ethical risks - uncontrolled spread, gene transfer, weak regulations, limited long-term data, and concerns over life modification or misuse. Responsible development requires transparency, public engagement, and global safety standards. Collaboration between scientists, policymakers, and industry will be essential to ensure safe and beneficial applications.

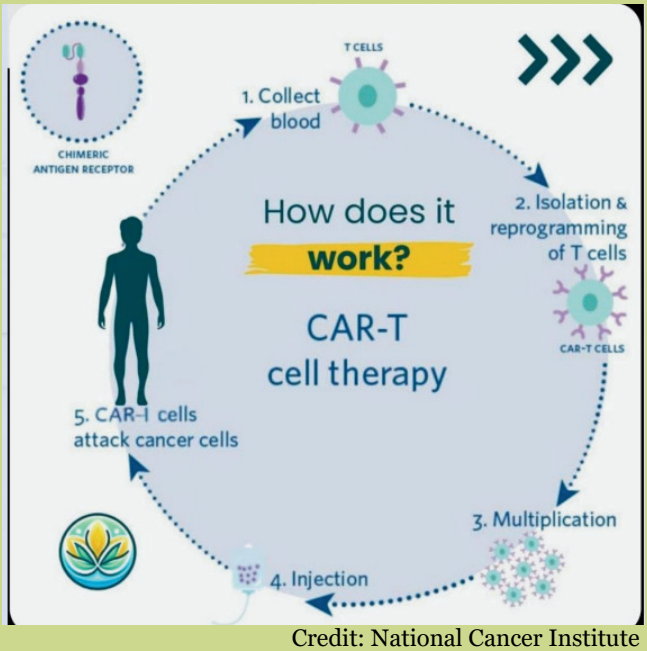
Conclusion

Synthetic microbiomes merge biology and technology, offering the potential to revolutionize medicine, agriculture, environmental management, industry, and even space exploration. With strong ethical oversight and effective regulation, they could become a defining innovation of the 21st century, shaping a healthier, more sustainable future.

~ Ragnee Jha (S.Y. SEM-3)

ENGINEERING THE IMMUNE ARMY: THE RISE OF CAR-T CELL THERAPY

"Targeted. Engineered. Unstoppable."



Credit: National Cancer Institute

"We don't just fight cancer anymore — we teach the body how to win."

Why the need for new therapies?

Conventional cancer treatments often fail in advanced stages. CAR-T offers a targeted immune-based solution with lasting results in blood cancers.

How It Works?

CAR-T cell therapy (Chimeric Antigen Receptor T-cell therapy) is a form of personalized immunotherapy where a patient's own T cells are genetically engineered to better identify and kill cancer cells. It has proven highly effective against specific blood cancers and is currently being researched for its potential in treating solid tumors.

Approved Uses:

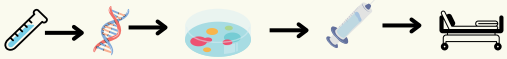
- Acute Lymphoblastic Leukemia (ALL)
- Diffuse Large B-Cell Lymphoma (DLBCL)
- Mantle Cell Lymphoma
- Multiple Myeloma

BENEFITS	CHALLENGES
TARGETED TREATMENT – attacks cancer cells precisely	**CYTOKINE RELEASE SYNDROME (CRS)** – can cause high fevers and inflammation
PERSONALIZED THERAPY – uses patient's own T cells	**NEUROTOXICITY** – may lead to confusion, seizures, or speech problems
HIGH SUCCESS IN BLOOD CANCERS (e.g., ALL, DLBCL)	**HIGH COST** – therapy and production are expensive
LESS HARMFUL TO HEALTHY CELLS than chemo/radiation	**RISK OF RELAPSE** – cancer may return if antigen changes or is lost
LONG-LASTING RESPONSE in some patients	**LIMITED EFFECTIVENESS** in solid tumors
RAPID INNOVATION – CRISPR, universal CAR-T in research	**TIME-CONSUMING** – weeks needed to engineer and expand cells

How successful is this treatment?

A 2020 study found that over 85% of children with acute lymphoblastic leukemia achieved complete remission after CAR T-cell therapy, with 60% remaining cancer-free after 12 months.

