



Microbiology  
Society of  
M. G. Science

Department of  
**Microbiology**



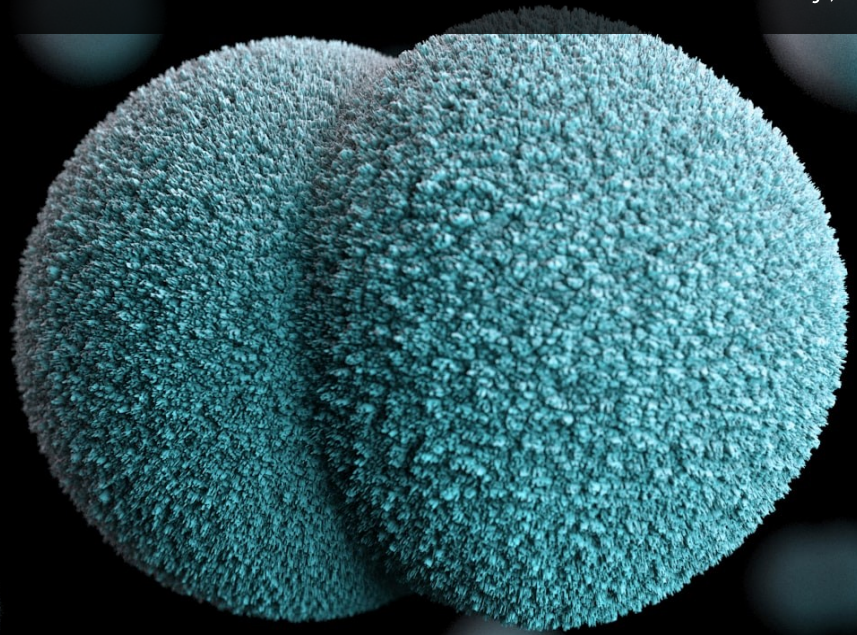
M. G. Science  
Institute

Vol. 5

THE  
WORLD  
OF  
MICRO

# BIO ME

July, 2021



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# About **MSMG**

Microbiology Society of M. G. Science Institute, Ahmedabad

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Science Institute.



Photo by Meet Joshi

Before coming to MGSI, Dr. Vivek N. Upasani floated the idea and played a key role as the Secretary in organizing the first state-level Seminar, Quiz and Article writing competition under the aegis of the Microbiology Study Circle (MSC), Department of Microbiology, J.& J. College, Nadiad in 1989-90. This event had an overwhelming response and became an annual event. The MSC was highly active in student related activities. This had inspired him to start the Microbiology Students' Society (MSS) at MGSI in 1996 and organize the State-level competitions at MGSI. This was supported by Prof. N. I. Dani (Principal) and Prof. (Mrs.) Umaben Desai, HoD of the Department. Since then MSS has been instrumental in carrying out activities such as seminar, article writing, scietoon drawing, quiz and other competitions for the students. The students are screened and nominated to participate in the GiBION and other competitions. The name of MSS was changed to Microbiology Society of MGSI (**MSMG**) to give it a wider scope by Dr. (Mrs.) Aysha N. Rafique. MSMG also organizes Guest lectures, webinars, career counselling, placement, industrial visits for the benefit of the students. Since last few years it also publishes a Newsletter/magazine with an editorial team consisting of students and guided by the faculty of the department. The activities of MSMG has encouraged students to win awards in various competitions, inculcate team spirit, develop scientific publishing and research skills, etc. The MSMG also runs a departmental library for the students.



**T**he outbreak of the global pandemic has brought into question several concerns with regard to the patented drugs and vaccines. Debates have been erupting on every screen as to whether in the face of this calamity where millions are losing their lives, should these medicines and vaccines be patented.

This is a very complex debate that will take us back to the formulation of intellectual property rights. The justifications and objections to the entire regime can be found in the theories of intellectual property law.

The philosophical foundations of intellectual property are found in four theories of property:

# JURISPRUDENTIAL Analysis of Patents

## The Welfare theory

Also known as the incentive theory, is rooted in utilitarianism (maximum good for greatest number of people). It is based on the fact that any information is non rivalrous in consumption, that is, more than one person can consume the same product at the same time. Its relative non excludability gives it a very public nature. So, a majority of people will foresee the investments made in innovation and if they copy such innovation, the creator will

not get any return and hence, will have no incentive to produce anything new. There are some circumstances that contribute to lack of production or under production of such public goods, like the high cost of production, marginal cost of reproduction (so product can be easily copied), ease of reverse engineering, risk of product failing and the high positive externalities of public goods

## The Fairness Theory

Another theory that the Intellectual Property regime is founded on is the Fairness Theory. It postulates that everyone is entitled to the fruits of their labor as it is their natural right. Ideas are generally free for everyone, so if someone is putting intellectual labor into harvesting thoughts, they must have protection for that product.





### The Personality Theory

Further, the Personality Theory has also seen its impact on the intellectual property regime. It states that private property rights are required to safeguard base needs and for that real and tangible property rights must be provided. Same is the case for intellectual property. Intellectual work is a manifestation of personality of a person and Intellectual Property rights should shield them from misappropriation or modifications of their creations.

### The Cultural Theory

Finally, The Cultural Theory also manifests itself in this regime that keeps property rights at its center. It envisions human nature as blooming under certain conditions, and says that our policies should maximize such conditions. Karlx Marx in this theory gives nine points of this bloom including life, health, interaction, privacy

etc. When it comes to Intellectual Property policy making an attempt to expand and equalize these nine things must be made. Culture Theory will be in favor of price caps in patent law especially in medicines because there is inequality in access among countries, especially with regard to life and health. Hence, a study of the above theories indicates that a balance must be struck at a policy level between the interest of the creators and interest of the society to ensure access to health and culture. Some ways to strike this balance are encapsulated below.

**A:** The Government itself provides the good: The problem with this is propaganda financing by the government.

**B:** The Government subsidies select private investors: The problem with this is that bureaucrats are very arbitrary in its process.

The Government issues prizes for successful private producers in informational

products: This is strongly advocated for especially in the pharmaceutical industry.

**C:** Legal reinforcement of self-help strategies: Technological protection measures to prevent dissemination of product can be employed, such as watermarks, inability to right click, exclusivity contracts like on kindle and google books to the effect that when you break a contract you are made liable.

**D:** The government protects producers against competition: The economists vehemently argue for this, to grant limited term monopolies to the Intellectual Property holders to incentivize production.

In such unprecedented times of pandemic, where we have lost millions of lives already, there is a pressing need to liberalize such intellectual property theory by a fine balance of all above theories and recommendatory measures in order to ensure health to all to fight this pandemic.

