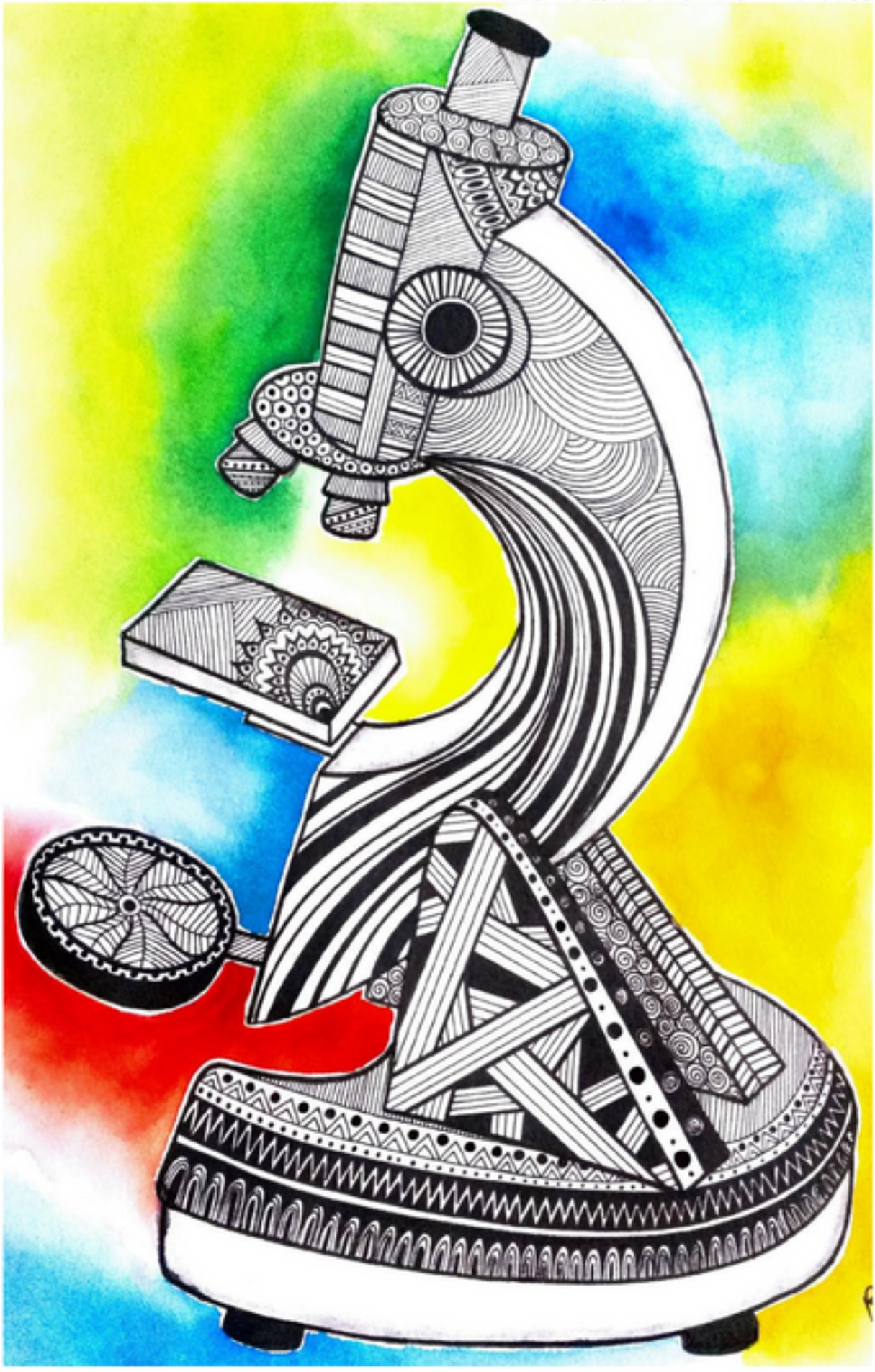
Microscopia
I WE & MICROBES

MICROMIA *Aureus*

June

welcome to the world of microbes



A DETECTIVE OF LIFE

A PARADE OF VACCINATION

vol. III

A MICROSCOPIA IWM MAGAZINE

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Preface

We would like to present, with great pleasure, the third volume of our monthly magazine, "MicroMia Aureus". This magazine is part of the MicroScopia IWM services to the Life science community and is devoted to the gamut of Life Science, from theoretical aspects to scientific-dependent studies and the validation of emerging ideas. This new magazine was envisioned and founded to represent the growing needs of Life science as an emerging and increasingly vital field now widely recognized as an integral part of scientific and Research investigations. Its mission is to become a voice of the Life science community, addressing researchers and practitioners in areas ranging from various disciplines, from microbiology to biotechnology, from Biomedical sciences to Food Technology, presenting verifiable research methods, findings, and solutions. The magazine is intended as a forum for professionals and researchers to share various techniques and solutions in the area, to identify new issues, and to shape future directions for research, while industrial users may apply techniques of leading-edge, large-scale, high-performance practical methods. This volume comprises multiple manuscripts, connected by a unifying theme. The articles exemplify the analysis and exploration of complex research models and data sets from various domains in the field. We are very thankful to everybody within that community who supported the idea of creating a "MicroMia Aureus" Magazine. We are certain that this very first issue will be followed by many others, reporting new developments in the Life science field. This issue would not have been possible without the great support of the editorial board members, and we would like to express our sincere thanks to all of them. We would also like to express our gratitude to the "MicroMia Aureus" editorial staff of MicroScopia IWM, who supported us at every stage of the project. Throughout the preparation of this volume, the Editors were supported by various research programs. It is our hope that this fine collection of articles will be a valuable resource for Transactions on Life Science readers and will stimulate further research into the vibrant area of Life science.

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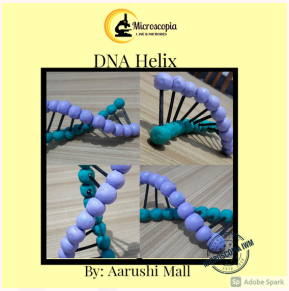
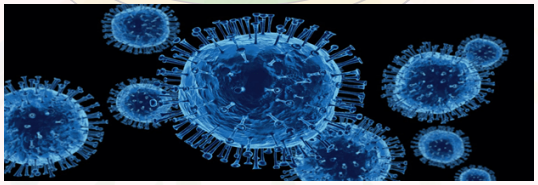




A "Parade of Vaccination"-DBT

The department of biotechnology highlighted the Atma-Nirbhar Bharat Abhiyan and showcased the COVID-19 vaccine development process in their tableau at Rajpath on Tuesday.

