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Deans message

The Department of Life Sciences has, over the years, made significant strides in their efforts to nurture the budding scientists of tomorrow. Be it in through innovative seminars, guest lectures, certificate courses, e-learning modules or other related activities, the Department has always outdone itself to ensure that their students have holistic learning experiences in college. A noteworthy initiative that is extremely popular among the student body is their annual newsletter 'Biolink', the sixth edition of which I am proud to present to you all today.

This newsletter is a compilation of students' views on science, through the media of art, prose and humour. The Editorial Board comprising of both Faculty and Student Editors has worked relentlessly to bring out an edition that is both intellectually stimulating and creatively satisfying. We hope the readers will find a lot to learn from, ponder upon and enjoy in Biolink 2017.

From the Editors' Desk

The Department of Life Sciences has been successfully publishing BioLink for the past four years. This venture started in 2012 with the aim of showcasing the recent trends in the upcoming field of biotechnology, depicting the talents of our students and colleagues and to highlight the activities of the department in a precise and easily readable form. The great response from the readers in the past has inspired us to continue this venture. We believe that the students have done a great job in bringing out the newsletter. They have worked relentlessly to execute this challenging task and finally came up with this informative issue. We present BioLink 2017 with a hope that our readers will enjoy reading it as much as enjoyed compiling it.

Quick Facts:

When wet, a healthy strand of hair can stretch an additional 30% of its original length.

Can't Comb Your Hair? We Found The Exact Problem.

Many people struggle to get rid of the knots present in their hair. The fight to untangle the hair continues, until they get fed up and leave it the way it is. This extreme knotting of hair is known as 'uncombable hair syndrome' or even 'Struwwelpeter syndrome'. In the case of this syndrome, the comb does not stand a chance. The people who are affected have frizzy, dry hair that is generally light blonde with a characteristic shine. The hair completely resists getting tamed. These symptoms are more prominent in childhood and then ease over time. During adulthood, the hair can be styled more or less normally.

The phenomenon is extremely rare. However, there have been more than one hundred cases documented worldwide. Many people don't seek a doctor's help for this problem; hence very few cases have been documented. However, this syndrome affects only few families, hence it is a genetic disorder.

The scientists in Bonn have sequenced all the genes from those affected. After comparing the sequenced data in databases, the scientists have found mutations in three genes that are involved in forming hair.

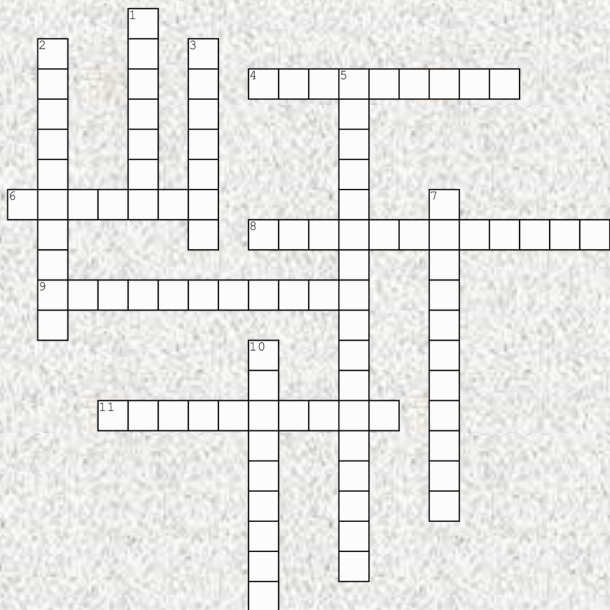
The changed genes bear the identifiers PADI3, TGM3 and TCHH. The first two contain the assembly instructions for enzymes, while the third, TCHH, contains an important protein for the hair shaft. In healthy hair, the TCHH proteins are joined to each other with extremely fine strands of keratin, which is responsible for the shape and structure of the hair. During this process, the two other identified genes play an important role; PADI3 changes the hair shaft protein TCHH in such a way that the keratin filaments can adhere to it.

The scientists in Bonn have identified the importance of the mutations on the function of proteins. If even one of the three components is not functional, this has fundamental effects on the structure and stability of the hair.