**A**ntibiotic resistance is one of the biggest threats to global health in the post antibiotic era. The infections caused by Gram-negative bacteria (*Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, *Enterobacter cloacae*) are even more concerning due to the presence of both intrinsic and/or acquired mechanisms of antibiotic resistance. A potential solution for the treatment of infections caused by Multidrug Resistant (MDR) Gram-negative bacteria is the use of bacteriophage-derived lytic enzymes.

## HOW BACTERIOPHAGE INFECTS GRAM NEGATIVE BACTERIA AS A SOURCE OF LYSIN MOTIF?

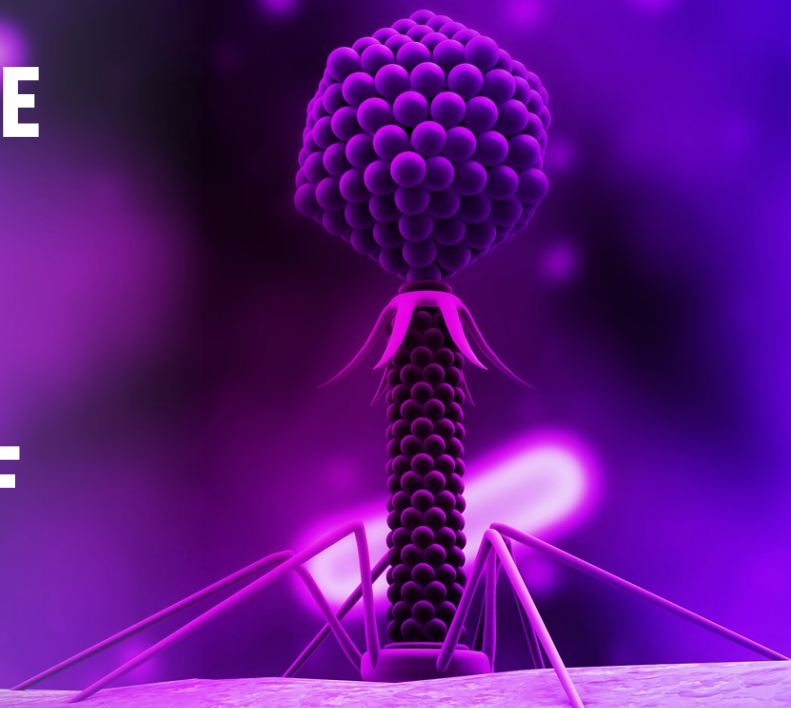


Photo source: wallpaperbat.com

**B**acteriophages were first used to combat bacterial infections by Felix d’Herelle. Emergence of MDR bacteria has now highlighted bacteriophages as the antibacterial agents of the 21st century. Mechanism of antibiotic resistance include inactivation and/or alternation of the antibiotic structure, modification of drug binding sites, changes in cell permeability, biosynthesis of efflux pumps, and biofilm formation. Genes responsible for these antibiotic resistance mechanisms can be found on bacterial chromosome, plasmids and transposons.

Bacteriophages replicate in the cytoplasm of prokaryotic cells and release viral progeny through the hydrolysis of the peptidoglycan (PG) layer of bacteria, except in the case of filamentous phages. Cleavage of PG is caused by phage-lysins, proteins encoded by the phage genome. Bacteriophage-derived lytic enzymes target specific bonds in the PG layer. Bacteriophages that infect Gram-negative bacteria, also encodes spanins, proteins that form junctions between the inner and outer membranes of bacteria to permit viral progeny release. On the other hand, the holin-lysins association is not man-

datory for lysin export to the periplasm. Single-peptide (SP) – containing lysins, for example, have a cleavable SP that controls release of lysins into the periplasm through the host Sec machinery. Furthermore, signal-arrest-release (SAR) containing lysins are also exported to the periplasm space via Sec-dependent translocation, while the SP remains in the lysin active form. SAR-lysins accumulate as inactive proteins embedded in the inner membrane until further membrane depolarisation by pinholins. Pinholins are involved in lysine activation instead of export.

However, a comprehensive analysis of the lysin repertoire of bacteriophages that infect Gram-negative pathogens of clinical interest is reported while focusing on holin-independent lysins found in sequenced genome of bacteriophages that infect *Klebsiella spp.*, *Acinetobacter spp.*, *Pseudomonas spp.*, *Enterobacter spp.*, *Salmonella spp.* and *Helicobacter spp.*

**Aditi Rathod (S. Y., B. Sc.)**  
**Kinnari Rathod (S. Y., B. Sc.)**

# Life in CARBON DIOXIDE WORLD

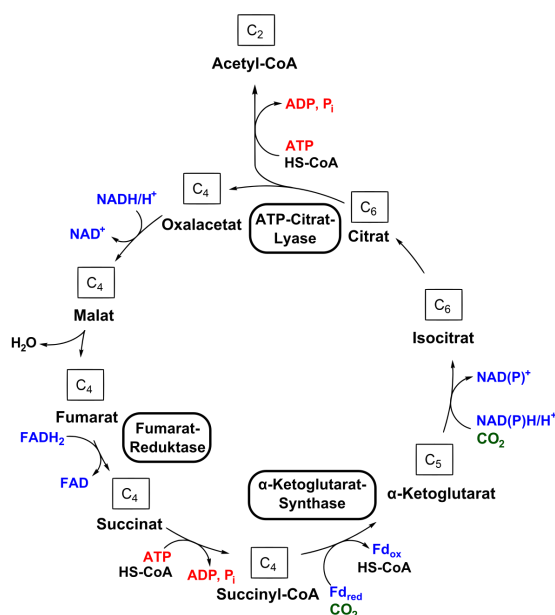
**Introduction:-**Microorganisms living in hydrothermal vents that emit carbon dioxide gas provide a striking example of metabolic finesse, which sheds light on microbial ecology in extreme environments and offers clues to early life on Earth.

Priya Pandey & Milee Tanna  
(S. Y. B. Sc.)

For most microbes, CO<sub>2</sub> looks more like a feast than a threat. Authors uncover key details about an ingenious pathway that enables bacteria to thrive in a hydrothermal environment surrounded by gases consisting mainly of CO<sub>2</sub>. He studied *Hippea maritima* bacteria. These microorganisms shun oxygen, love temperatures near 60°C and obtain energy from the reaction of hydrogen gas (H<sub>2</sub>) with sulfur to H<sub>2</sub>S. If *H. maritima* grows in the presence of CO<sub>2</sub> concentrations of 40% , they do some ‘chemical engineering’, using a pathway called the reversed oxidative TCA. That might sound complicated, but it is connected to something familiar — “Human nutrition”. The food we eat is broken down in the gut, our cells convert the sugars, fats and proteins into energy and CO<sub>2</sub> using a pathway called the TCA cycle. This TCA cycle can run backwards in some bacteria. This change of direction, to give the reversed oxi-