A tableau showcasing the strength and efforts of biotechnology sector in responding rapidly through the development of vaccine and diagnostics for COVID-19

The Theme of the tableau was Atma-Nirbhar Bharat Abhiyan: COVID.

The front part of the tableau shows India's strength for an Atma-Nirbhar Bharat and also how well we are positioned to be a Global manufacturing hub for vaccine development and large-scale manufacturing.

The rear part of the tableau shows the vaccine research and development laboratories and clinical trials. Side panels display the capacity and infrastructure available with the biotechnology institutions and industries for development of innovative vaccines.

The tractor portion showed larger than life statue of a scientist with COVID vaccine, signifying the historic achievement to save mankind.

The trailer portion was divided into 5 sections.

- The first cabin showed an electron microscope describing the process of virus isolation and characterization.
- Th second cabin showed the cell separator, cell grower and virus storage system depicting large scale virus propagation and production.
- The third cabin had vaccine research lab.
- The fourth cabin showed vaccine production in bioreactors and vaccine production lab.
- The fifth cabin showed clinical trial for Phase-I and Phase-II. Outside the cabin, the Phase-3 clinical trial on human beings was shown.

Peep into the Deep Thoughts...

Union of heart and mind is incumbent for dedicated research because

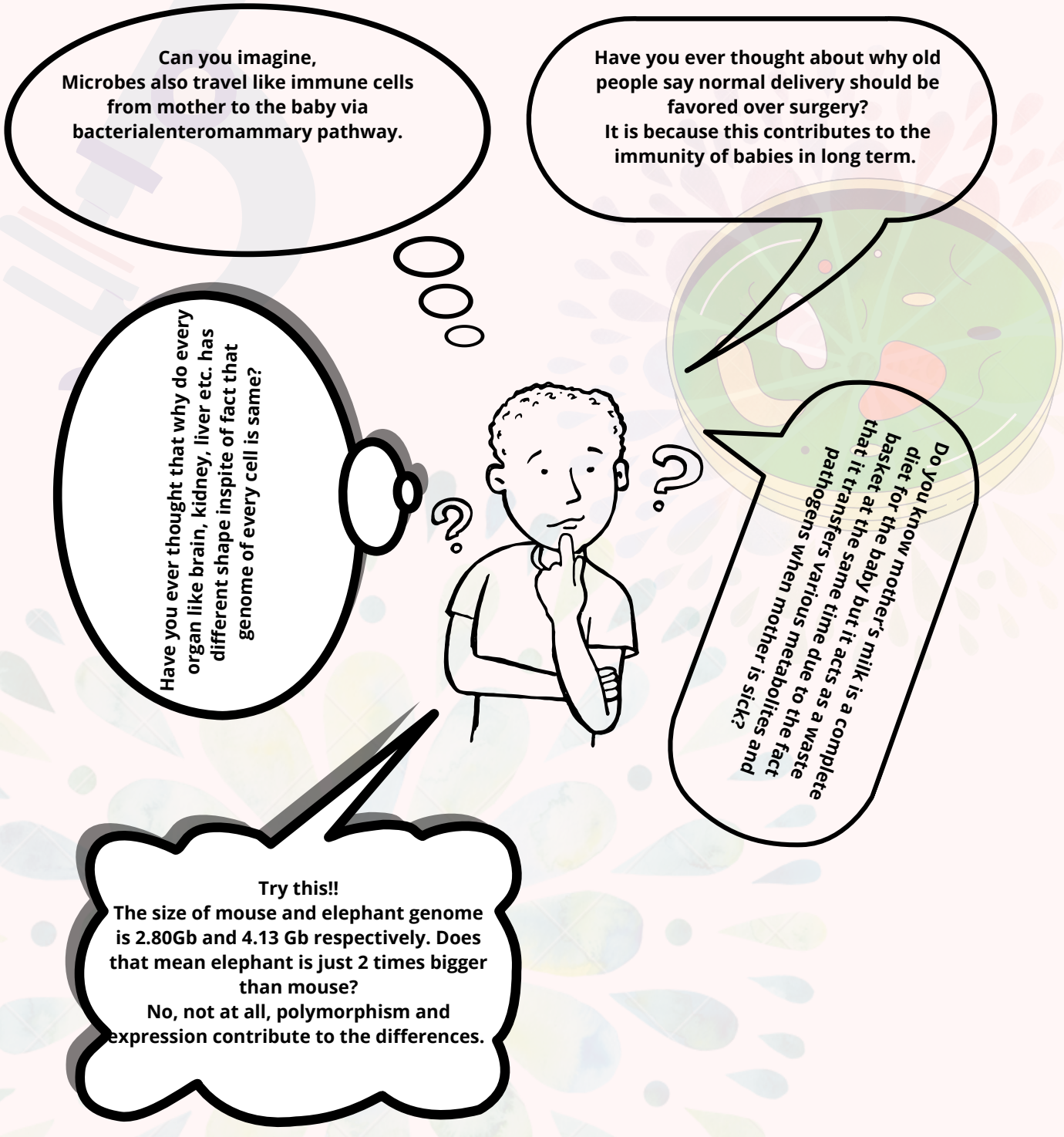
1. Union of heart and mind is incumbent for dedicated research because **the heart forbade to let go of research after consistent failures and allows the mind to refocus on it.** - Anurpa Tomar, Institute of Basic Sciences, Bundelkhand University, Jhansi
2. Union of heart and mind is incumbent for dedicated research because **necessity is the mother of invention and this new era demands more invention.** –Shivam Swaraj, Dr. APJ Abdul Kalam Institute of Forensic Sciences, Bundelkhand University, Jhansi
3. Union of heart and mind is incumbent for dedicated research because **the final result from the research needs devotion and each step requires the process of struggle and sacrifice, which later sums up in detectable molecule.** –Snehlata, Department of Microbiology, Bundelkhand University, Jhansi
4. Union of heart and mind is incumbent for dedicated research because **the prospect of a fruitful approach towards the investigated aroma needs full dedication and its basic requirements are boosted when heart and mind are incumbent.**- Shantanu Shrivastava, Department of Microbiology, Bundelkhand University, Jhansi