Timeline of Therapy



Day 0	Day 2-10	Day 10-14	Day 15+	Post Infusion
Blood Collection	Genetic Modification	Cell Expansion	Cell Infusion	Ongoing

~Hetu Rathod (S.Y. SEM-3)

Unlocking Career Opportunities: How Pharmaceutical Courses Empower Microbiologists

Pharmaceutical companies oversee the complete lifecycle of drugs, which are chemical or biological agents used to diagnose, treat, and prevent disease. Microorganisms are ubiquitous and play a significant role in drug development and manufacturing.

Where Do Microbiologists Play a Role?

1 .Ensuring product safety

Microbiologists help ensure product safety by identifying sources of microbial contamination — in facilities, equipment, raw materials, and utilities such as water and air. Their responsibilities include implementing sterilization techniques, handling materials properly, and maintaining aseptic conditions.

2. Quality Control

In quality control, microbiologists perform tests to ensure products meet standards for purity, efficacy, and safety set by regulatory authorities such as the FDA. They verify that results are accurate and reliable.

3. Antimicrobial resistance

With the rise in antimicrobial resistance, understanding microbial interactions with drugs and therapy effectiveness is vital. Microbiologists study how microbes interact with drugs and help assess the effectiveness of treatments, which is crucial as antibiotic resistance increases.

4. Drug Development

Microbiologists contribute to drug development by studying the mechanisms of antimicrobial agents and identifying new therapeutic targets. Their expertise is essential in developing antibiotics, vaccines, and steroid medications.

Main responsibility of microbiologist

1. Routine quality checks of water for coliforms and other pathogens such as Pseudomonas spp.
2. Calibration of equipment
3. Maintenance of aseptic environments through workstation fumigation, proper hygiene, and protective gear (e.g., masks, head caps, gowns, and use of 70% IPA).
4. Microbial Limit Tests of raw materials and finished products.
5. Preparation of media for routine tests.
6. Sterility testing, especially for products like eye drops and injectable drugs.

Image source: freepik

Pharmaceutics and microbiology are deeply interconnected, with pharmaceutical manufacturing relying on microbiologists for safety, contamination control, and innovation. Strong collaboration between these fields ensures effective industrial practice and laboratory work in healthcare.

~ Tanay Dubey (S.Y. SEM-3)

MOBILE PHONES

Our Pocket - Sized Petri Dishes

Mobile phones have become an extension of our hands, used from dawn to dusk. But have you ever wondered what else they carry besides your favourite apps? Your phone, especially the screen, is like a petri dish you carry everywhere—from your pocket to the restroom, the dining table, and even your face while snapping selfies or answering calls. Scientific studies have shown that mobile phones harbour more bacteria than a toilet seat, with over 90% of phones tested showing microbial contamination. Harmful bacteria like Staphylococcus aureus, E. coli, and Klebsiella thrive on our phones, some even resistant to antibiotics.

Why does this occur?

Because phones are in constant contact with our faces, hands, bags, beds, and a myriad of dirty surfaces. We use them for eating, sneezing, traveling, and even using the restroom, but we hardly ever consider disinfecting them. Microbiology serves as a reminder that innocuous does not necessarily equate too invisible. Although these microbes might not make us sick right away, our phones can serve as silent carriers of pathogens, spreading them to our mouths, skin, and even open wounds.

Every time you place your phone on your lips or cheek, the warmth, perspiration, and moisture from your skin provide an ideal environment for bacteria to grow. How about cosmetics? It adheres to your screen and functions as a nutrient-rich food source for microorganisms. These accumulations eventually form slick, bacterially-friendly areas where your face and fingers meet.

What are we to do?

First, use alcohol-based wipes or microfiber cloths sprayed with a mild cleanser to clean the surface of your phone on a regular basis. Before eating, after returning from public areas, and particularly after using the restroom, wash your hands. Phones should not be used in restrooms or bathrooms. Put them on sanitized surfaces instead of beds or kitchen counters. Teach your loved ones about microbial hygiene, particularly students and medical professionals who are more exposed.

Conclusion

Our phones enable us to stay connected in this digital age to people, information, and entertainment. They also give us access to invisible microbial worlds. Let's continue to be vigilant, knowledgeable, and—above all—clean.