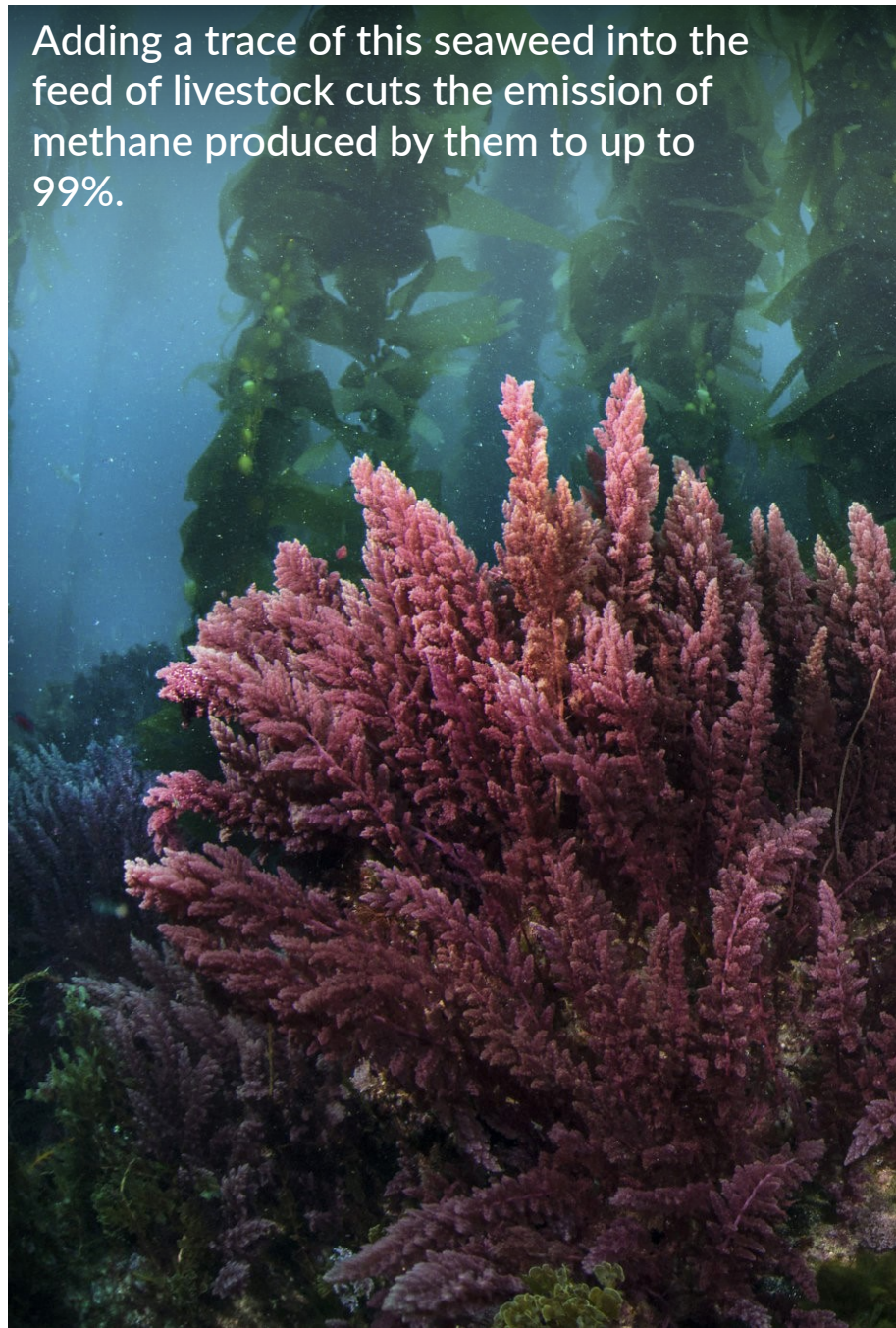
dative TCA cycle , invests energy that converts CO<sub>2</sub> into amino acids, sugars and lipids. *H. maritima* uses this cycle when high levels of CO<sub>2</sub> are present. The authors fed the bacteria amino acids and CO<sub>2</sub> labelled with carbon-13. It helped to determine how many full ‘turns’ of the reversed oxidative TCA cycle occur as carbon is assimilated. To enable the TCA cycle to run backwards in response to high levels of CO<sub>2</sub>, the cells harbor huge amounts of the enzyme citrate synthase. A high level of citrate synthase makes it easier to generate acetyl coenzyme A (acetyl-CoA) molecules, which exit the reversed oxidative TCA cycle by forming pyruvate, which is converted to lipids, sugars and amino acids . This in turn, invites CO<sub>2</sub> to enter the cycle. In this way, high environmental CO<sub>2</sub> levels push the cycle in the direction of converting CO<sub>2</sub> to acetyl-CoA . Looking at the genes that microbes use in a given environment can reveal important clues to the secrets of life in microbial communities. Individual microbes, like *H. maritima*, and even whole ecosystems, can thrive on the energy supplied by the reaction of H<sub>2</sub> with CO<sub>2</sub>. Yet CO<sub>2</sub> is only half of the story. To convert CO<sub>2</sub> into organic compounds, microbes need a source of energy and electrons which is H<sub>2</sub>. The effort that *Hippea* invests in making pyruvate from H<sub>2</sub> and CO<sub>2</sub>, seems almost unimaginable that the very first biochemical pathways could have got going before there were enzymes to assist the carbon-fixing reactions. The chemical reactions that underpin the lifestyle of *H. maritima* thus hark back to a time when the first cells lived in a world of carbon dioxide.

*“The presence of genes alone cannot reveal in which direction cells are using a pathway because the environment can dictate the flow of substrate”*



# HOW SEAFOOD FOR LIVESTOCK CAN CURB THE EMISSION OF GREENHOUSE GAS?

Adding a trace of this seaweed into the feed of livestock cuts the emission of methane produced by them to up to 99%.



**G**ut bacteria like methanogens and other *Enterobacteriaceae* dwell symbiotically in the rumen of cattle where they break down the plant material like cellulose into  $\text{CO}_2$  and  $\text{H}_2$  which eventually couple as  $\text{CH}_4$  through their enzymes. This methane contributes 8-10% of the global methane emission by fermentation in the rumen. Additionally,  $\text{CH}_4$  is 28 times more potent Greenhouse Gas than  $\text{CO}_2$  over a span of hundred years.

To resolve this, many have tried their odds but none rolled out in their favor. Modern farmers have tried to supplement their livestock feeds with other products like garlic, legumes, alfalfa to reduce the leaching of methane but none had a significant im-

provement. This crisis led a chemist called Alexia Akbay to turn into an entrepreneur and make a company called Symbrosia. This company based in Hawaii finds regionally occurring red seaweed or red macroalgae which when supplemented in feeds of cattle reduces their methane emission by a significant number.