COVID-19 vaccine is prematurely in use because

1. COVID-19 vaccine is prematurely in use because **prevention is better than cure so people are more reluctant to be vaccinated.** -Megha Aggarwal, Dr. APJ Abdul Kalam Institute of Forensic Sciences, Bundelkhand University, Jhansi
2. COVID-19 vaccine is prematurely in use because **there is the high emergency of human safety which can only be in control by the introduction of bio warriors known as the vaccine.** - Snehlata, Department of Microbiology, Bundelkhand University, Jhansi
3. COVID-19 vaccine is prematurely in use because **apart from the side effects, it will also help to protect people around us especially those at increased risk of severe illness from the SARS-CoV-2 infection.** - Shalu Patel, Institute of Biomedical Sciences, Bundelkhand University, Jhansi
4. COVID-19 vaccine is prematurely in use because **the situation of the pandemic has been declared as an "emergency" which needs to be controlled as soon as possible due to inordinate havoc.** – Palak Agrawal, Institute of Biomedical Sciences, Bundelkhand University, Jhansi

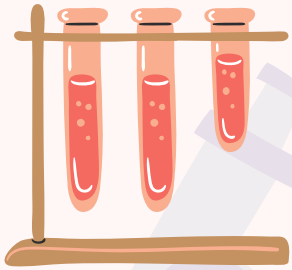
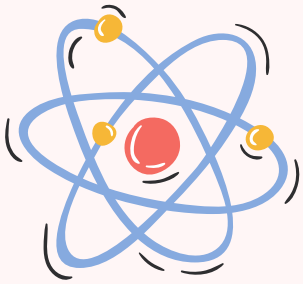
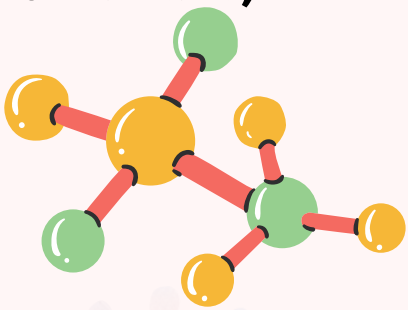
Crash blossom

"Although Nature needs thousands or millions of years to create a new species, man needs only a few dozen years to destroy one."



BIOWEAPONS

(The potential candidates of a Biowarfare)

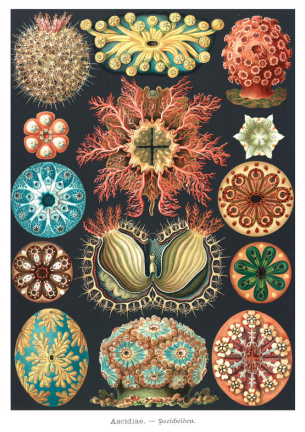




All of us have heard a lot about the devasting effects of nuclear bombs, tear gas, machine guns, missiles, and many such weapons employed during wars, one of the potent and much wide spreadings of these weapons is Bio-weapons. Bio-weapons include various deliberately introduced natural or genetically constructed living organisms and the components or products extricated from living beings that hold a capacity of inducing disastrous effects like killing large human populations and other living creatures like plants and animals. Most common agents employed as bio-weapons include ruinous bacterial, fungal, and plant toxins, animal corpses, materials such as clothes infected by disease-causing spores, pollens, and other such factors. The most common passage of Bio-weapon introduction involves contamination of sources of drinking water with catastrophic detrimental agents like a fecal matter of diseased patients, corpses, and other calamitous agents listed above. The outbreak of plague, anthrax, smallpox, severe influenza, swine fever, cholera, and many zoonotic diseases have been a result of biowarfare since World War 1. These Bio-Weapons have ravaging outcomes on the health and well-being of human beings, livestock, crops, and other living creatures exposed to these agents. Generally, diseases that are less known to occur in the target area are employed as Bio-Weapons since the unexposed organisms being unimmunized to that particular agent, have more adverse consequential effects. In most cases, such weapons are not known to represent any clear and spontaneous symptoms, and by the time the disease by and large spreads across large proportions of the attacked population. Agents which are easy to be manufactured and collected in larger amounts in a short period of time, are extremely virulent and communicable, and are associated with high mortality rates are generally chosen as the best candidates of Bio-Weapons. Other than causing high mortality in the target population, these potent candidates employed for biowarfare can cause the extinction of many endangered species. Many times, due to cross-species infection, organisms other than the targeted species population may get adversely affected having further consequential catastrophes since these detrimental agents generally are known to be antibiotic-resistant and insensitive to most of the known vaccine candidates of the time. These agents are known to have adverse resultant effects on the economy of the affected nations, both developed and developing, due to the loss of a large number of living populations and an instantaneous need to develop remedial measures for the outbreak. With the advancement in techniques and instruments of disease study, we have gathered a huge amount of information about the bio-weapons, their engineering, associated consequences, and many possible remedies, though much of it is yet left to be explored.

Human Gut Microbiome

The genome of all, pathogenic and symbiotic, microorganisms living in and on all vertebrates is known as the microbiome. The gut microbiome is comprised of the aggregate genome of microbes living inside the gut including archaea, bacteria, viruses, and fungi.
These microbes live symbiotically on and within various sites of the human body including the oral cavity, genital organs, respiratory tract, skin, and gastrointestinal system. The human microbiota is estimated to be ~10^13–10^14 microbial cells. 1:1 ratio of microbial cells to human cells.

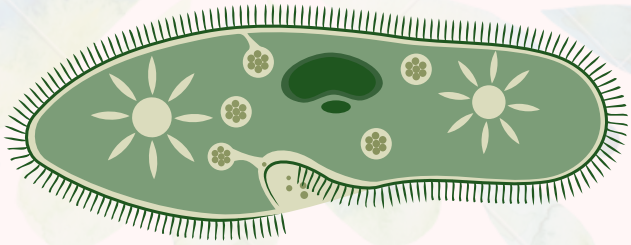
Major bacteria phyla in the Human gut microbiome :

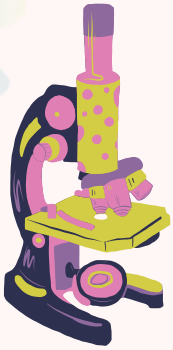


Firmicutes
60-80%
Bacteriodetes
20-30%
Actinobacteria
<10%
Proteobacteria
<1%

ROLE OF GUT MICROBIOME IN HUMAN WELLNESS :

