

Mélange

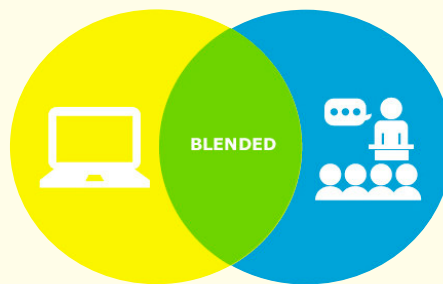
UNITY IN DIVERSITY



SUMMER EDITION

WE DID IT!

AY 2021-22

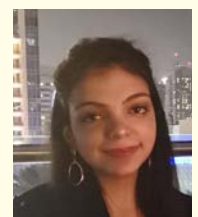


EDITORIAL LETTER

This is the moment we have all been eagerly waiting for, it's finally summer break! And as we come to the end of yet another academic year, we can look back and reminisce about all the things that have happened so far this year, from the virtual global day to the inter-university competitions etc. For some of us, it is the end of yet another year, while others are preparing for the next challenges that lie ahead in their journey after graduation.

In this final issue of melange, the newsletter team brings to you a special interview with one of our own medical students who has published her very own poetry book. What an amazing accomplishment! Find out what your friends are getting up to this summer and definitely do check out the unique articles on the library of babel and plastic eating bacteria. I am sure you all will enjoy this issue of melange thoroughly.

I really do hope you all have a fantastic long break, spending time with your family and friends and practicing your favorite hobbies. I am sure you guys will come back refreshed and ready to take on the next academic year. See you all next year and as always, happy reading!



Vaneezeh Khamisani
(2018bm15)
Editor in Chief



INTRODUCING EVERYONE TO GMU CAMPUS TV!

GMU campus TV is a student-powered channel with an exclusive view of student life at GMU. We plan to have a bouquet of interviews with inspiring people, interactions with members of our very diverse student community and cover all the important news from our university and around the world.

GMU Campus TV Team



MONTH OF RAMADAN



Quran Competition Winners



Manipal E-poster Competition Winners

INTRODUCTION

From the deep sea of the Mariana Trench to the Pyrenees peaks, our planet is wrapped in plastic. What was once hailed as a "miracle material", is now slowly killing our planet. There are many types of plastics that can be found in the environment and PET is the most commonly used.

Polyethylene terephthalate (abbreviated as PET or PETE) is a lightweight yet strong plastic that is widely used in the food industry.

However, all hope is not lost as scientists have discovered a new species of bacteria capable of decomposing plastics: Ideonella sakaiensis.

IDEONELLA SAKAIENSIS

Ideonella sakaiensis is a bacterium from the genus Ideonella and family Comamonadaceae, which is capable of breaking down and consuming the PET as a sole carbon and energy source.

CHARACTERISTICS

The bacteria is Gram-negative, aerobic, non-spore-forming, and is rod-shaped. The cells are motile with a polar flagellum. It grows within the optimal pH of 7-7.5 and optimal temperature 30-37°C.

METHODOLOGY

The team collected and screened 250 samples of PET debris-contaminated environmental samples including sediments, soil, wastewater, and activated sludge. One of the samples contained a microbial consortium, no. 46, that was formed on the PET film and was able to degrade it. The bacteria capable of degrading and assimilating PET was successfully isolated from this consortium.

ENZYMES AT WORK

The main reason PET can be hydrolysed by the bacteria is due to the presence of enzymes PETase and MHETase. Ideonella sakaiensis degrades PET into MHET, which is then broken down by MHETase into the building units of PET, terephthalic acid and ethylene glycol.

LIMITATIONS

- Ongoing research is being done on the applications of these plastic-eating enzymes.
- For now, use of this bacteria is limited to PET plastics only.
- The commercially available plastics have additives, plasticizer and other biodegradable impurities, like phthalates. Therefore, apart from the breakdown of PET, toxic byproducts can be released into the environment.

FUTURE PROSPECTS

- It can improve plastic recycling or decomposition and can decrease or curb plastic pollution.
- Genetic sequences of involved enzymes can be used to mass-produce the enzymes themselves and use them directly to degrade plastic polymers.
- It can provide a high growth rate, with low cost, and easiness of manipulations.

1st place
Layla Jameel
Anshula Anilkumar
Jaelyne Tauro
Zavia Kitherian

CRISPR off – LEADING THE WAY TO CURE.

Lubna, Shereefa Hannath

BMS Student, College of Medicine, Gulf Medical University, UAE

Introduction

CRISPR/Cas9, a single fusion protein, has got the megafamous ability to silence any gene without altering the genetic code, making it unique and specific. From the conventional CRISPR method, which methylates only at sites where CG sequences are highly concentrated. Nearly 30% of human genes that lack CpG islands are not controlled by DNA methylation, but CRISPR/Cas9 has ruled out the CpG island requirement for methylation, i.e. the technique does not require CpG islands to turn the genes off by methylation. Since the epigenome plays a principle role in many diseases, researchers believe the CRISPR/Cas9 technology may lead to a powerful therapy.

CRISPR Cas9 vs CRISPR OFF

CRISPR/Cas9 is a special gene-editing technique that allows researchers and geneticists to alter the DNA sequences, thereby, potentially curing genetic diseases. While the system enables researchers to alter the DNA, the changes made are permanent. The drawback of CRISPR/Cas9 technology is that alterations made are difficult to fix and control, especially the altered areas where CRISPR changes the wrong sequence of DNA.

To solve this, a team of researchers at MIT and UCSF developed a new gene-editing system, CRISPR OFF. With this system, specific genes can be altered while leaving the DNA sequence unaltered and these variations are completely reversible, using CRISPR/Cas9. So rather than modifying the DNA sequence, it changes the way the sequence is read.

Materials

The researchers mimicked classic CRISPR technology by modifying a CRISPR/Cas9 system and CRISPR OFF, using the technique on pluripotent stem cells to transform it into neurons. They decided to test it on neurons to study whether CRISPR OFF is suitable for treating major diseases.