**Symbrosia**

*Asparagopsis taxiformis* is a cosmopolitan red algae that thrives in tropical to warm temperate waters. Eerie-looking red seaweed is dried and homogenized with feed for anti-methanogenic properties. Roque and her team tested the efficiency of *A. Taxiformis* at the University of California. They added 1% of this seaweed of total feed, which reduced the emission of methane by 84.7% and the inclusion of doses greater than 2% brings down the output of methane by 99% in-vitro which is almost undetectable. They also observed that the addition of *A. Taxiformis* did not have any prominent effect on the rest of the fermentation factors like volatile fatty acid (VFA) and decomposition of organic matter (OM) which are key indicators



Asparagopsis taxiformis is a cosmopolitan red algae that thrives in tropical to warm temperate waters.



Photo source: [www.greenergrazing.org](http://www.greenergrazing.org)

of fermentation efficiency.

Seaweeds are abundant in bioactive ingredients like proteins, carbohydrates, and to a lesser extent lipids, saponins, alkaloids, and peptides. The bioactive compounds like bromoform, bromochloroacetic acid, dibromochloromethane, dichloromethane, and dibromoacetic acid were found to be present in *A. taxiformis*. The halomethane, bromoform binds to the Vitamin B<sub>12</sub> in turn inhibiting the enzymatic activity of methanogens. Hence these bioactive have a key role in mitigating enteric methane fermentation.

Enthusiasts like Symbrosia plan to scale up the production of this seaweed and supply it to the farmers. Strain improvement programs of *A. taxiformis*

include cross-breeding between strains that grow faster on lab medium and strains which produce more bioactive compounds are conducted by Symbrosia to make a superior strain for industrial scale.

Scientists all over the world have been studying these anti-methanogenic compounds, their pros and cons, and their applications. Efforts made by every individual

count to mitigate the entire scenario of global warming. Each and every new potential idea to reduce the footprint of greenhouse gases when executed collectively can bring about the anticipated change.

- Meet Joshi (T. Y., B. Sc.) & Nirmal Kachhadiya (T. Y., B. Sc.)



# CHEMICALFREE BIO-ENZYMATIC CLEANERS



The matter of sewage disposal and industrial waste has become more and more essential. The freshwater bodies are getting polluted and the authorities lack cleaning mechanisms to keep the environment clean. Ruinous impacts on human health and the atmosphere might result if pollution of receiving garbage into water is sustained. Therefore, to preserve water quality for future generations, a good means of finding this drawback should be thought of. Bio-enzyme usage for domestic purposes and even in cleaning water bodies has shown effective results.

## WHAT IS BIOENZYME?

Bio Enzymes are organic compounds produced by fermentation of fresh vegetable/fruit waste in presence of water and brown sugar/jaggery. The objective is to clean water bodies with Bio enzymes. By using selective microorganisms such as yeast, the fermentation process forms mineral salts, organic acids, alcohol, natural chains of proteins and enzymes.

## HOW IS IT MADE?

Bio-enzyme can be easily prepared at home using basic kitchen items.

**MATERIALS REQUIRED:** Plastic air-tight container, Vegetable dregs, fruit waste, water, and sugar (brown sugar, jaggery, molasses sugar).

**COMPOSITION:** 10:3:1 ratio of Water: fruit or vegetable waste: sugar

**METHOD:** The plastic container adds all the ingredients in the given composition and leaves some air area for fermentation. Open the lid of the container every day to release the gases produced. Keep the container away from the sunlight. After 90 days extract out the water leaving the sediments. Sediment can be dried and used as manure for plants or can be used to prepare the next batch of bio-enzyme.



## USES OF BIO-ENZYME

- Cleans and disinfects all surfaces in the house.
- Purifies air and removes bad odours.
- Very effective in removing lime scale on taps and other steel appliances.
- Removes pesticides and harmful chemicals from fruit and vegetables.
- Nourishes the hair and skin of pets.
- Excellent fertilizer for plants and enriches the soil naturally.
- De-clogs drain very effectively.

- Krithika Bisani (T. Y., B. Sc.)



1<sup>st</sup> death due to mysterious viral pneumonia in China.

A virus which was firstly merely endemic to Wuhan in December 2019 is now a major issue to whole world as there are possibilities of 3rd wave incoming. There is timeline following this text about the events of Covid-19 pandemic in short way.

1<sup>st</sup> case occurred in Wuhan, China of mysterious viral pneumonia on December 2019



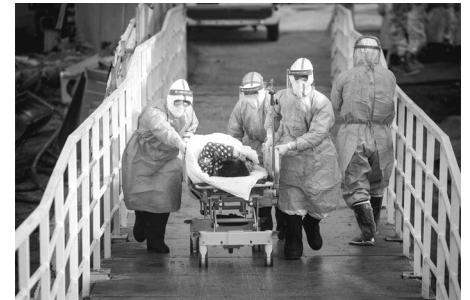
1<sup>st</sup> case outside China occurred in mid-January. Declaration of Global emergency by WHO caused by unknown coronavirus.

# COVID-19

## From Rags to Riches

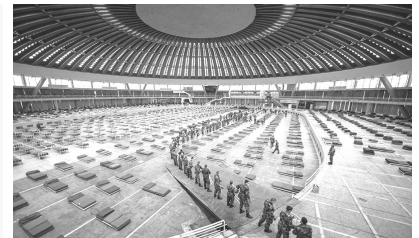
Manas Lele S. Y. B. Sc.

WHO declares pandemic due to high graphs of infected & death occurred



Lockdown imposed in various major countries around the world including UK, USA, India etc.

Scientists traces back the cause to bats and snakes. Also many of them start researching and sequencing the genome of this new variant of coronavirus



Recovery rate of patients increased but at same time things got worse in many countries

Vaccines in development after conditions became worst throughout the world



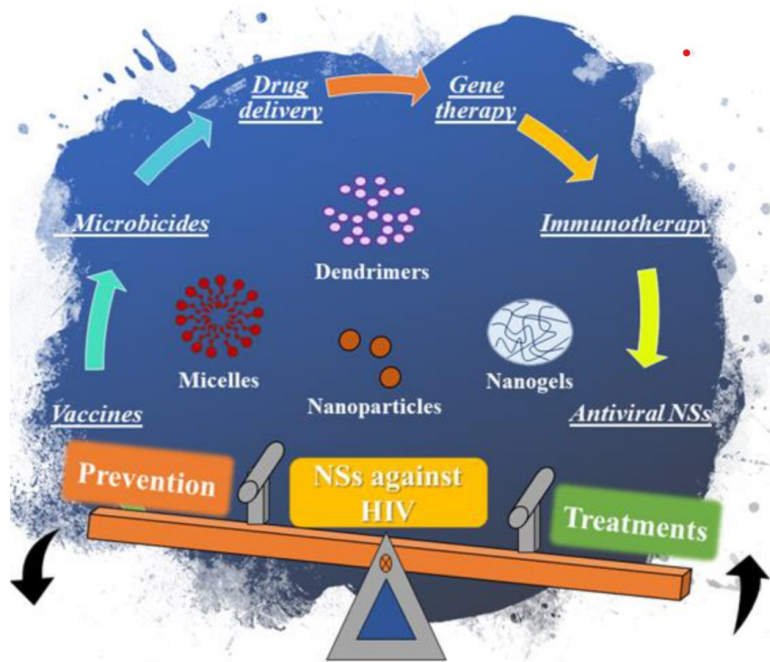
New variants of the virus found at the end of 2020 which include a fast mutating British variant



And this way the pandemic has affected the lives of billions of people and still it is affecting them after initial stages of pandemic (Life is now better in UK, Israel and NZ).