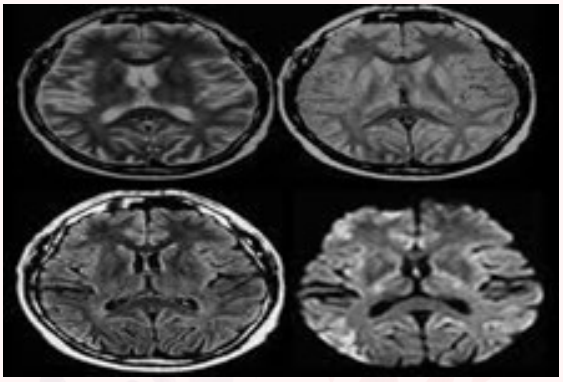
- The gut microbiome plays an important role in metabolizing complex nutrients and providing key nutrients necessary for host metabolism. The gut microbiota contributes up to 10% of daily dietary energy by utilizing unabsorbed starch and making it accessible to host metabolic pathways via conversion.
- Gut microbiota activates G protein-coupled receptor in gut epithelial cells assisting in the production of the multifunctional hormone leptin, which plays a role in host physiological functions such as energy metabolism, appetite, and activation of nerve and immune responses.
- Vitamin K-producing producing gut bacteria plays an essential role in lowering cholesterol levels and maintaining normal nervous system function.
- Gut microbiota serve as an source of vitamins B5 and B12.
- The gut microbiota plays a significant role in hematopoiesis (innate immunity development).





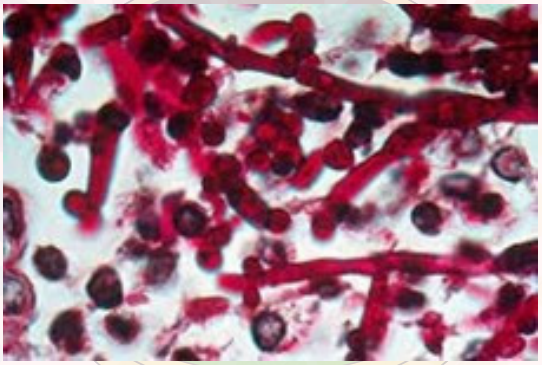
Controlled Vocabulary

Creutzfeldt-Jakob disease (क्रूट्सफेल्ड जेकब रोग)



It is a fatal disease usually inherited or transmitted from an infected tissue during transplant or surgery which commonly leads to spongiform encephalopathy; mostly observed in humans leading to dementia and death.

Candidiasis (कैंडिडिआसिस)

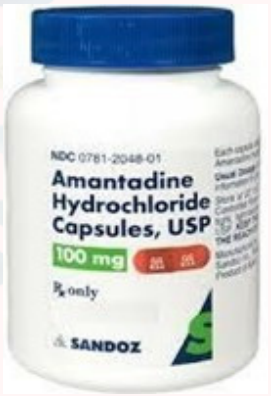


Fungal infection caused by yeast C. albicans which is usually seen affecting skin (cutaneous candidiasis), vagina (yeast infection) or oral cavity (oral thrush). Mostly reported in female.

Campylobacter jejuni gastroenteritis (कैम्पिलोबैक्टर जेजुनी गैस्ट्रोएंटेराइटिस)

Gastroenteritis, food poisoning in simple terms caused by C. jejuni.

Amantadine (अमांतादीन)



Drug that increases dopamine release and prevents its reuptake and is used to treat Parkinson's disease, it acts as a non- competitive antagonist of NMDA receptor.

Shutterbug Column

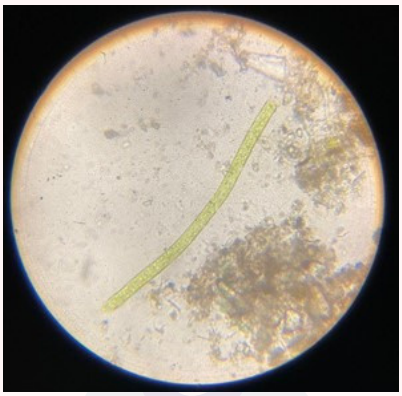


Image- cyanobacteria (under a compound microscope)
By- Dheeraj Patkar (Bundelkhand University, Jhansi)

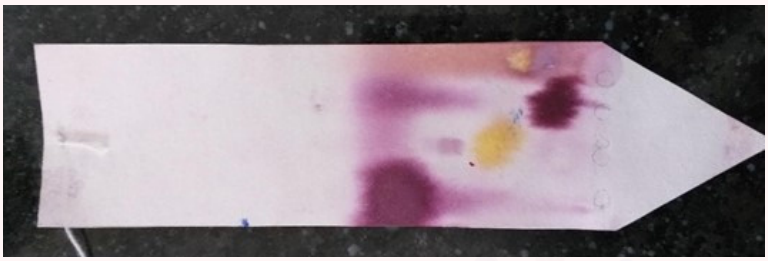


Image- Paper chromatography of amino acids
By- Adarsh Pandey (Bundelkhand University, Jhansi)

Image- Muller Hinton Agar with antibiotic disc (Antibiotic susceptibility test)
By- Snehlata(Bundelkhand University, Jhansi)

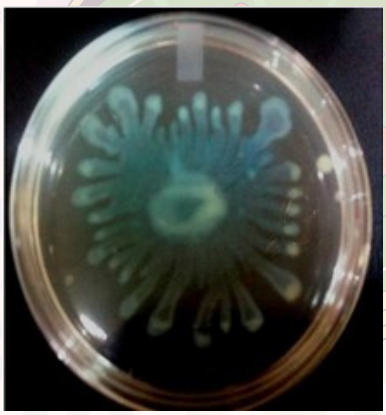


Image -Biofilm formation in P.aeruginosa
By- N.Shreya Mohan (Dr. D. Y Patil Institute of Biotechnology and Bioinformatics, Pune)

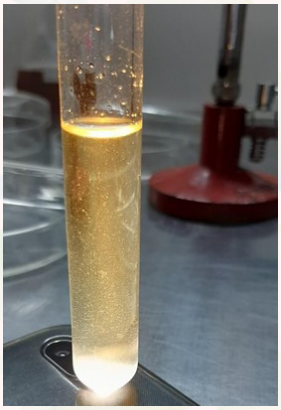


Image- turbidity of bacterial growth in liquid broth
By- Shantanu Shrivastava (Bundelkhand University, Jhansi)