In neurons, protein called Tau protein, when expressed can form tangles in brain which causes memory loss and severe symptoms of Alzheimer's disease.

To this protein, they added CRISPR OFF which "almost entirely" silenced the expression of Tau, minimizing the severity of the condition.

Therefore, this is a possible approach in controlling the genetic expression that causes Alzheimer's.

Findings

A striking discovery in the field of medicine CRISPR technology development in 2013. Cancer researchers implemented this strategy to turn off the gene. The gene editing tool was inspired from bacteria, that acquired the defense mechanism when attacked, creating memory by storing the bacterial DNA, called CRISPR, creating memory by the help of Cas9. Cas9, the same bacterial DNA gets sliced up the next time they attack.

Now, CRISPR is under experimental studies to direct and find the possible solution for most Chronic Virus. CRISPR came to support effective drug development.

However, certain limitations found are, editing of different gene targeted off-target regions which may not be separable at times and this is where the advantage of CRISPR comes into action. There are some viruses carrying CRISPR that is intended to act on only specific target cells which may act on multiple cells. However, some methods ask viruses that are tested safe compared to previous therapies.

From the studies it is found that, editing from inside the body has got the chance of altering other cells such as gene cells that got the potential to give an information to surrounding generation. To avoid this malpractice, CRISPR OFF is proposed as a better alternative. The idea of CRISPR is constantly using with each step reducing the side effects and directly changing the future of science.

Methodology

CRISPR-OFF has got the capability of targeting any possible genes without altering the genetic sequence. This enzyme acts directly on the epigenome, following the classic methylation process. CRISPR OFF silences the targeted genes and CRISPR/Cas9, a remarkable tool, that can be used to turn on the silenced region making DNA methylation a reversible process. Therefore, with this technology, methylating the DNA causes it to become unreadable by the mRNA and stops the translation process.

Result

CRISPR OFF was not just able to silence the regions of gene expression but also other regions that did not express proteins. This shows that there are many potential applications of the technology.

In the field of therapeutics, applying CRISPR OFF could treat rare genetic disorders such as Marfan syndrome affecting the connective tissue, baby syndrome affecting the immune system making it sensitive to microbes, Fragile X syndrome that causes wide range of intellectual and development problems and certain forms of cancer.

Further investigations and a detailed research on the following technology could certainly hold a promising future in the field of therapeutics and treatment.

Summary

A modification which can control genetic expression, that can be beneficial in the field of medicine providing possible treatments for different rare disorders. Analyzing chromatin after CRISPR OFF administration marks the role of heritable gene silencing. Restriction of gene can also be performed, ensuring a safe approach.

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2nd place
Lubna
Shareefa Hannath





What are your plans for the summer break?

Khadijah Ahmad 2016ph27

My plans for the summer break:

1. I want to rest and catch back on all the sleep I missed during the school year
2. I want to spend some quality time with my family cos I've been away from them for a while
3. I want to engage in more religious acts and pray more cos I barely get time to do those during the school year

Aisha Akinola 2019ph14

My plans for the summer break:

1. I want to rest and get my mind off school for a while
2. I want to spend some quality time with my family and friends cos I've been away from them for a while
3. I want to get my license and go to cooking school

Mustabshira Ayyub 2019PH22

This summer I plan to travel more and spend time with my family. My usual summer plans consist of spending more time away from screens and electronics and spending more time reading or at least being more intentional with Internet/overall usage of electronic devices. I hope to get a proper break from being in the studious state of mind and I'm going to be more purposely unproductive (because I deserve it). My summer would also hopefully consist of a possible internship or some work experience of some sort.

Yasser 2016ph31



I will try and review the important courses we did in the past three years. I will also try and create a stress free environment for myself so that I can relax and enjoy myself.

Fatima Malami 2018ph41

I'm going to try and perfect my culinary skills, exercise more, improve my public speaking skills and try and catch up on all the TV shows I've been missing.

Fatima Idris 2018ph16

This summer I don't really have much to do because I'm going to take a summer course for 3 weeks. After that I'm going back to Nigeria. I will visit my friends and which I'm so excited for. Lastly, this summer I want to go to a culinary school to improve my cooking skills.

Zainab Jamari 2019ph18

My plan for the summer break is to learn a skill, sewing to be precise, to learn from professional tailors. I also want to practice my driving and graduate from a learners permit to a driver's license. I couldn't go home during the last break due to lockdown so i am looking forward to going home and meeting with family and friends.

Jamilah Abdullahi 2017ph09

The plan for this summer is to travel and explore my village in Bauchi state called Darazo. I would love to visit the emir, go to the museum, listen to ancient histories and traditions of the people living there, and make a documentary on that, I will build my YouTube channel by making educative and entertainment videos, retrieve my sports skills in table tennis, hockey and also volunteer in a non governmental organization as a translator or an intern.

Fatima Bashir 2018ph34



AN INTERVIEW: THE RHYTHM LEFT TO SOAR

By Steffy Terrance

1) How did you get into poetry?

Ever since I have been penning down, I have found poetry as a powerful medium to convey certain messages. It helps connect with the readers at a very intellectual level.

2) How did you manage to get a book published on Amazon despite being a medical student?

Honestly, it's been a hectic process, but a lively one too. I had to make some compromises, mostly with respect to time. But I have enjoyed each moment.

3) What or who inspired you write a book?