# NANOTECHNOLOGY

## A REVOLUTIONIZING APPROACH FOR THE PREVENTION AND TREATMENT OF *HIV/AIDS*



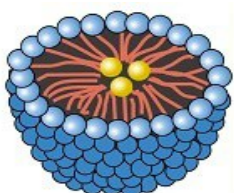
Prevention and treatment of HIV infection and several NSs (Photo Source: mdpi.com)

Sexually transmitted infections have already been a global health concern in which Human Immunodeficiency Virus (HIV) has spawned one of the deadliest diseases (since its first report in 1981) called Acquired Immuno-Deficiency Syndrome (AIDS). By 2006, this infectious reaper had taken the lives of 25 million people, affecting substantial social and economic damage to the world. The need to deal with this became more evident and so from biomedical research, certain solutions have been developed over the years like:

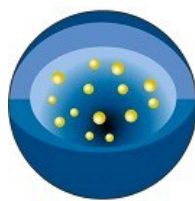
**A.** Combination antiretroviral therapy- improved the expectancy of life in patients but with major side effects of taking it for a lifetime and in certain people, it renders ineffective due to the development of virus resistance.

**B.** There have been enormous efforts for finding vaccines as a preventive resolution to no avail because of the constant undergoing mutation.

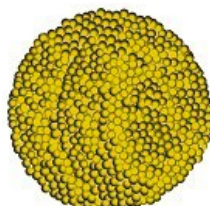
Hence, the absence of a complete cure under current treatment underscores the great need for innovative approaches in the treatment of AIDS. Nanotechnology is one such emerging multidisciplinary field that involves the understanding, designing, engineering and fabricating materials at the atomic and molecular level.



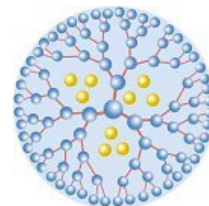
Micelle



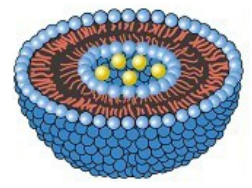
Nanocapsule



Gold Nanoparticle



Dendrimer



Liposome

Nanopharmaceuticals (Photo Source: mdpi.com)

## Drug-delivery Nano system:

The major cause of no complete eradication of the virus from the body is that the virus resides in 'latent reservoirs' within memory CD4<sup>+</sup> T cells and macrophages. Using nanotechnology, it has become possible to achieve improved delivery of poorly water-soluble drugs, targeted delivery of drugs to anatomical reservoirs of HIV and intracellular delivery of macromolecules. Such platforms (Nano-systems) for systemic delivery enhance the half-lives of drugs, modulate their distribution within different tissues and keep them in circulation at therapeutic concentrations for longer periods of time. Hence, overcoming the limitation of current treatments. Nanotechnology is also used alongside newer methods like- Microbicides, Gene Therapy, Immunotherapy and RNA silencing.

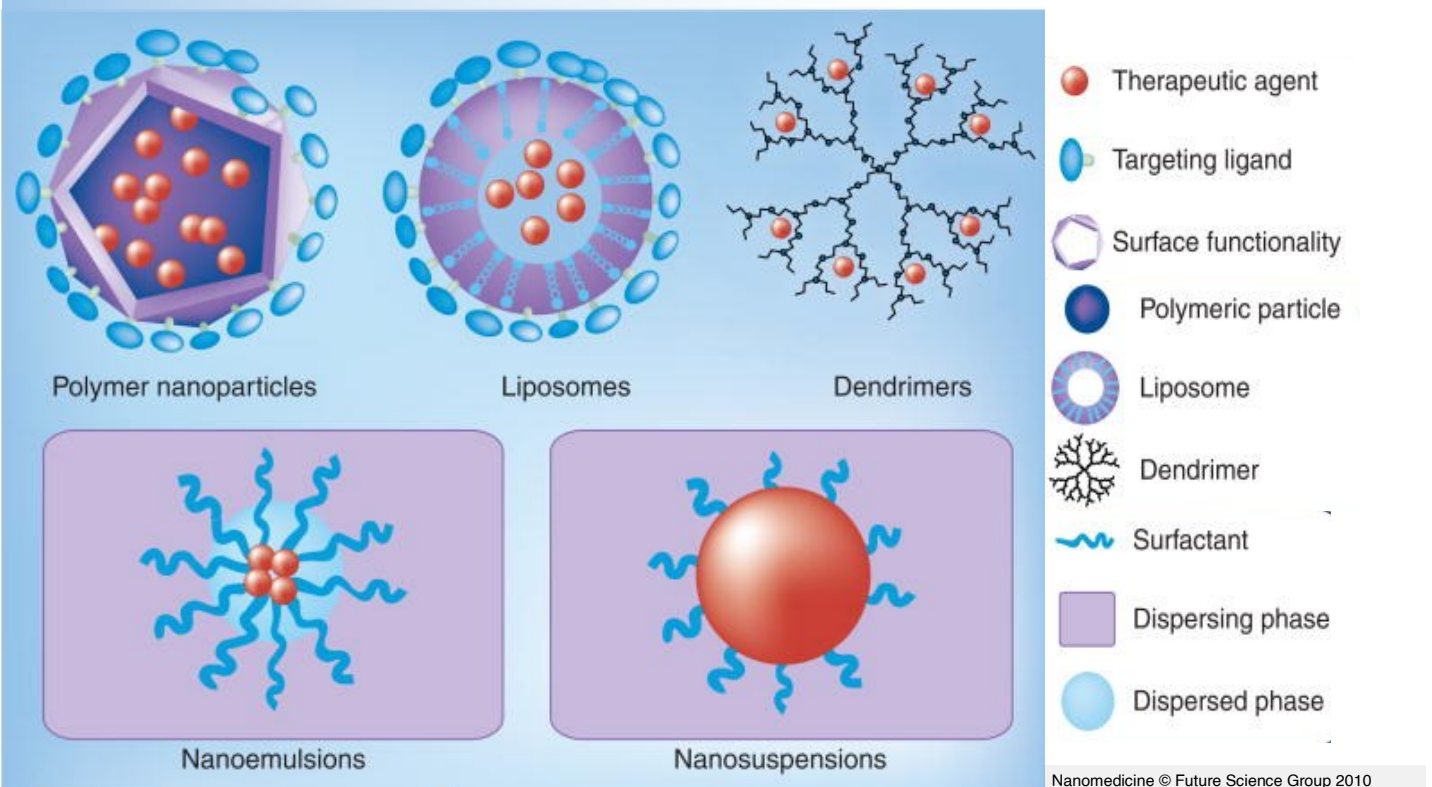
**The major types of Nano-systems used for the treatment are:**

**A: Liposomes**– Lipid vesicles of variable size and structural complexity encapsulating drugs. These are rapidly absorbed by phagocytic cells which act as reservoirs of HIV in an infected.