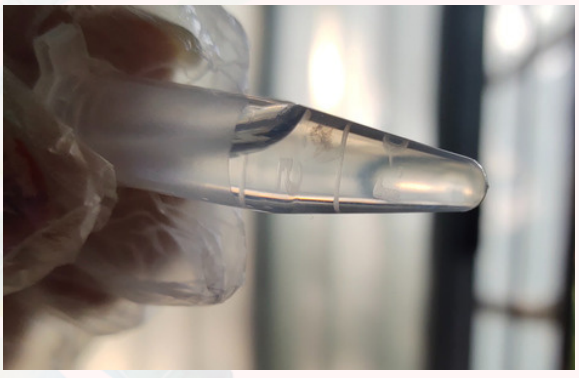
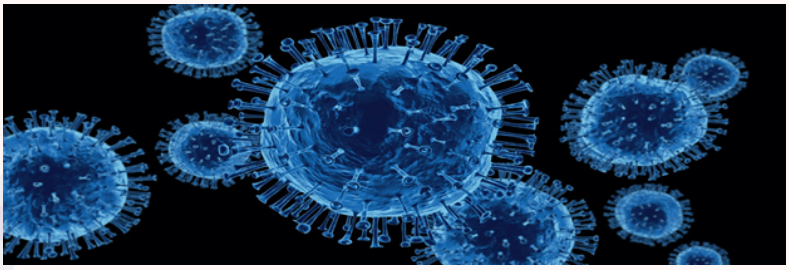
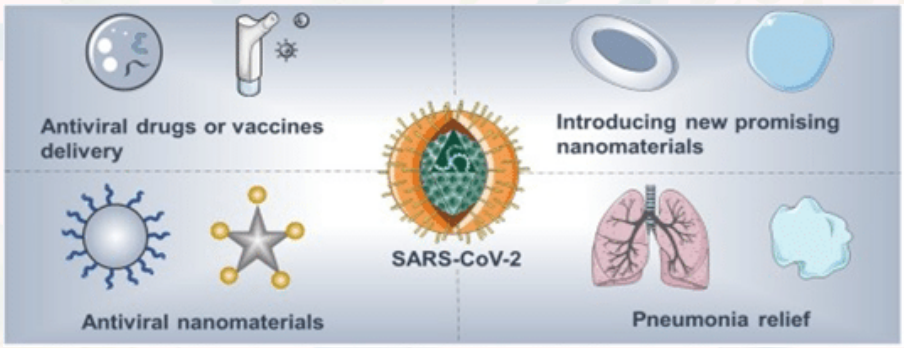


Image- Bacterial DNA Extraction
By- Shalu Pathak (Bundelkhand University, Jhansi)

Impact of Nanotechnology in Covid-19



Nanotechnology, the science of particles on a nano-scale has been showing its tremendous potential in diverse fields. Nanorobots in surgery, electrospun nano-fibers in water filtration, nanomedicine, etc would be a few to name. The surge in the application of nanotechnology has amassed great attention for its prospective in Covid-19, its treatment, or other operations. Nano-sized particles range from 1 to 100 nm, which makes it a great choice for developing drugs with higher bioefficacy. On the account of the small size of the nanoparticle, they prove to be a good drug delivery vehicle making it bioavailable. They have certain distinctive properties like higher surface adaptability, enhanced solubility, less interference with metabolic pathways, and versatility in functioning. Such attributes can be considered in developing new drugs making them specifically targeted and personalized. Nanotechnology is considered as one of the great potentials for alternative antiviral therapy and a lot of research has been done in this area with respect to viral treatment. However, it also plays a vital role in various areas, such as vaccine development, personal protective equipment development, surface disinfection, drug development, theranostics, diagnostics, etc. Below are a few areas in which nanotechnology not only has good potential but has also been able to promote more efficiency.



Structure and proteins of SARS- Covid 19

SARS-CoV-2 or Covid-19 virus is a single-stranded enveloped virus with an RNA genome that belongs to the family coronaviridae and genera betacoronavirus. It consists of 4 parts: S (Spike) protein, E (Envelope) protein, M (Membrane) glycoprotein, and Nucleocapsid. The spike protein interacts with the host cell receptors and cleaves into S1 and S2 subunits by the host cell protease (TMPRSS 2- Transmembrane Protease Serine 2). S1 binds to the host cell surface receptor and S2 mediates membrane fusion

Nanotechnology in production of Covid 19 vaccine

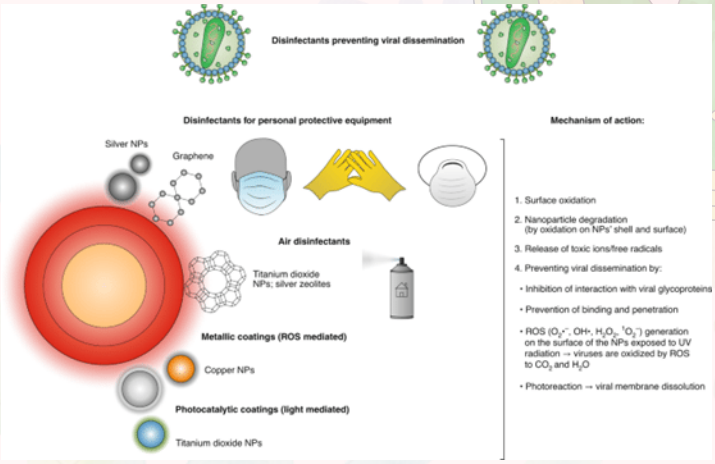
Viruses and nanoparticles (NPs) range around on the same scale, making nanotechnology a very desirable approach in the development of vaccines. Subunit vaccine: They are based on the inhibition of viral pathogenesis with the help of S protein by activating the antibodies that prevent viral binding and membrane fusion. S protein is an excellent target for vaccine development as its receptor-binding domain (RBD) or N-terminal domain can be used to enhance immunological action. RNA-based vaccines: They are based on the mRNA encoding a specific antigen and based on the sequence of interest it is introduced inside the cells, which serves as a template to produce the antigen (protein) and presented to the T-cells resulting in an immune response. Lipid Nanoparticles for vaccine development: Lipid nanoparticles can form complexes with nucleic acid and act as a carrier that helps prevent nucleic acid from nuclease degradation. Lipid nanoparticles form stable complexes with anionic nucleic acids (negatively charged) making them more resistant to nuclease degradation.