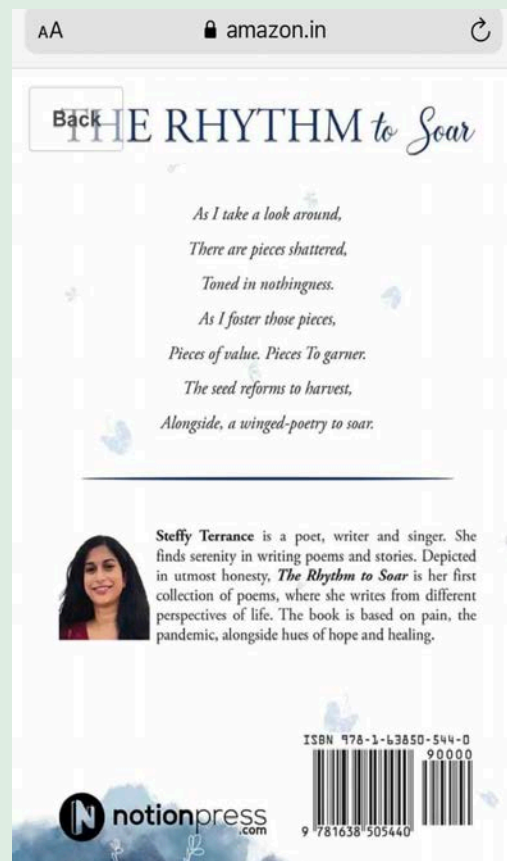
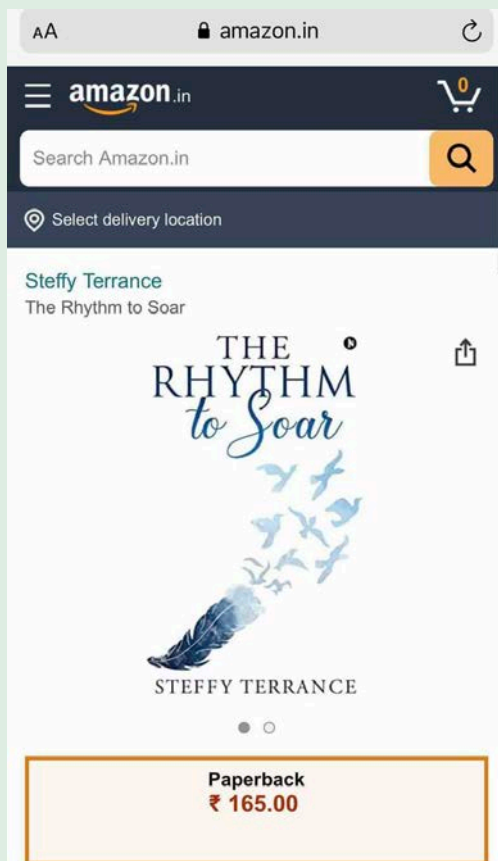
I have always wanted to publish a book right from middle school. Many poets like Sarojini Naidu, Vikram Seth have inspired me.

4) How does it feel to have a book published at such a young age?

Looking back through the process, it feels very liberating now. It is an amazing experience. I don't consider it to be any sort of gain. But I do acknowledge the amount of responsibility that comes with it.

5) How do you manage to make time to write poetry along with studies?

I don't have a plan or schedule to write anything. It's a very natural process for me. Sometimes penning certain thoughts can be relieving.



COVID SCIENCES A-Z COURSE, E- POSTER COMPETITION

POSTER



Cardiac rehabilitation via telerehabilitation in COVID-19 pandemic situation

Ayesha Seemab, Izaa Sehat, Jagruti Dhanak, Rawan Mandoub, Zehra Nazeem

Abstract

Background: Adherence to medication and lifestyle changes are very important in the secondary prevention of cardiovascular disease. One of the ways is by doing a cardiac rehabilitation program.
Methodology: Cardiac rehabilitation program is divided into three phases. The cardiac rehabilitation program's sustainability, inspection is needed in its implementation, such as telerehabilitation. So, the cardiac rehabilitation program can be implemented by patients and monitored by health care providers continuously.
Conclusion: Physicians & Physiotherapists play an essential role in motivating patients and encouraging their family members to control for a sustainable CR program with telerehabilitation to facilitate its implementation.

Introduction

- The coronavirus disease-2019 (COVID-19) pandemic has a significant impact on health care globally, including acute and chronic cardiac care.
- Cardiac rehabilitation (CR) is a comprehensive intervention for secondary prevention of cardiovascular disease (CVD). The CR program focuses on risk assessment and management. This program implements a preventive lifestyle to control risk factors of cardiac disease, such as obesity, hypertension, diabetes, and dyslipidemia.
- CR includes medical evaluation, physical exercise, counseling nutritional intake, lipid levels, and blood pressure (BP); planning programs to reduce cigarette smoking and alcohol consumption; stress management; modified individualized lifestyle consultation; tailored targeted pharmacological therapies; patient education; and psychological counseling. The CR program components are aerobic training, strength/resistance exercise, flexibility, posture, coordination, and balance.
- This literature review aimed to promote telerehabilitation specifically in CR through telerehabilitation programs among physicians and encourage each family member to actively support the continuum of rehabilitation programs at home to maintain and improve patients' quality of life.



Figure 1. Monitoring devices in telerehabilitation

Methods and Materials

Phase 1: Acute phase - The acute phase includes patient assessment, early mobilization, identification of CVD risk factors, and pre-discharge assessment. In this phase, outpatients are prepared to enter CR.
Phase 2: CROR - The second phase begins as soon as patients are allowed to be discharged. The phase II or center-based cardiac rehabilitation (CICR) phase is a program that provides resources and an environment, i.e., a supportive community for patients to complete their comprehensive rehabilitation program. The CR program generally consists of 3 sessions per week for 4-6 weeks.
Phase 3: Maintenance phase - The third phase is the essential part of the program yet usually receives the least attention. The benefits gained from phase II (CICR) will be subdued within a few weeks if they stop exercising. Therefore, home-based cardiac rehabilitation (HBCR) may overcome this problem and be used as an adjunct or alternative to CICR.

Results

Results are presented in table 1, 2 and figures 1 & 2.