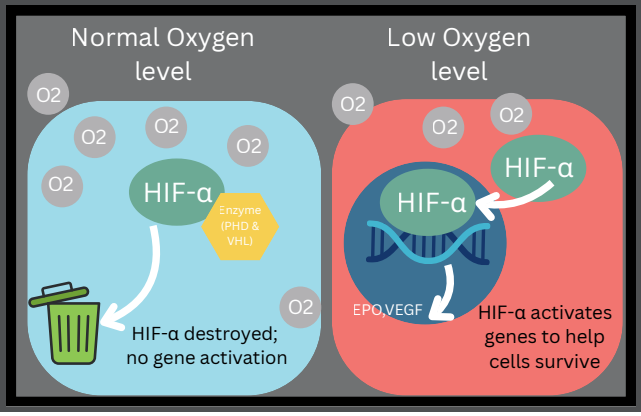
~ Dhruvi Patel (F.Y. SEM-1)

William G. Kaelin Jr., Sir Peter J. Ratcliffe, & Gregg L. Semenza

Nobel Laureates-2019

In 2019, the Nobel Prize in Physiology or Medicine was awarded to William G. Kaelin Jr., Sir Peter J. Ratcliffe, and Gregg L. Semenza for solving one of biology's great mysteries—how our cells sense and adapt to oxygen.

Oxygen is the fuel of life, yet until recently, scientists didn't know how cells detected and responded to its levels. The laureates uncovered this mechanism by studying a protein called HIF (Hypoxia-Inducible Factor). Semenza identified and cloned HIF, showing how it switches on genes when oxygen is scarce. Ratcliffe revealed how oxygen-dependent enzymes fine-tune this system, while Kaelin linked it to the VHL tumor suppressor, showing that the body "tags" HIF for destruction when oxygen is plentiful.



Together, their work revealed a molecular switch: in normal oxygen, HIF is destroyed; in low oxygen, HIF survives, driving the production of red blood cells, new blood vessels, and metabolic changes to keep tissues alive.

This discovery is more than textbook science—it is reshaping medicine. Drugs that boost HIF activity are already being used to treat anemia by stimulating red blood cell production. Conversely, blocking HIF could cut off tumors' survival strategies, offering new hope for cancer therapy. Future prospects include treatments for heart disease, kidney disorders, stroke, and even chronic inflammatory conditions—where controlling oxygen responses could make a life-saving difference.

By decoding the oxygen sensor, Kaelin, Ratcliffe, and Semenza not only answered a fundamental question of life but also opened a gateway to therapies that may transform healthcare. Their work stands as a brilliant reminder: the smallest cellular secrets can have the biggest impact on human survival.

~ Rajvi Chavda (S.Y. SEM-3)

KNOW YOUR CITY

THE PIRANA WASTE-TO-ENERGY PLANT

Ahmedabad's Pirana landfill, once infamous for its towering "**garbage mountain**," has been reborn as a model of sustainable waste management. After four decades of waste accumulation, the city turned to advanced technology—and microbial allies—to tackle its solid waste crisis.

Inaugurated on **November 1, 2024**, by Union Home Minister Amit Shah, the Pirana Waste-to-Energy (WTE) Plant is Gujarat's largest, built with **JITF Urban Waste Management**. It processes **1,000 metric tonnes** of municipal solid waste daily, generating **15 MW of electricity** through **refuse-derived fuel (RDF) incineration**—enough to power thousands of homes.

Crucially, before incineration, the waste undergoes microbial pre-treatment, showcasing the unseen role of microbiology in this green transition.

Microorganisms at Work -Behind the Scenes

Even though the Pirana plant uses incineration, microbes play key roles in waste pre-treatment and pollution control:

Organic Waste Breakdown: *Bacillus, Pseudomonas, Aspergillus,* and *Penicillium* help decompose proteins, fats, and plant materials in biodegradable waste.

Leachate Treatment: *Nitrosomonas* and *Nitrobacter* remove nitrogen waste, while denitrifiers and sulfate-reducing bacteria detoxify leachate.

Anaerobic Digestion (Future Scope): *Methanobacterium* and other methanogens may be used in upcoming biogas projects to generate energy from organic matter.

Microbial Champions of the Circular Economy

The plant reduces reliance on landfills, cuts down greenhouse gas emissions, and produces valuable energy. A **new 300 TPD Waste-to-Steam Plant** is also in development at the site, using German technology—likely to include **microbial pre-treatment modules for steam optimization**. The Pirana Waste-to-Energy Plant is more than a technological marvel—it's a living example of the **circular economy** in action. Beneath the turbines and incinerators lies a microscopic workforce that decomposes, detoxifies, and prepares waste for transformation. By harnessing the power of microorganisms, Ahmedabad is not just managing its waste, but reshaping its future—**cleaner, greener, and microbially smarter.**

~ Aditi Dutt(T.Y. SEM-5)

MICROTIMES

LATEST DISCOVERIES & DEVELOPMENTS IN MICROBIOLOGY, INFECTIOUS DISEASES, AND BIOTECHNOLOGY

"INVISIBLE THINGS ARE THE MOST POWERFUL. WE TRACK THEM FOR YOU."