Nanotechnology in Personal protective equipment (PPE) kit

With the surge of cases of this infectious virus, the need of developing an efficient system to safeguard the lives of the healthcare professionals as well diminish the re-transmission of the virus. In this case, nanotechnology comes into play. One of the parts of the PPE is the head protection which with the incorporation of polymer and nanocomposite can enhance the comfort level of the user by making it lightweight, transparent, tougher. Sensors embedded in PPE can sense the hazard in the near environment and regulate the temperature to acclimatize to the body. Besides this, they can also be created specifically for the work environment. For hand and foot protection, nanomaterials can be used to build flexible and robust gloves and footwear that can offer a greater comfort level and can also help warn about any thermal, chemical, or biological threats. Nanofibres used in the development of facemasks can provide a better filtration rate. Facemasks with nanofibres built with 3 layers; inner layer being nonwoven and fiber material, the middle layer being comprised of the nanofibre, and the outer layer being made of the nonwoven and fiber material provide reduced pressure drops and enhance the filtration of airborne particles along with comfort to the person wearing it. The general composition of the nanomaterial used for these purposes consists of a metal group, two non-metal groups, and an anion. This facilitates the reduction or prevention of virus transmission.

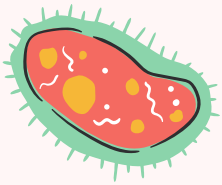
Nanotechnology for surface disinfection

Surface disinfection is attributable to the capillary action and adhesion force between the contaminant particle and the water droplet. The friction force determines the cleansing action. Zinc oxide and titanium dioxide nanoparticles possess antimicrobial properties that can be incorporated into the development of disinfectants as they are effective even at low concentrations. Metallic nanoparticles such as silver are known for their broad spectrum of antimicrobial activity can be a potential choice that provides antiviral activities too. It also can help boost the host immunity against pathogen attacks. The incorporation of nano-disinfectants reduced the need for active ingredients and increased the overall efficiency of the process showing a significant reduction in the pathogenic (bacterial and viral) concentration.Integrating nanomoieties can propagate the repellence of any blemish or stain, eliminate any static electrical conductivity, that too keeping the comfort and flexibility of the textile check. In spite of having numerous advantages, nanotechnology faces some challenges with respect to the scale-up and production economy. They also possess some toxicity and minor environmental incompatibility which emphasizes the need for more research that can help develop an efficient disinfection system utilizing nanotechnology.



Despite of having some drawbacks and loopholes, nanotechnology has managed to have an overall positive impact. Nanotechnology has an important place in vaccine development and drug development, especially targeting the problem of drug resistance that usually occurs during the treatment administration phase. It has not only covered the medical aspect of Covid-19 but also being an efficient candidate in developing masks, head protection, protective footwear, and gloves. They have also played a major role in disinfection and pathogen spread control. This shows the massive potential of nanotechnology and opens doors to more research that can help to devise coherent methodologies and technologies to accelerate the process of combating this problem.

Microbes and Microbiomes: A Poem



Oh! I never knew, what you all are up to!
You are so tiny, so old, so ubiquitous too.
Within the soil, beyond the air, in the water blue,
I wonder how teeny-weeny creatures like you can reign all through.

I love food and you love them more,
You were discovered as Yeast in 7000 BCE for sure.
Microbes and metabolism go hand in hand,
For your tremendous contribution, modern food technology stands.

From a little particle to the entire system's regulation,
Microbes and microbiomes comprise the whole food reformulation.
Lactobacillus in curd, Lactic bacteria in supplements
Your existence proves their destiny to consume, quite immense.

From Louis Pasteur's statements in 1857 to helping, being a Yeast in alcoholic fermentation,
You validate yourself within leguminous plants as Rhizobium, serving for nitrogen fixation.
As Rhizopus in Sugar Syrups to LAB and Yeast in cakes, idlis and dough,
Even, you provide us Vitamin B12 being Fungi and steal the entire show.

So, this is how your functional journey channels vastly your entire evolution,
Influences you to the peak in the scriptures of Biology and makes you the worthiest in every dimensions.