**B: Polymeric micelles**– Nanostructures composed of block polymers with a hydrophobic core- hydrophilic shell arrangement. Hence, utilized for improving solubility and disease site targeting of several drug molecules.

**C: Dendrimers**- Dendrimers are synthetic macromolecules possessing multivalent interactions which can inhibit the virus-cell interaction and give the space for the monovalent drugs to work.

## Nanomedicine



## Nanovaccine:

Traditional vaccines for HIV have been difficult to develop due to several reasons including poor delivery to cells, reversion of a live attenuated virus to its virulent form or too weak to facilitate an immune response. Nanoparticles overcome these hindrances by protecting antigens from proteolytic enzymes, promoting antigen uptake and processing antigen-presenting cells.

While there is exciting potential for nanomedicine in the treatment of AIDS, challenges like the toxicity of nanomaterials, stability of nanoparticles, their administration and the economic hurdles for large-scale production remain.

In conclusion, even though most of the nanotechnology-based studies for the treatment and prevention of AIDS are in the pre-clinical stages, it is gaining momentum that with continued support, medicine and the field of HIV/AIDS will be important beneficiaries of nanotechnology for years to come.



~Shruti Amin T. Y. B. Sc.

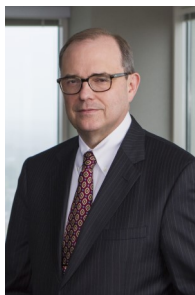
# NOBEL LAUREATES

Harvey J. Alter  
Michael Houghton  
Charles M. Rice

For the discovery of Hepatitis C virus



H. J. Alter



M. Houghton



C. M. Rice

**I**n 1982, the Hepatitis C virus was discovered by screening millions of DNA samples. Their work has helped to explain a major source of blood-borne hepatitis that would not be explained by the Hepatitis A and B viruses and made possible blood tests and now medicines that have saved millions of lives.

Hepatitis stands for inflammation in the liver. The disease is characterized by poor appetite, vomiting, fatigue, and jaundice. Chronic hepatitis leads to liver damage and in some cases liver cancer too. The leading cause of Hepatitis is a viral infection, autoimmune responses, drugs, toxins, and alcohol.

Five major types of Hepatitis viruses namely: A, B, C, D, and E. Hepatitis C is caused by an RNA virus of the *flavivirus* family, currently known as *Hepatitis C virus*.

**Harvey J. Alter:** He studied blood Hepatitis in patients who had received a blood transfusion. The infections were not similar to Hepatitis A and B virus. His team demonstrated that blood from these patients could transmit disease to chimpanzees. The mysterious illness was termed "non-A, non B" Hepatitis.

**Michael Houghton** and his team generated a collection of DNA fragments from the infected blood of chimpanzees and thoroughly searched it. They found a novel RNA virus belonging to the flavivirus family named it as C virus.

**Charles M. Rice** used genetic engineering for the detailed study of viruses. He had injected an RNA variant of the virus into the liver of a chimpanzee. The changes were similar to those seen in humans. This was the final proof that the virus was the cause of transfusion-mediated hepatitis.

The discoveries have helped to design sensitive blood tests and helped in developing antiviral drugs. This has increased the hope of eradicating the virus from the world population.

According to WHO, "globally, an estimated 71 million people have chronic hepatitis C viral infection and a huge number develop cirrhosis or cancer of the liver."

- Milee Tanna (S. Y., B. Sc.)



# KNOW YOUR CITY



Virtual tour of Lambda

## LAMBDA THERAPEUTIC RESEARCH LIMITED

**L**ambda Therapeutic Research Limited is a leading global Clinical Research Organization (CRO) established in 1999 and is based in Ahmedabad, India with additional facilities in Mumbai, Erwitte (Germany), Toronto, Warsaw, London, Pittsburgh, Las Vegas, and Fargo.

Lambda corp. Ahmedabad property spreads across 20,000+ sq. mt. Lambda House is one of the most elegant (Corp. HQ). Its net revenue is estimated to be more than 5 Billion rupees.

The company's services include clinical trials implementation, laboratory, and data management, information technology support, medical affairs assistance,

quality assurance, and bioanalysis. Up until today, Lambda has successfully conducted over 43 phase-I studies in the past 5 years for various formulations including Oral, Parenteral, Inhalers, Topical, Transdermal, Nasal Sprays, Injectable, Pessaries, and Suppositories, etc.

In addition, the company conducts pharmacokinetic, bioequivalence, first-in-human, and biostatistics study programs.

They also provide therapeutic services for dermatology, oncology, rheumatology, cardiovascular, central nervous system, and autoimmune deficiencies.

- Harsh Prajapati (T. Y., B. Sc.)

## FACT SHORTS

### IMMORTAL HENRIETTA

Henrietta Lacks who died of cervical cancer is alive in millions of genetic labs. This is because a cell biologist called George Otto Gey conserved the cancerous cervical cells of Henrietta's and developed a cell line with her consent. HeLa cell line is still used to culture viruses and more.

### RAMPED UP YIELD BY 50K TIMES

Aid by Penicillin in World War 2 to the soldiers made a huge difference. But the production was too limited, around 1mg/L. Extensive research in strain improvement programs and production media, over a period of years by labs all over the world, produced a superior strain which today yields 50g/L of Penicillin.

### LARGEST ORGANISM IS A MUSHROOM

Honey mushroom, *Armillaria ostoyae* is the largest known single living organism to be living on earth. Found in Malheur National Forest, Oregon, USA, this mushroom has its mycelium spread over a 2,385 acres. Its predicted age is around 2,400 years and weighs around 6,800-31,750 tones.

# SCRATCH

## QUIZ BUZZERS

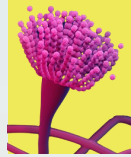
Who introduced the use of sterile culture media?

- Edward Jenner
- T. Schwann
- Spallanzani
- Aristotle



Which species can produce Aflatoxin?

- Rhizopus
- Trichoderma
- Agaricus
- Aspergillus



Who is regarded as the father of medical microbiology?