Table 1. Patients with high risk during cardiac rehabilitation

Subgroup	Subgroup
High risk group	High risk group
High risk group	High risk group
High risk group	High risk group
High risk group	High risk group
High risk group	High risk group
High risk group	High risk group
High risk group	High risk group
High risk group	High risk group
High risk group	High risk group
High risk group	High risk group

Table 2. Types of activities commonly used in early cardiac rehabilitation

Activity	Frequency	Intensity
Walking	3-5 times/week	Low to moderate
Cycling	2-3 times/week	Low to moderate
Swimming	2-3 times/week	Low to moderate
Strength training	2-3 times/week	Low to moderate
Cardiovascular exercise	2-3 times/week	Low to moderate
Flexibility exercises	2-3 times/week	Low to moderate
Balance exercises	2-3 times/week	Low to moderate
Coordination exercises	2-3 times/week	Low to moderate
Posture exercises	2-3 times/week	Low to moderate
Coordination exercises	2-3 times/week	Low to moderate



Figure 2. Process for establishing a cardiac CR program

Discussion

- The CR programs are available in two forms: center-based cardiac rehabilitation (CICR) and home-based cardiac rehabilitation (HBCR).
- The CICR exercises are conducted in hospitals or specialized institutions, which is safer for cardiac disease patients because professionals supervise them.
- However, the CICR program cost is quite expensive since it is a long-term program and may not be convenient for patients living in rural areas.
- Both CICR and HBCR programs effectively improved clinical outcomes and health-related quality of life (HRQL) in patients with CAD, MI, or low-risk HF.
- The efficacy of HBCR was comparable to CICR in terms of increased aerobic capacity, level of physical activity, exercise compliance, controlled BP, and cholesterol level. The HBCR effectively reduced cardiac mortality in patients with CAD, ranging between 27 and 33%.

Conclusions

- The cardiac rehabilitation (CR) program is a sustainable and multidisciplinary intervention where patients are encouraged to continuously implement a healthy lifestyle and regular exercise after starting the program. This program should include physical training, risk factor modification, education, stress management, and psychological support.
- The CR programs are available in two forms: center-based cardiac rehabilitation (CICR) and home-based cardiac rehabilitation (HBCR).
- Using multiple technology modalities may be superior to using a single modality implementing information and communications technology in medicine, known as telerehabilitation, maybe a worthy alternative to CR. There were already some countries that have been applied telerehabilitation.
- Moreover, it is highly recommended in the current COVID-19 pandemic, where patients are advised to perform remote consultations unless in urgent conditions.

Contact

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GROUP MEMBERS



Izaa Jagruti Rawan Zehra Ayesha



HOW REALISTIC ARE THE MEDICAL TV SHOWS WE WATCH?

As a healthcare student, you have most probably watched at least one of these TV shows related to your course but how realistic do you think they are? In this article, you will find out which of these healthcare based series is closest to reality.

By Sayesha Taneja (2020pcs18) and Husna Jalia Nakitende (2019m085)



THE GOOD DOCTOR

The medical jargon, diagnostic steps and treatments in this show are fairly accurate even though it does have its medical errors as well. The unnecessary removal of organs and walking into operation rooms without masks being some of them. Shaun really does portray an accurate depiction of savant syndrome and yes, an autistic person with such brain power can end up working in the medical field.

THE RESIDENT

This show is ranked relatively real but it has some very obvious scenes that would not be seen in a hospital, like taking selfies in an operation room, which fortunately is not acceptable. Also, this show probably has more drama than a high school but do not expect such plot-twists in a real-life hospital. It is true that surgeons do play their favorite music while operating but as we all know, Dr. Bell and his shaky hands would never be found in a real hospital.

NEW AMSTERDAM

Besides all the drama in this show, the medical aspect of it is almost completely real. As with

other medical tv shows, doctors are seen doing the jobs of nurses and this does not happen in reality. Dr. Bloom definitely does a lot of unethical and inappropriate procedures and although she is most times right, this kind of behaviour does not seem acceptable. Some of the medical cases may be exaggerated but are definitely possible, although extremely rare in day to day medical settings.

So these tv series really are mainly just for the drama with a few medical accuracies. I would personally not recommend using these to learn more about your course which of course none of you is doing. You could even get a good laugh from some of these shows presenting perfectly normal EKG readings as “flatlining.” Though no one is really looking to study from these so enjoy the drama! (2019m085)

“I think the love-hate is fundamental. Everyone hates reality television, and everyone’s watching it”, quoted by Bo Burnham speaks a lot on the view of the audiences as a viewer.

While the television brings out some of the worldly reality in the eyes of normal people, it is thought provoking to ask whether every instance is itself a reality or not?

Fact to be agreed that there are life lessons that can be derived from TV shows. They give us helpful information, various forms of education, and



entertainment which are all a part of the positive effects that television shows have on our society. Being in one part of the world, it also helps us to indulge and experience different forms of culture and language.

However, there is a lot more into TV shows than we expect. TV shows being a life saver can also be a life taker. It shows us a world that is not real. We tend to believe that the world is more of a violent place than it really is. By indulging into TV shows, we perceive the glamourised life of people and believe they are better off than we are. While some TV shows are no less than just imagination and illogical thinking, but also ends up gaining the interest of audiences. TV shows are no less than an exaggeration and a glamourised view of how things take place in our world.

Considering “Grey’s Anatomy”, an American medical drama television series which has been the longest running medical series of all time has resulted in some story lines that never had any closure. The series revolves around the protagonist Dr. Meredith Grey and her journey of starting as an intern and turning into the chief of general surgery. One such illogical scene has been of Maggie Pierce’s Career Timeline. Based on the series, she had become the head of cardiothoracic surgery when she was 31 years old and she started her fellowship at 25 which implies she had graduated from medical school at the age of 19 or 20 and obtained her bachelors by 15 or 16 years. This led to absurd ideas about career and education. This in real life is not possible.

Characters of the Grey’s Anatomy had suffered too many major disasters, for instance Meredith had

many close brushes with death – an explosion, a mass shooting, drowning, a plane crash, and other multiple personal losses – all in less than a decade of her life which is less likely to happen in real life. Another famous American web series, the “Chicago Med” focuses on the emergency department at Gaffney Chicago Medical Centre and on its doctors and nurses as they work to save patient’s lives. In the episode “Cold Front”, Chicago Med never treated Latham’s condition like a deficiency. The episode directly addressed the fact that his Asperger’s, and any disability, has the ability to be a positive in someone’s life. This is always not considered a reality.