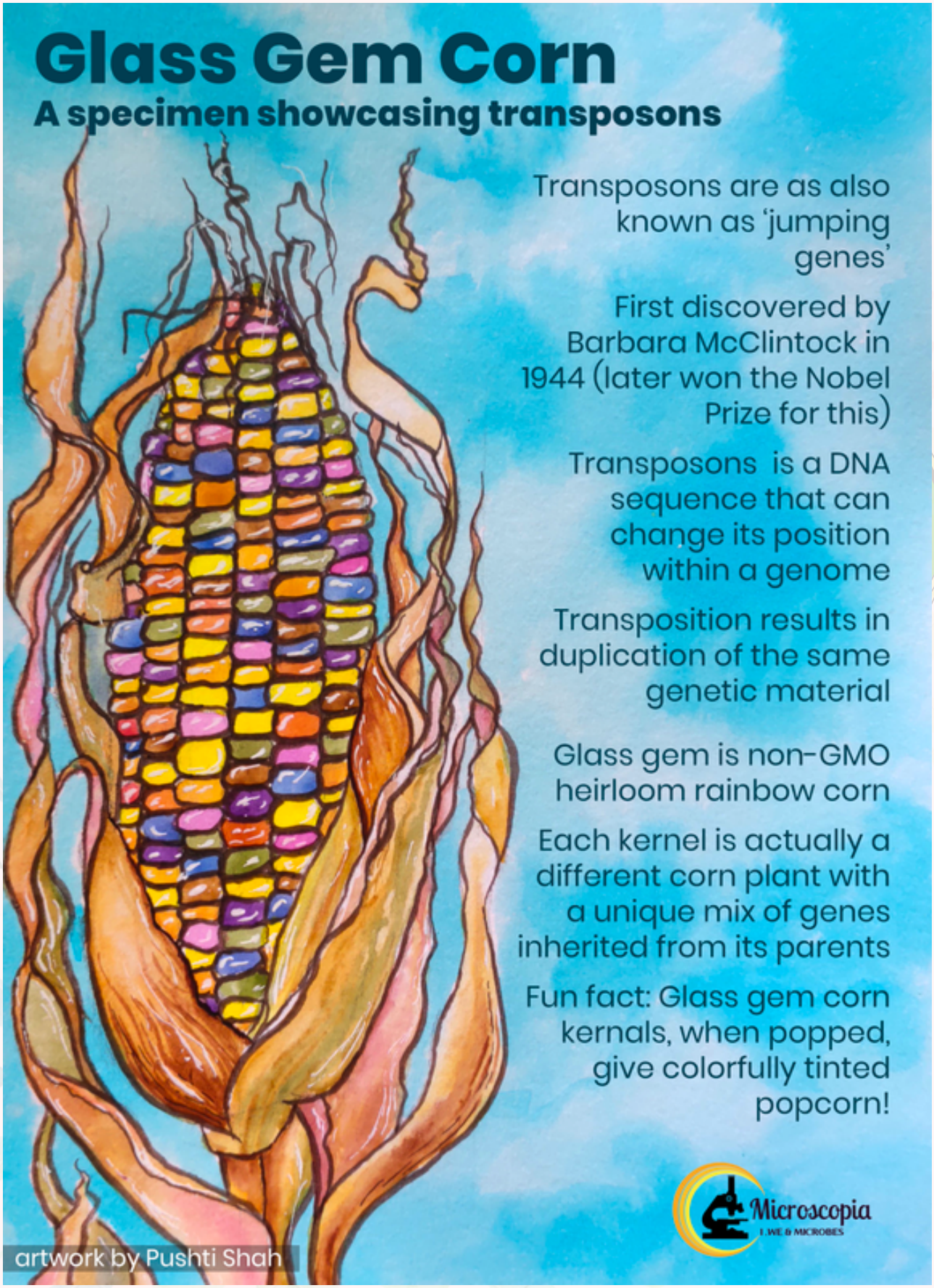
Best from Waste Challenge

Congratulations to all winners.

Monument to the laboratory mouse

The Monument to the laboratory mouse is a sculpture in Novosibirsk' Akademgorodok, Siberia, Russia. It is located in a park in front of the Institute of Cytology and Genetics of the Russian Academy of Sciences and was completed on July 1, 2013, coinciding with the 120th anniversary of the founding of the city.
The monument commemorates the sacrifice of the mice in genetic research used to understand biological and physiological mechanisms for developing new drugs and curing diseases.

A Specimen Showcasing Transposons



8 Probiotic Foods for a healthy gut

Probiotics are live bacterial cultures that we consume naturally in fermented foods or in the form of supplements. These live bacterial cultures/microbes play a significant role in regulating our physical and mental health. Consuming probiotics can help alleviate IBS (Irritable bowel syndrome) and IBD (Inflammatory bowel disease) symptoms, anxiety symptoms, reduce risk of eczema in infants, and may help reduce seasonal allergy symptoms. Some most commonly consumed probiotics are:

YOGURT

Widely preferred source of probiotic as it is suitable for lactose intolerant people. It is made from milk that is fermented with lactic acid bacteria and bifidobacteria. It helps in improving bone health, normalising blood pressure, reduce diarrhoea and relieve symptoms of IBS.
Substitute: Cottage cheese, Cream cheese

TRADITIONAL BUTTERMILK

It is another commonly available and most drunk probiotic in India. Buttermilk is the leftover liquid from making butter. It is low in fat and calories and contains several important vitamins and minerals such as vitamin B12, riboflavin, calcium and phosphorus.
Substitute: Sour cream

SOUR PICKLES

Pickles are cucumbers that have been pickled in a solution of salt and water. They become sour due to fermentation by lactic acid bacteria. They are low in calories and a good source of vitamin K, an essential nutrient for blood clotting.
Substitute: Dill pickle

TEMPEH

Tempeh is a fermented soybean product and is originally from Indonesia. It is also popular worldwide as a high-protein meat substitute. The fermentation lowers the amount of phytic acid in soybean, which increases the amount of minerals our body is able to absorb. Fermentation also produces some vitamin B12 which is initially not present in soybean.

KIMCHI

Kimchi is a fermented, spicy Korean dish made from cabbage. It is flavoured with a mix of seasonings such as red chili pepper flakes, garlic, ginger, scallion and salt. It contains lactic acid bacteria Lactobacillus kimchii that is important for digestive health. It is rich in vitamin K, riboflavin (vitamin B2) and iron.
Substitute: Fermented radishSubstitute: Cottage cheese, Cream cheese

SAUERKRAUT

Sauerkraut is finely shredded fermentated cabbage that is the oldest traditional food of Europe. It is sour and salty in taste and rich in antioxidants lutein and zeaxanthin.
Substitute: Fermented red cabbage

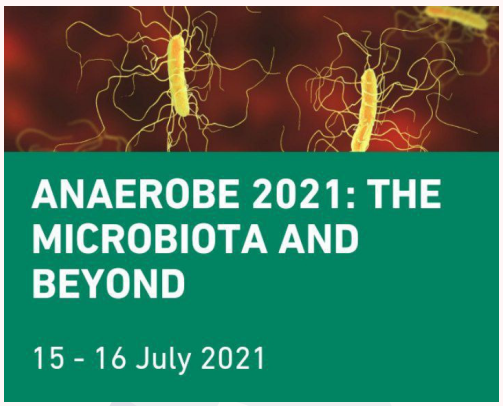
KEFIR

Kefir is a fermented probiotic milk drink which is made by adding kefir grains to cow's or goat's milk. Thick, creamy, and tangy like yogurt, kefir has its own strains of probiotic bacteria, plus a few helpful yeast varieties too.
Substitute: Sour cream

KOMBUCHA

Kombucha is a fermented black tea drink which contains strains of bacteria and yeast. So aside from the probiotics inside, it also offers the health benefits of tea.
Substitute: Fermented green tea

Student Community Blog



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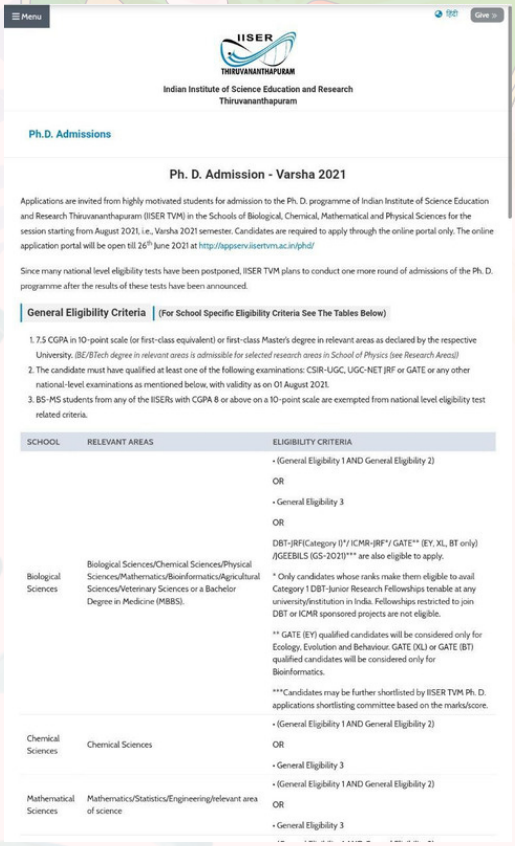

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Hiring!! For Laurus Bio - Quality control.
Openings for -
0-1 years - internship.
2- 5 years - Experienced.