- Leeuwenhoek
- Robert Hook
- Louise Pasteur
- Robert Koch



The Biocontrol agent Trichoderma is a

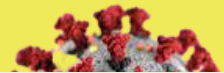
- Fungi
- Cyanobacteria
- Bacteria
- Actinomycetes

Which of the following is not a Gram negative bug?

- Clostridium perfringes*
- Vibrio cholera*
- Escherichia coli*
- Bordetella pertusis*

The genome of Coronavirus is

- + sense single-stranded RNA
- sense single-stranded RNA
- Double-stranded DNA
- + sense single-stranded DNA



## SCITOPAN

**Panel 1:** A blue alien with spiky hair asks, "HUMANS? What is a HUMAN?". A green alien with a large red spiky head shows a scroll to a family. The scroll says: "According to the SCROLL, THAT'S HOW THE MYTHOLOGIC GIANTS THAT LIVE BEYOND THE UNIVERSE ARE CALLED."

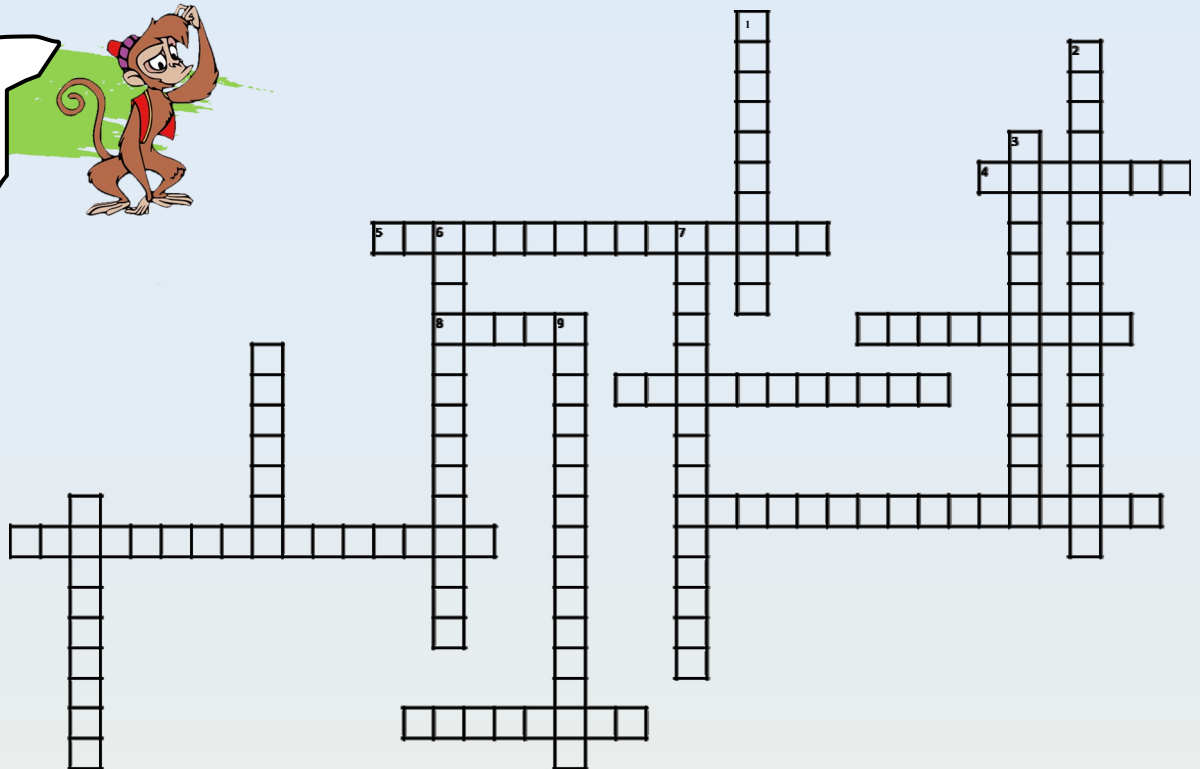
**Panel 2:** The green alien explains, "I DIDN'T TELL YOU BEFORE NOT TO SCORE YOU, BUT WE WERE EATEN BY ONE OF THEM MOMENTS AGO!". The blue alien reacts with "WHAMAAT?".

**Panel 3:** A diagram shows a red human and a yellow human with DNA circles. A green arrow points down to a child, with a speech bubble: "VERTICAL TRANSFER IN HUMANS MEANS DNA IS TRANSFERRED FROM PARENTS TO CHILDREN."

**Panel 4:** A diagram shows a purple bacterium transferring DNA to a blue bacterium, which then transfers it to a pink bacterium. A speech bubble says: "WHILE IN HORIZONTAL TRANSFER, WHEN A BACTERIUM IS ABLE TO TOLERATE OR EVEN DESTROY AN ANTIBIOTIC, IT CAN PASS THIS GENETIC INFORMATION TO OTHER BACTERIA."



# IT



## CROSSWORD PUZZLE

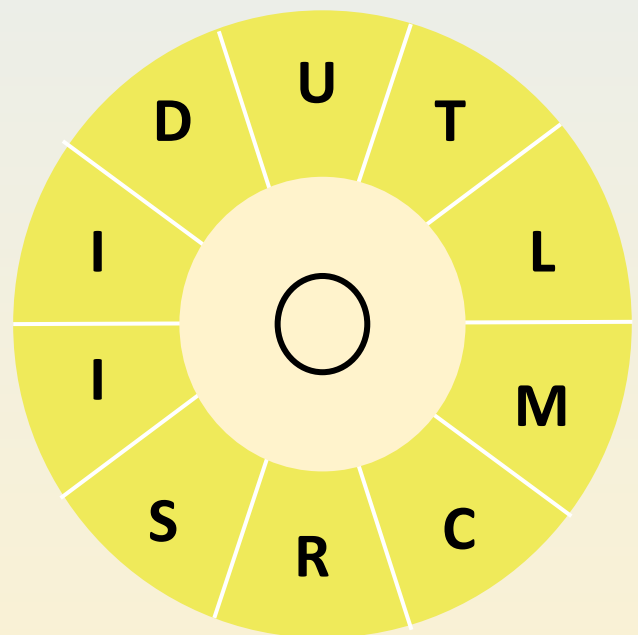
### Across

4. Successful in raising 17 germ free chicken for 40 days
5. Substance present in endospore but not in vegetative cells
8. The syndrome most often affects children and teenagers recovering from viral infection.
10. Arginine + H<sub>2</sub>O → \_\_\_ + urea
12. Molecule similar to Peptidoglycan in an Archaeal cell wall.
14. All RNA viruses replicate in cytoplasm except
15. Enzyme responsible for cAMP Formation
16. Electrophoresis discovered by

### Down

1. Acid present in Fontana's mordant
2. Poliomyelitis is often known as
3. Rhizosphere term was coined by
6. Direct microscopic counting chamber
7. R/1: 1.3/18 + 1.1/18 + 0.3/18: S/S: S/Ap, Se
9. Carotenoid pigment produce by *S. aureus* that act as virulence factor
11. Competition between *P. cadatum* and *P. aurelia* was studied by
13. \_\_\_\_\_ is trapped by *Arthrobotrys* in predation interactions

## WORD WHEEL



### Instructions:

Goal of the word wheel puzzle is to create as many SCIENTIFIC words as possible from the letters given above while also following given rules:

- Each word should have central letter present and all of them must be more than four words.
- No letter can be repeated until its given twice in the wheel.