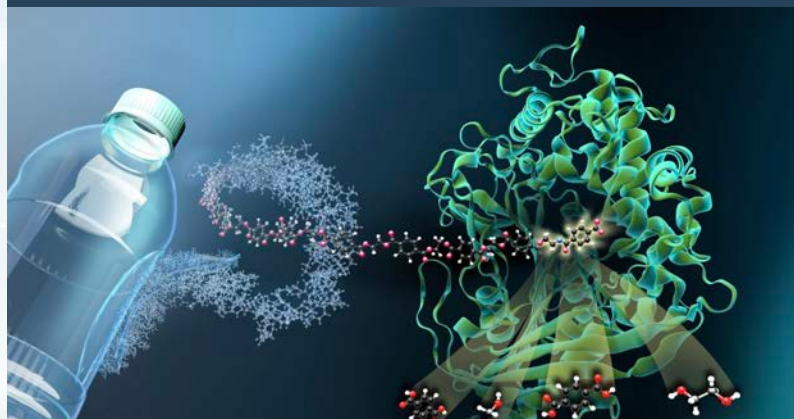
Reality television is corrupt – it pretends to depict and deliver the reality but it actually manipulates the truth to suit programme makers and audiences. The programme makers try to place the individuals in an unnatural scenario and provoke them to behave oddly. The scenes are overly exaggerated to capture the interest of the people. The television shows are playing with minds that are not fully developed. The makers only force characters to humiliate each other and create conflicts, nevertheless still manages to get viewers for the same.

Watching television shows we must always have a clear vision and understanding of what is true and what is not. However, watching television can also be a way to relieve our minds and have a positive effect. It can act as a stress reliever and give our mental health some joy.

Just like how every coin has two sides, so does this. It always depends on the way we perceive it.



A lesson to be learned from microbes - recently discovered plastic eating bacteria



By:

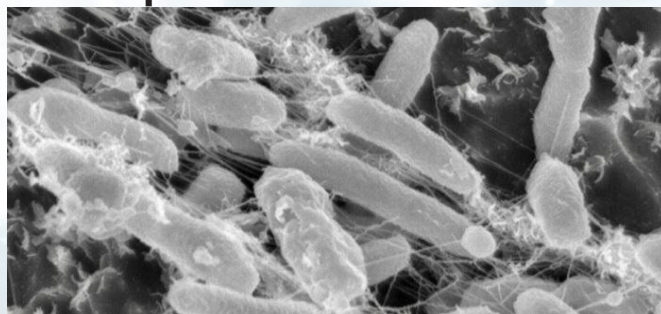
► Zavia Evangeline Kitherian (2019bm36)

► Rigza Razzaq (2018bm11)

Plastic is the general term for a wide range of synthetic or semi-synthetic polymerized products. Plastic waste, or plastic pollution, is 'the accumulation of plastic objects (e.g.: plastic bottles and much more) in the Earth's environment that adversely affects wildlife habitat, and humans.

Since the late 20th century, we have depended on plastic as an affordable, versatile and durable material. However, since the majority of plastic materials take centuries to degrade, all of the plastic that has been sent to landfills in the UK still exists and yet we're still producing and consuming more of it. That plastic has to go somewhere, and it's frequently either dumped carelessly on land or in rivers in developing countries, before ending up in the ocean, where it threatens marine life. The fact is, we simply can't cope with the amount of plastic on our planet nor the amount that continues to be produced. For this reason, our attitudes and behaviours towards plastic must change to ensure a safe and healthy future for our planet. In our study here, we will be discussing how scientists have supercharged how a plastic-eating bacteria gobbles up plastic - and it could help solve the pollution problem. Among many, let us emphasise in two main of them:

Ideonella sakaiensis - a biodegrader of PET plastic



Microscopic view of Ideonella sakaiensis)

While searching for microbial degraders of PET (polyethylene terephthalate) around various plastic bottle recycling facilities in Sakai, Japan, a team of researchers led by Dr. Kohei Oda and Dr. Kenji Miyamoto discovered a strain of bacteria which is capable of using PET as its carbon source. Discovered in 2016, Ideonella sakaiensis is a prominent plastic biodegrader. It is classified as an aerobic, non-spore forming, gram negative bacterium which are normally found in swamps. It was seen that the microbial community not only grew on the PET film, but also used 75% of the degrading PET as its source of carbon dioxide. Upon further research, it was noted that I.sakaiensis produces two enzymes to degrade PET plastic - PETase (or polyethylene



terephthalate hydrolase) and MHETase (or mono-hydroxyl-ethyl terephthalate hydrolase). The end products are ethylene glycol and terephthalic acid which are proven to have a low toxic effect on the environment. It takes approximately six weeks for the wild-type bacteria to colonise and break down a thin film (0.2 mm thickness) of low crystallinity PET.

The discovery of *Ideonella sakaiensis* has spurred the discussion about PET biodegradation as a method of recycling and bioremediation. It is also seen as an advanced solution to plastic pollution.

***Pseudomonas putida* - a versatile host for the production of natural products**



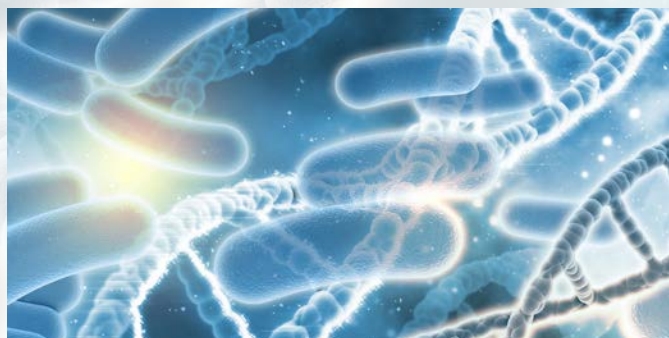
Culture growing *Pseudomonas putida*

Pseudomonas putida is a Gram-negative, rod-shaped, non-fermenting bacterium that is ubiquitously encountered in the environment. It harbours a broad spectrum of metabolic enzymes, allowing the species to adapt to various niches, including soil and water-associated habitats. In a study, conducted to see how 'Biodegradation of Plastics by *Pseudomonas putida* isolated from

Garden Soil Samples' works, it was found that *P. putida* has the ability to tolerate and degrade many toxic and hard polymers substances.. Among the samples used milk cover was found to be more degradative up to 75.3%. Hence, *P.*

Putida are efficient in biodegradation of plastic materials. The mechanism of degradation is not known. The surface of plastic materials has turned from smooth to rough with cracking. This may due to the compounds secreted extracellularly by the microbes that may break the complex molecular structure of plastics. Hence, further study on microbial enzymes or organic acids in degradation of the polyethylene plastics will pave the way for finding technology for degrading the plastic materials, which are otherwise hazardous to the environment. Therefore, the current study reveals the *P. putida* were found to be efficient bacteria for bioremediation of plastic material.