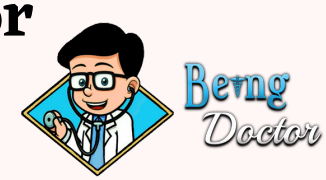
Qualification: M.Sc. Biotechnology/ Biochemistry/ Lifescience/ Biological Science.

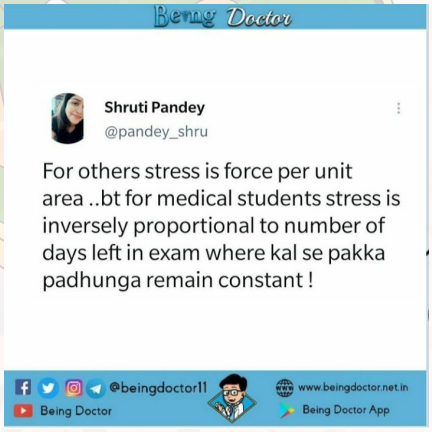
Experience on HPLC, UV - Enzyme assays, Raw material testing, packing material testing , Water analysis, QMS investigation, Instrument Calibration.

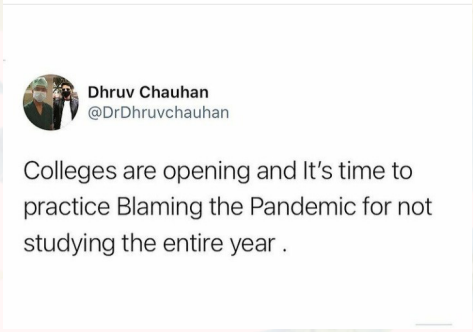
Location : Bangalore / Tumkur.

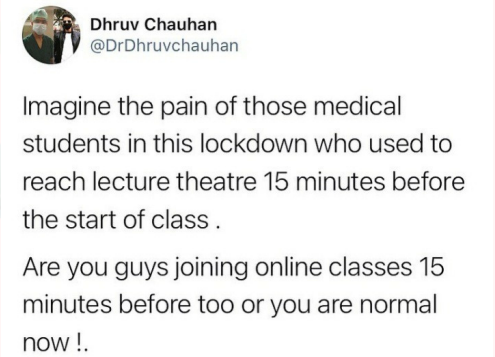
Share resume : shivakumar.kt@laurus.bio

9 Reasons why Being Doctor

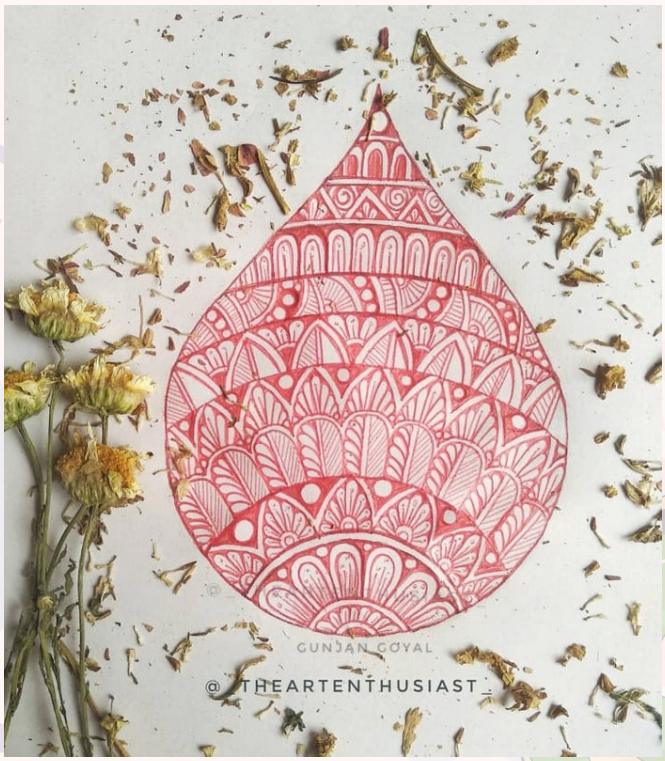








HER



We are all very well aware about the Taboo, Period is considered.
From the day of menarche to the day of menopause, A girl/woman is often considered "IMPURE" in her monthly days. Some people even consider it a 'Sin' to touch girls in those days. People who menstruate have long been taught to be ashamed of or to keep silent about their periods for many reasons.
But those who do so, have ever wondered, what a girl/ woman feels in her Period Days? Okay, so you must have read it somewhere that Period Cramps is almost as bad as having a "Heart Attack". Now can you imagine the pain? Have you ever give it a thought, why does it happens to "Her" only? The answer is Because "HE" can't reproduce a new life. It is the "SHE" who can give birth. God considered "HER" capable enough to bear all the pain, which occurs during the process. Isn't that our Superiority? Isn't this the Super Power, "SHE" is blessed with? Yes, IT IS.
In this era, where people should think of eradicating the bad deeds from the society to live a harmonious life with other creatures of the world, there is still a group of people who gives "Period Taboo a due importance". Why? Is that even necessary to Period Shame a Girl? It's a high time for us to get rid of this sick mentality. There are a lot many things in the world to be taken care of. Those 7 days can't define "HER" identity.

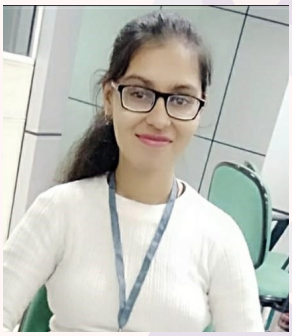
Team MicroMia Aureus

Bipin

Adarsh

Pradhum

Shantanu



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