Candida auris – The ICU Invader

A multidrug-resistant fungus spreading in Indian hospitals, C. auris can survive on surfaces for weeks and is misidentified by standard tests.

🔍 Why it matters: High mortality in bloodstream infections; recent outbreaks in Maharashtra ICUs.

Mycoplasma genitalium – The Silent STD

Often symptomless, this pathogen is becoming highly drug-resistant.

🔍 Why it matters: It causes infertility, pelvic infections, and is rarely screened.

Cryptosporidium spp. – The Waterborne Menace

A chlorine-resistant parasite causing severe diarrhea, especially in children.

🔍 Why it matters: Summer outbreaks reported in Kerala and Spain.

Lurking Threats: The Overlooked Microbial Killers

Microbe	Origin	Risk
Elizabethkingia anophelis	ICU Pipelines	Neonatal sepsis, ICU outbreaks
Burkholderia pseudomallei	Soil & Water (Asia)	Mimics TB, Fatal in diabetics
Hendra Virus	Bats→ horses→ Humans	No Vaccine

Spices Under the Scope

2025 studies from ICMR found high levels of ***Bacillus cereus*** and fungal aflatoxins in unbranded spice powders.

🔍 Why it matters: Chronic exposure linked to liver damage and food poisoning.

🩹 Advice: Always use certified brands; store spices in airtight dry containers.

The Forever Vaccine

Universal Flu Vaccine Enters Final Trial Phase

An mRNA-based vaccine covering all flu strains shows strong results.

🔍 Why it matters: One shot may protect for years — no more seasonal updates.

Biohazard Watch 2025

Chapare virus – Hemorrhagic virus from Bolivia; human-to-human spread, no vaccine.

SFTSV (***Severe Fever with Thrombocytopenia Syndrome virus***) – Tick-borne virus; rising in East Asia, ~30% fatality.

Klebsiella pneumoniae (XDR)– ICU superbug; resistant to nearly all antibiotics.

Avian Influenza A(H5N1) – Bird flu; human cases reported in 2025, >50% fatality.

Thank you for staying curious with MicroTimes 2025!

Follow us for more invisible insights @msmg_mgscience

READ MORE

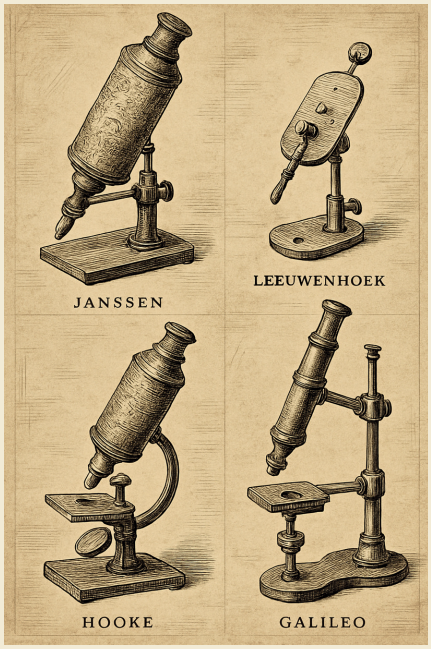
Whispers from the MICROSCOPE

The glass reveals what eyes can't see—
A realm of life and mystery.
Tiny architects at play,
Building worlds both night and day.

Threads of life in winding trails,
Cells like ships with silent sails.
Bacteria in bustling towns,
Fungi weaving forest threads.

Whispers echo in the air,
Stories told with utmost care.
Of battles fought and peace restored,
Of ancient secrets long ignored.

DNA's twisted, twirling scroll,
Holds the key to every soul.
A blueprint written line by line,
A code of life, so pure, divine.



Hans Janssen, Zacharias Janssen, Robert Hooke, Antonie van Leeuwenhoek, and Galileo Galilei

The microscope—our widened eye—
Reveals the worlds that live and lie.
It calls to those who dare to dream,
To see beyond the surface gleam.