So let us ask you something which is "can plastic eating bacteria be the solution to our plastic problems?" definitely No, but it can be one of the futuristic solutions. The discovery of plastic biodegraders is relatively recent and the knowledge on these organisms is limited. However, with the evolving technology, these organisms can be genetically modified to speed up the plastic degradation process. Another possible solution is the extraction and mass production of the required enzymes to avoid any chance of the organism becoming invasive. With the help of these organisms, we can improve plastic recycling and decomposition. Finally, In our closing remarks, we would like to take this opportunity to advise all of you, including ourselves to let's learn from these bacteria and just as they take plastic as their food, we take earth as our beautiful motherland and take the responsibility and an initiative to keep it as clean as we can. There are of course ample ways which we can adapt to make our earth, if not pollution free, definitely a better place for future generations.



The Library of Babel

and how it would make the most futile research tool in existence

By Dana M. Louai Al Akhras
(2020bm06)



Imagine a library that contains any and every single piece of information in the observable universe, that was – or is yet to be – said, written, or thought. If such a library existed, it would be called the Library of Babel; sounds like something plucked out of fantasy, right? Perhaps one would immediately dismiss such a bizarre notion as it is practically implausible. However, believe it or not, the algorithm to generate a digital replica of the magnificent Library of Babel already exists, and you can easily access it at this very moment.

The concept behind the Library of Babel was originated by the Argentine author Jorge Luis Borges in his short story with the same title. Borges, who was also a librarian, described the universe in his book as an infinite library; one with infinite rooms, infinite staircases, infinite walls, shelves, books, and pages. As for the architectural structure, the hexagonal rooms that comprise the library are joined together by a central staircase that runs in the middle of each room, linking it vertically to the rooms

above and the rooms below. In addition, there is a hallway that leads into each hexagon through its two free sides, linking it to the adjacent rooms. Those two connections serve as the only means to traverse between the galleries. There are also twenty bookshelves in each gallery, which are divided equally amongst the remaining four walls. The same pattern is followed in each and every single hexagon.

In the Library of Babel, each shelf contains thirty-two books, which, in turn, comprise of every 410-page combination of letters, spaces, commas, and periods. To put this into perspective, if you were to “look through” the Library of Babel, theoretically, you will be able to find every single book that has been written, and every single book that will be written, all drowned out by an endless sea of nonsensical volumes.

By now, you might be wondering if such a complex ab-



straction could even be tangible. Astonishingly, programmer and author Jonathan Basile was able to create a website that grants a glimpse of how the actual Library of Babel would look and operate. It uses a pseudo-random number generating algorithm that can generate a predetermined base-29 output – which is the combination of the twenty-six lowercase English letters in addition to commas, periods, and spaces – from a seed; the sequential page number. If you run the inverse algorithm, entering the initial text you found will take you to the exact location you started with; try it for yourself!

Go to the website <https://libraryofbabel.info>. Click 'Browse' and look for the hexagon with the hex name typed in the box below (in base-36) by copying it and pasting it in the search box, then go to wall three, shelf four, volume twenty-two, and surely on page 375 you will find:

"hello, i am a student at gulf medical university"