Scan this for answers

# Activities

1. M. G. Science Institute accredited by NAAC at 'A' grade in the 3rd consecutive cycle (2021). M. G. Science Institute (MGSI) had submitted SSR in March, 2020 and cleared DVV by June 2020. Due to the prevailing COVID19 pandemic, the Peer Team Visit (PTV) was undertaken on 25th and 26th February, 2021. After the successful PTV the result was declared on 1st March, 2021 by the 60th Standing Committee of the NAAC. MGSI was accredited "A" Grade for the third consecutive cycle with 3.18 CGPA, which was highest among the 15 institutes accredited in this meeting.



NAAC PTV to Microbiology department & lab

2. On 1st November, 2020, Dr. Vivek N. Upasani, Head Microbiology Department, took charge as Principal (Officiating) on the superannuation of Principal Dr. B. K. Jain.
3. Online teaching using MS Team platform started from 1st July, 2020 across all semesters. About 2800+ online lectures and practical have been conducted.
4. Under the aegis of MSMG (Microbiology Society of MG Science) and UGC-CPE a webinar was organized on "World Cancer day". The guest speaker was Dr. Hemanjini H. Vora (Professor and Head GCRI, Ahmedabad) an alumnus of the department. There were 35 attendees and they became aware of the various cancers, diagnosis, prevention, treatment and the modern facilities at GCRI for the same.

5. The Institute hoisted flag on 15th August, 2020 as well as 26th January, following all COVID19 guidelines. On the Republic Day, Dr. Rustom Mody, Sr. Vice President, Sun-Pharma and a proud alumnus of the Institute, was invited as the Guest of Honour. He highlighted the contributions of the pharma industry and his achievements in providing affordable drugs for the Indian market. This inspired the students to pursue their career goals.



Dr. Rustom Mody at flag hoisting ceremony with our principal Dr. Vivek Upasani



Dr. Rustom Mody visits Microbiology Department

6. A webinar on "My perspective – How to capitalize your degree in Microbiology?" by Mr. Tushar Patel (Global Director of Operations, Sensient Technologies) was organized on 26th September 2020, 4.00 pm. More than 70 students and faculty members attended the event. The students benefitted from the experience of Mr. Tushar, and learnt how he managed to reach this position to manage billions of dollars' business in different countries.



Jay N. Patel, Fenil A. Parmar, Vivek N. Upasani (2021). Isolation and Characterization of Pathogens Causing Disease in Pomegranate (*Punica granatum L.*), India. DOI: 10.15680/IJRSET.2021.1005041

Jay N. Patel, Fenil A. Parmar, Vivek N. Upasani (2021). Exploring Microbes from Bhavnagar and Okhamadhi Marine Salterns for Production of Industrially Important Enzymes. DOI: 10.15680/IJRSET.2021.1005212

Varjani S., Pandey A., Vivek N. Upasani (2021). Petroleum sludge polluted soil remediation: Integrated approach involving novel bacterial consortium and nutrient application. Science of The Total Environment 763:142934

7. Following is the list of competitions and webinars students of microbiology department of Second and Third year had participated in 2020-21: Agar art contest (American society of Microbiology), MicrobiOlympiad, MicrobioSlate, MicrobioPodium (Government Institute of Science Aurangabad), MANAV Human Atlas Initiative (National Centre for Cell Science), Biologics in Healthcare 2021 (L.M.

College of Pharmacy), ETHealthworld India Pharmaworld Summit & Awards (Economic Times), Micro'Grid Crossword Competition (Microbiologist's Society, Delhi Unit) COVID-19: Current status of Vaccine Development and Immunization (Department of Microbiology, Mangalore University & Microbiologists Society, India) and more.

## DEPARTMENTAL ACHIEVEMENTS

Name of the student	Award/ Achievement	Semester	Name of the competition
Meet Joshi	Best Photography award 2021	Sem 5	Virtual Antimicrobial Symposium to observe World Antimicrobial Awareness week
Meet Joshi	Winner of MicrobioPodium 2021	Sem 6	20 <sup>th</sup> MicrobiOlympiad
Qureshi Muhammad Avesh Habibur Rehman	1 <sup>st</sup> rank	Sem 6	Solo Un Minuto organized by Microbiologist's society India (Delhi Unit)
Goonja Nirmal	2 <sup>nd</sup> rank	Sem 2	Slogan writing competition organized by Microbiologist's society India (Delhi Unit)

## FACULTY ACHIEVEMENTS

- Under the guidance of **Dr. V. N. Upasani, Mr. Nikunj N. Brahmhatt** was awarded Ph. D. (Biotechnology) by Kadi Sarva Vishva Vidyalaya, Gandhinagar for the thesis entitled "Development of Loop mediated iso-thermal amplification for forensic investigation of closed interspecies animals" on 19/12/2020.
- Dr. Vivek N. Upasani** has deposited two endophytic fungal cultures (*Alternaria sp.* CBL01) and (*Cladosporium sp.* CBS02) and isolated from the DBT Major Project to which the accession numbers MCC 9037 and MCC 9038 have been assigned, respectively by NMCR-NCCS, Pune.



**Jay Patel** won three medals at 69<sup>th</sup> annual convocation of Gujarat university on March 13, 2021.

Bhavini N. Rathod, Vivek N. Upasani (2021). Purification of halolipase from *Haloferax larsenii* (kp636736): An archaeon isolated from Gujarat, India. 12(2): 226-236

Varjani S., & Upasani V. N. (2021) Bioaugmentation of *Pseudomonas aeruginosa* NCIM 5514 - A novel oily waste degrader for treatment of petroleum hydrocarbons. Bio-resource Technology 319: 124240

Varjani S., Pandey A., Upasani V. N. (2020). Oil-field waste treatment using novel hydrocarbon utilizing bacterial consortium—A microcosm approach. Science of The Total Environment 745: 141043

Varjani S., & Upasani V. N. (2020) Biore-mediation of oily sludge polluted soil employing a novel strain of *Pseudomonas aeruginosa* and phytotoxicity of petroleum hydrocarbons for seed germination. Science of The Total Environment 737: 139766

# MEET THE TEAM



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The team will be very glad to hear from you about the magazine, reach out to us at [microbiology.mgscience@gmail.com](mailto:microbiology.mgscience@gmail.com).

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