Each slide, a universe contained,
With wonders waiting to be named.
A silent hum of life's grand choir,
Sings softly, lifts the mind higher.

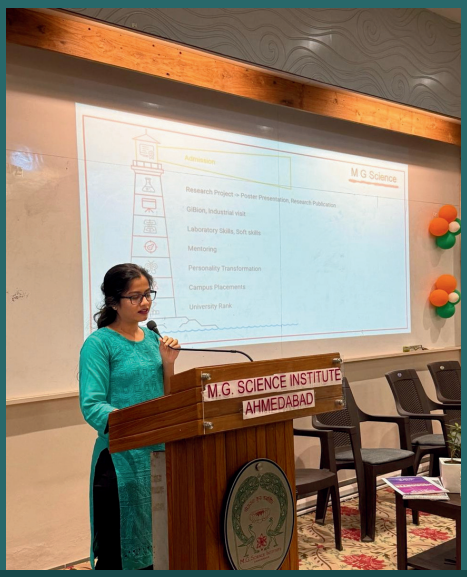
So lean in close, and you will find,
Whispers that expand the mind.
A dance of life, both small and grand—
The microcosm of the land.

In every glance, a world awakes,
In every view, the mystery takes.
The whispers from this tiny scope,
Fill hearts with awe and endless hope.

~ Deep Kanani (T.Y. SEM-5)

ACTIVITIES

MAGAZINE LAUNCH- MICROBYTE (VOL 2) ON 14/02/25



Followed by interactive session by Ms. Jemi Gandhi

Workshop on "Modern Microbial Testing" in collaboration with LMCP was held on 17–19 July 2025, attended by Aashvi Bhatt, Aditi Dutt, Deep Kanani, Vedant Sheladiya (Sem 5) and Param Baxi (Sem 3).

A three-day training on "Basic Animal Cell Culture Techniques" was held on 23–25 July 2025 by AIC GISC Foundation and SAST-GTU, with participation from Heer Jadav, Ayan Meman (Sem 5), Param Baxi, and Krishna Parvadiya (Sem 3).

• **Dr. Ronak Chhaya** (Microbiologist & Phlebotomist – Algae Energy, S.A.) conducted an informative session for M.Sc. Semester-1 students, discussing advancements in phycology and industrial microbiology on 13th August 2024.

• Students from M.Sc. Chemistry (SF) and Microbiology visited NEPL (Narol Environmental Project Limited), on an advanced industrial wastewater treatment facility.

• Biocalyx – 26 July 2025

Poster Presentation: Sneha Prajapati, Parvadiya Krishna, Tanay Manoj Dubey (B.Sc. Sem 3); Mutoo Solomon Khaemba (B.Sc. Sem 3); Diya Patel, Dinalba Vaghela (M.Sc. Sem 3)

Model Making: Jadav Drashti, Anjali Thakkar, Ami Chavda, Disha Patel (M.Sc. Sem 3)

ACHIEVEMENTS

Celebrating Excellence: Top 50 in the University – BSc Sem 4

MSMG Scientifica Model Competition

SEM-6	SEM-4	SEM-2
1st: Priti, Shaily, Nisha, Denisha 2nd: Devanshi, Dhwani, Saba, Arpita	Joint 1st Place : Tasneem & Vishakha; Diane 2nd: Miral, Purva, Aashvi, Aditi	1st: Sharvari, Rajvi, Riddhi 2nd: Hetu, Khushi, Krupa, Ruchika