Okmlcjnttuy2cf1bgkbtqy3wgtg6w4yiafvz88st60yqc0lcl0wc33ga0idixzxi32xgtu2wkazci68ft2458gch76x0bqctv5gfo9fxhmgk8ak7uj6it63y7f3qso7si7y8rkz9rapcnfke874wdxy28yihzwrhmopi1grf6d5nvc4529k1dwd2l9pbbh08faefpt6na5xntj5i2wmf62zmx7ze8ufkqo3t5zoaqaokh0djny65vloab05my5e2a18h8zmig0hxdkpeg24d1odeyqn9zhkotcwmx2mxonelp3hmbtawaxdplzq8frhy783ywt08r4tzt6f5wraqixzucubawnlglgduoa47guk5fwvzbt0huv6s30ontws-2rek32lkhqg6rfldor6retg7mo/m0rv1nbm35neclrdboitnch3m9zh23ubmq1xkrezhq18auw9m9sx2f9ws01k8m7e0xog-zl5vcv0mryp6n7lsalid5s32l6dwt50vqzah2v8gpc3d4bwa7vmldorckl0l2b2q6ciy9k5zy1556c7mzmuascl8db1v0c-n5a7h93xhdbi62lrx9s2urrcybepk3ywwc11y9w6wshvcsz1vjy0a1ydoo2e984zawchlxj4tax3omclhfg21w1nft3j7lmtot-2kufao9y9d6f6kshn9rm47owjicj2hgrc6tobtdle36ciqdezo4903viqgeppgjoevutwkomevqicdev6j0cl5feq4l5294za8y-pj089tmmah08ucdf9s6sf5870xbl6dvx03y4yp1rhuighyhs4ehj057jtu5p703epsu8kugez2u4dydyfwuua464y9juop1b-puz2vgi0962dnn370e5jicbssht9xr8exgsuw9zahifqk8udyb6873emmnvj7kftocy051lh439oxipm14w4iz9jy9et26i-5whkbifzggowup19vdd66vneatzrx1w2s0s4gvi0pbrvcbh49qzwqj1f6850qzslmlm9l9viltbjg3cczpjdzjez8omdiuc-9ogv0wlywfbhbkx5m9xufyt5udhym44a0y9d9aw1fzdda16ocq199gor80ogj8k05m0sil6ogr3n647zhzls5fas46cgk-kf0othktfbux0i0c5wqz7r7k70vpvja4qvold0nt7jjbrwhhisk7hennbgc2lm2va4k41egq5tdgdi83rfvym7djo8lihsdax0bxs-saz320mbhct1w3w0pccpzi1i9ah0n0757s9b3hww2zgrmgxrf51ujk3907kds23vsaz5g2yayopx6bbgt0kkxgoz49wzkif-56se547y9jrhovfw4w70jtnxyp8up1w9qrqvw4xe3t8ld4iugglowc6rx2bv7hnn45j816j7f7f5vg1ef74g90moop5oxzb23cb-337su28u3dsbtvhrh31Orloenkvaq30j1l1llysws32ew1lw16y9z2w14n9jrf55mcgijb000cznwzaphqjkuogeg8hge-byurmmvlfheufu3ouvk8k1qtp4zd9m97mx8p4a44j6fdsg1vmjn506wsp9o3shg1k9qwmvtyb9o9j19ofc9gf26vzfr3l-9n563cz3p0dy1pvyt0l6lvguvek7226kwkxj0h0p5vedj8i40vl1w0ld1ukugb2y78end35rclhniqimcdve5ow1f1b17a2l92-72iisipafuafteu1f1akrxd12ec5yo87rlo5ucwuxw2a1wp3y6gdj72epn5lk0721ccgyscttdb0k3d3upb1jlb60ggy08vb-zx1gsmu5d3pezknixxf21t5ggfj7ktv7ygeky0872ig8s8fm1llo39e7l7z7odxqd2yhb95eshj8jzuee3tgxx3hla0zq68n-0n721dcd5zgkmp58sc0eohxi3s04xqjd60o62s8kzw9503ptoonongotpy3lqgmyu74tvkg0pex4wpxd3jdukkzizv0-ropahmt9t9r3cclibczfz7lvm8djggux4ge0qsc10w0c2p0sfndp21jj2stb0fz8zlin78loyhnu8w24a4iaqhe35kq-j7wea06nos9fancn427d33j9q0bd3gkzjev2mey6sbauvylleglhqwxszxjix7chrcy11hy7kt9baoc81p3w6bwv9wvj1m-6lyj5t1ddp27dwhpd5h515g429v7uoyidwch760l12rindpdnucw9stzjaagim5eg6ims5nn7087mz0w2dr3ctxmg8bwqz-1292knuaqlbft5qpt2v052tzybkr49c0w62ncbhxpq3m4rtddmedbuqv5kaxo18z5g4ax25fnthacydewokimrtc16rxyket-jm838cauntbkuk1ndapsf72lke42mcmymeyael8edevgtlkahtlykzz2xw150geepel5il6wv455f4sd8bnca3yph-adwjaq4fremnzpfp7nslep24zhy7mi97magmwl6g6qwj7m9csw1fe3nbhvwajkybd3k38c99a8i2u1h4gh7odlgez9y4veof1r-17j7ve6iycy9g27aatnlmrq2yug8r8iaw7622qnwea2q806a013cxljmiej884q2ogalfxcnmq5zwsqpbw1ezhggugfkv1eb-m32t7op9bqpt78t6l0efh5n4oz52ydz13wsc8j0sxbvncp349q7w73ubnimik0weies8s3c0cirihky053a0591aeoihdax-w5yill2e2ag7kbg3kfuuw4l21yhwmt6elfzwy4d4tgs4musd13hvwptokp0atw8x95dkui7vjogjowy9dz6dnfd46jgmuxw-69zvwno6aybr47rkgtsngb8yjtjw4gtwp1m0q6k6h943n9mw5rbe9nisphjtds1vzsvn5u5035coasb7buouqitsa3wklxird-mcpty0tsb5uevj1ma1x8hm8exblgm2u44xq6r0iv99ksl3r51a8zaj7o6vj5c46xwj2ldwjsv3q6qx3ipvv117wqm4jy9bkmtdkx-ss4syj44rcc6sb4rikeu0iffu9u7557ve91f6kjm8tkf1ofui

Of course, nothing is actually saved anywhere. The algorithm simply generates an output from what you type in, and when you close the web page, everything gets disintegrated. The only guarantee is that if you come back to the same location, you will always find the same combination of characters. As Basile has clarified on his website regarding the prospect of assembling a real Library of Babel, "It would have required longer than the lifespan of our planet to create, and more disk space than would fit in the knowable universe to store." Besides, the website has various limitations: it is only operable in English, and searches are limited to 3200 characters; the approximate contents of one page. That said, this does not make Basile's website any less than a marvelous portrayal of Borges' image that further challenges our perception of the contrast between discovery and invention, and fuels our understanding of language and its limitations.

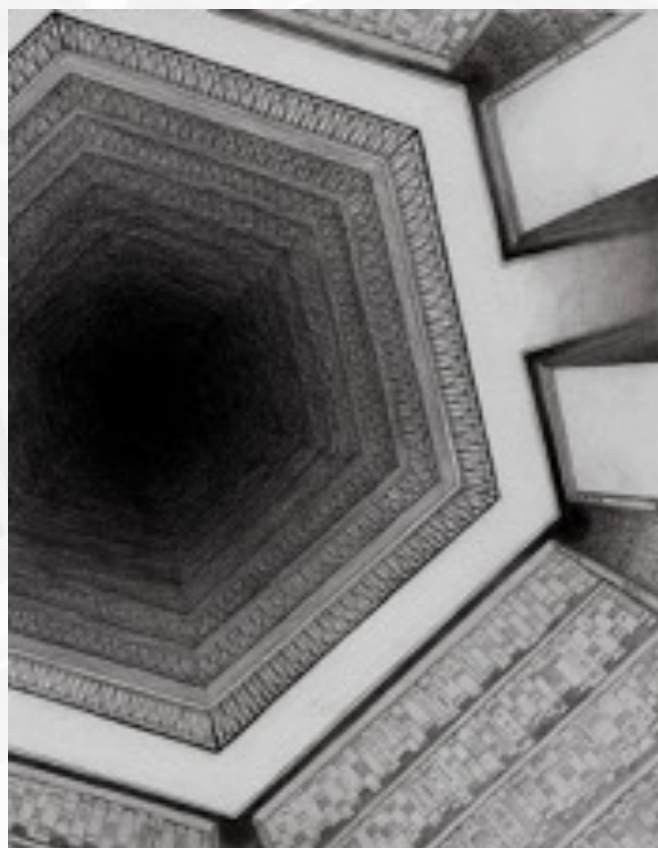
It is possible you now believe that a library with so much content – if it exists – would make an excellent destination for those looking for erudition and enlightenment. The irony here is that – although the Library of Babel would technically contain everything from art and literature to science, law, and all that is in between and beyond – being able to find any meaning in it is inconceivable. Firstly, the content of books written in gibberish will far exceed the number of books written in a correct, sensi-