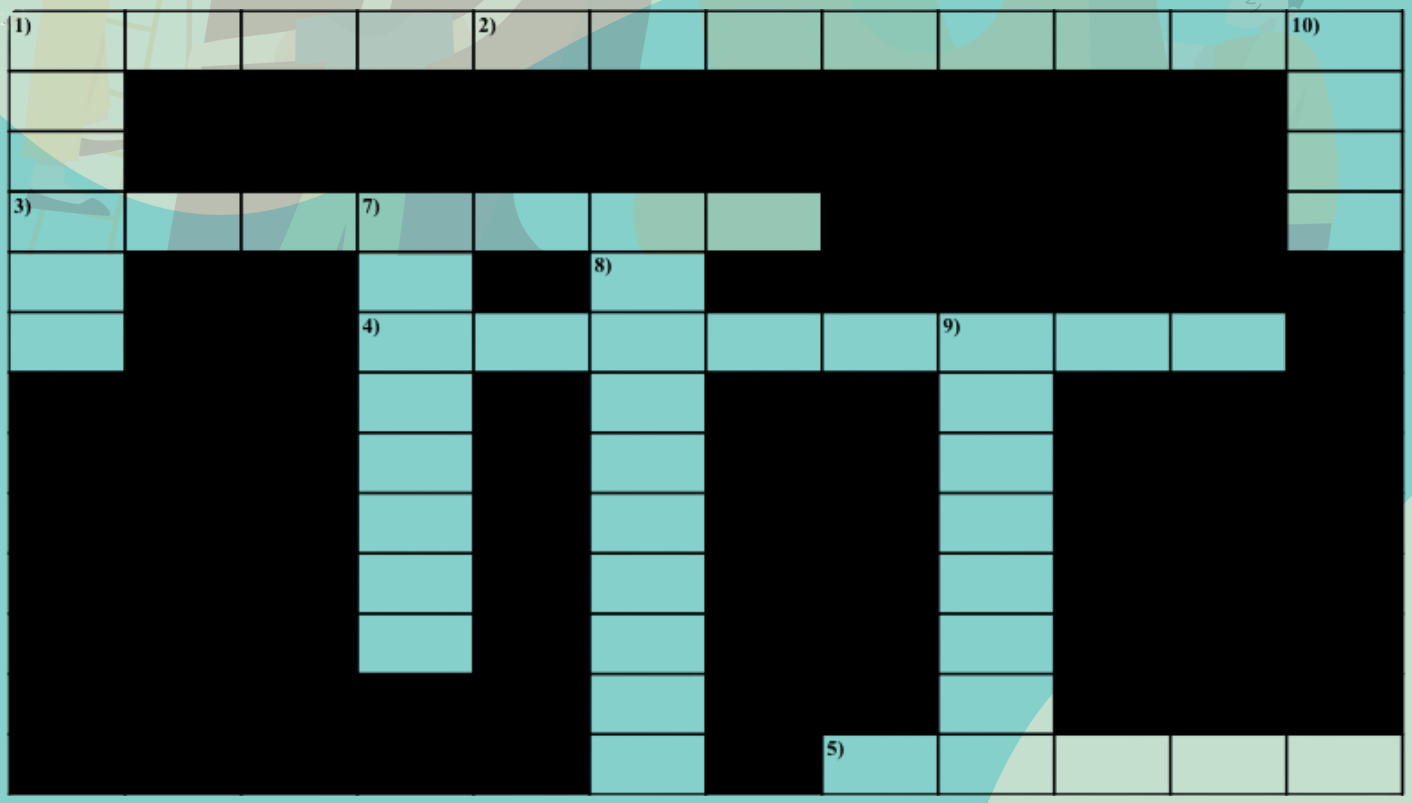
M.SC.SEM-2

1st: Nidhi Nayak	2nd: Anjali, Devangi,	Hemanshiba, Darshi

Pillar's of progress

- Kinjal Joshi, Noopur Goyal & Rupal Patwa published in Bioscience Biotechnology Research Communication (Vol. 18, Jan–Mar 2025).
- Dr. Payal Patel published in The Bioscan Journal on anti-MRSA antibiotic production.
- Dr. Avni Divatia contributed a chapter in Springer Nature's "The Future of Plant Protection."
- Ms. Komal Chaudhari presented a poster at the National Conference (MBSI), Valsad, Jan 2025 on marine *Actinomycetes*.
- Dr. Noopur Goyal completed 30 years in the field of Microbiology.
- Dr. Payal Patel and Dr. Avni Divatia served as a resource person in Workshop on "Modern Microbial testing" in Collaboration with LMCP, 17-19 July 2025.

SCRATCH



ACROSS :

1. Thickest layer of spore envelope is ____?

2.Cholera toxin is a form of ____?

3. ____ inclusions bodies usually contain either glycogen or poly-beta - hydroxyalkanoate.

4 ____ is a versatile compound used in a wide array of applications including skin care, food, medicine & industrial process.

5.DNA packaging, regulating gene regulation & providing structural support to chromosomes are the major functions ____ in the cell.