ble language, making it almost impossible to locate the latter. Secondly, even if one was able to come across a book, or phrase, that made sense, they would not be able to tell if what is written is true or false; there is simply no key to aid in the verification of the data. Therefore, as spectacular as it sounds, the Library of Babel would be useless as a research tool, and getting stuck in it would soon enough turn into a nightmare of overwhelming illogicality, played on a loop, with no escape.

Fortunately, the human brain acts as the guide that allows us to distinguish right from wrong; it is the most knowledgeable librarian in the Library of Babel. It filters out the nonsense, uses judgment and rationalisation, and chooses to only speak out what deserves to be said with meaning and intent. It gives us the power to vivify all that exists – but isn't alive until it is said, written, or thought.

To conclude, one simply does not need a Library of Babel to find the answers. In a world where you can find every combination of letters, every story, every scripture, every promise, and every lie, the only meaning that matters is the one you permit. In a library with cosmic knowledge, the sole truth lies within yourself; you just have to search for it.

Endnote - I was inspired to write this article after visiting Basile's website (<https://libraryofbabel.info>), which is where I also got most of my references from. This article reflects my understanding of the topic, and hence it will remain up to you to shape your own perception of what the Library of Babel resembles; sensibly and symbolically.





“GEMS-GMU Future Scientists of the UAE”

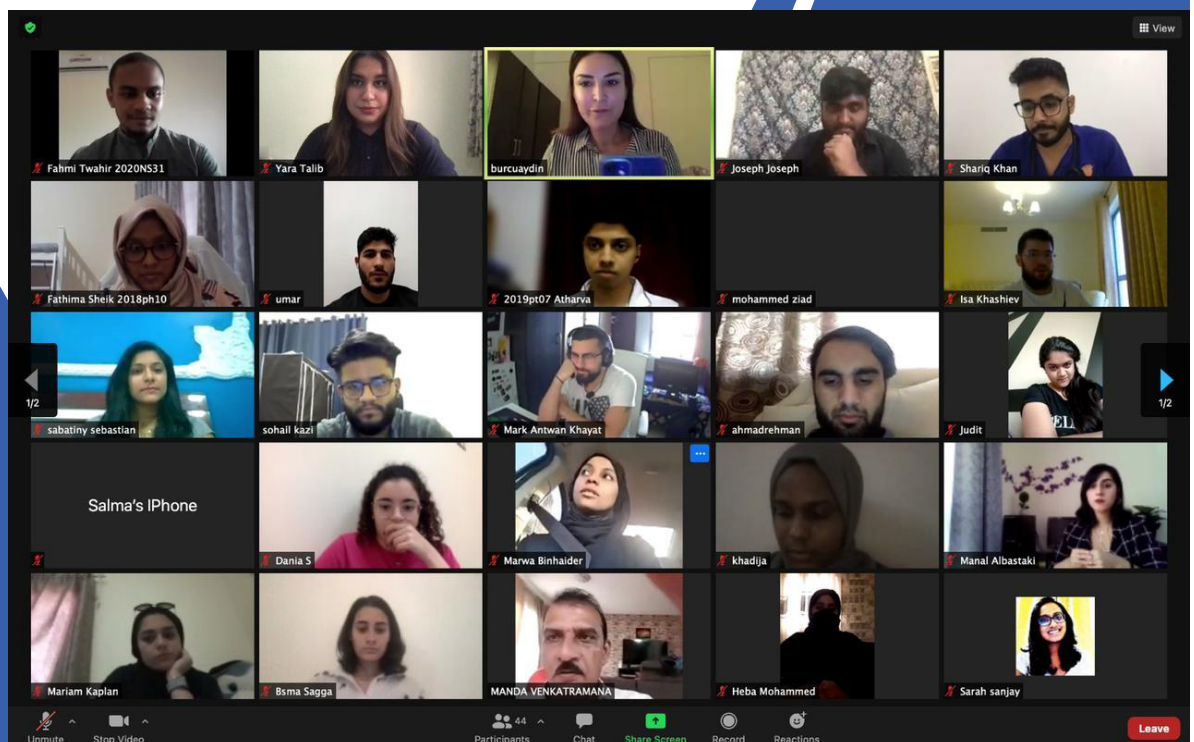


The second batch of the “GEMS-GMU Future Scientists of the UAE” Program was concluded through a colorful ceremony to celebrate the student’s journey of scientific discovery at the Thumbay Research Institute of Precision Medicine (TRIPM).

The aim of the “Future Scientists of the UAE” program is to provide an opportunity for high school students to focus intensively on biomedical research. The program is designed to attract talented and exceptionally motivated students and to nurture their interests in pursuing a career in biology and biomedical research. Students had an opportunity to work alongside TRIPM researchers to address the molecular basis of diseases such as cancer. Faculty mentors from colleges of Dentistry and Pharmacy participated in mentoring the students along with the TRIPM research mentors.

Student Council End of the Year Closing Ceremony

AY 2021-22



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