DOWN :

1. Visible growth of bacteria on solid medium is ____.

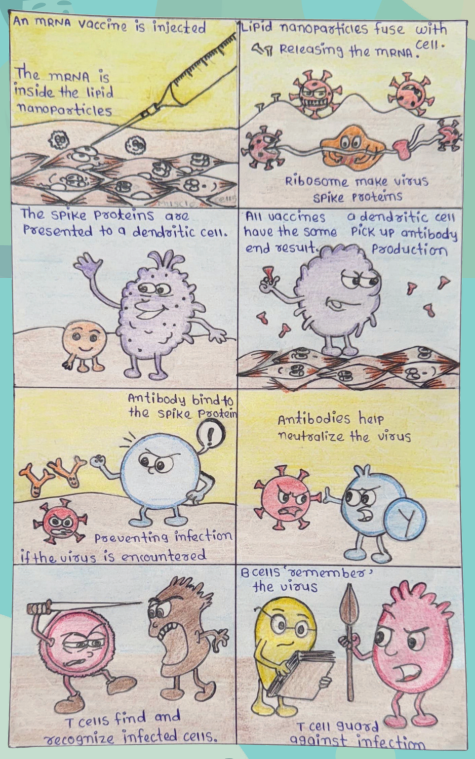
7. ____ is an amino acids that helps the body build protein.

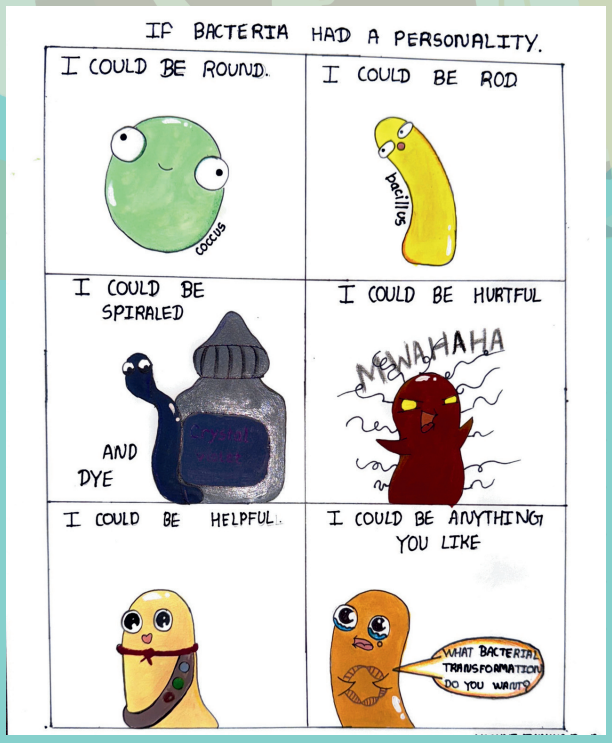
8. ____ are commonly called as suicide bags, because they contain hydrolytic enzymes that can breakdown cellular components.

9. ____ causes bacterial wilt in plants; a disease affecting a wide range of crops, including potatoes, tomatoes & bananas.

10. ____ is used for in fermentation to reduce metabolic intermediates.

TINYTOON





MICROZZLES

1.“When hungry or burned I guard my core, shrink and cloak myself in coats by the score.In ceilings, floors or soil I’ll lurk unseen—surviving eons until I wake from dormancy’s dream, who am I?”

2.“I ground tiny lenses, peered at pond-watersoup, Unveiling protozoa in my home-made loop. “Animalcules” I called them, life unseen made plain—Who am I, the first to chart this micro domain?”

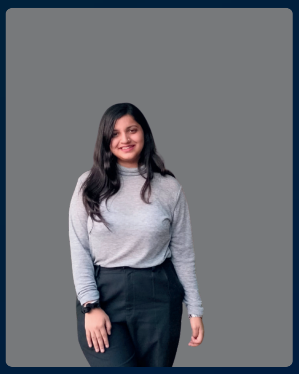
3.“I tremble in your steady hand, My plunger clipped in two distinct lands. With coloured tips I sip each drop,From microliters of DNA to buffers you swap, who am I.”

4.“Blue-green artists painting Earth’s first air, forging oxygen in pigmented flair .Stromatolite makers, lakes or coasts they roam—who are these pioneers of photosynthetic home, who am I?”

https://drive.google.com/file/d/1DXc0MiP49yP9BbypaZWPaye-V3p1kT2d/view?usp=drivesdk

behind the BYLINE

Vedant Sheladiya
Editor in Chief



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