Mice in which the PADI3 or TGM3 gene is defective thus develop characteristic fur anomalies, which are very similar to the human phenotype.

Some hair anomalies are associated with severe concomitant diseases, which sometimes only manifest later in life. For those who are affected by Struwwelpeter syndrome, do not worry; this disease occurs in isolation of any other disease.

- Debarati Bhowmik (4BCB)



- Saptami Chincholi

Down

1. Reduces cardiovascular disease and mortality
2. Substances found in sub-terranean African mammals- prevent cancer growth
3. 'Dope fied' - coined to describe negative side effects of a drug
5. GFP (Green Fluorescent Protein) - first isolated from?
7. Used to protect the heart from a second heart attack
10. Proteolytic enzyme present in pineapple

Across

4. Comes from cancer of female egg and causes it to grow certain human characteristics
6. Enzyme - manufacture hypoallergic baby foods
8. common organic molecule-used as a photo-chrome
9. Herbs that helps in slowing down of the growth of cancer cell
11. Drugs that improve human cognitive abilities

Cross Word

Bacteria out of the safety zone: Destruction of biofilm

In general, bacteria have a system wherein they form a biofilm and resist the action of antibiotics within our body.

So ? Are you intrigued to know what a biofilm is???

Biofilms are clusters of microbes which stick either to each other or onto a basal surface which is then well coated with an extracellular polymeric substance like protein or DNA. This is a kind of rescue mechanism followed especially by bacteria to protect themselves from antibiotics.

This makes it harder to treat bacterial infections as they are resistant to the body's own host defense system.

Based on a recent study by scientists in the USA, this biofilm formation has made it difficult to treat around two-third of the bacterial infections in the world.

So in order to overcome this issue scientists from IISc have successfully demonstrated that biofilm can be destroyed by using antibiotic doses coupled with induction of shock waves. The model they were experimenting on was mice. Scientists made use of a device called handheld shock wave generator. It is a diaphragm less shock tube which produced pulses of pressure and energy. This device was kept close to the site of infection (thereby prevents tissue damage) and energy of 0.3 calorie was applied for a period of few 100 micro-seconds. So here, in a period of 3 days mice was subjected to a condition of shock wave plus antibiotic ciprofloxacin. On the other hand, the control group was subjected to antibiotic alone. It was observed that the first set of mice recovered from weight loss, bacterial concentration was less whereas second set bacterial concentration remained the same. Bacterial colony variation was studied by scientists using scanning electron microscopy and crystal violet staining

This showed that shockwaves increased bacterial colonies' sensitivity to antibiotics in the range of 100 to more than 1000 fold.

This whole new technique is still in the experimental stage. Once it's approved, it will be a great method which could bring an end to a lot of bacterial infections faced by human beings.

-Varsha R

***"More than
99 percent of
all bacteria
live in Biofilm
communities"***

My name starts with 'N' and ends with 'E',
Nature they call me,

Is there anyone who listens to my entreaty,
Oh! God please help me,

Humans of the world as they grow, want to
destroy me more and more,

May be I am really the voice and you are foe,
Come on stop it,

If you continue this, your in
for a great surprise

By the time you try to save me, it is too
late for you to realize,

Please! Preserve me and maintain me for the
future generations,

Otherwise, I will have my own conclusions.

- K Dharani Shree (4BCB)

The Voice of Nature

Alzheimer's and Sniffing?

According to a new research article published in *Annals of Neurology*, an individual's olfactory sensations could be helpful in determining the chances of the onset of Alzheimer's. It is the most common form of dementia which affects around 5.4 million adults in the US alone and is expected to reach 13.8 million by 2050, unless new preventive methods are discovered. At present, it can only be detected and diagnosed through a series of examinations and cognitive assessments. Dr. Mark Albers, Principle investigator of the Department of Neurology, Massachusetts General Hospital, and team, explains that the disease can negatively influence the olfactory senses and brain circuits and such neurodegeneration can occur way before memory loss sets in. This had put an enquiry whether the onset of the disease could be predicted by the analyzing the sense of smell.

Their study included 183 elder adults, all of them were a part of ongoing studies at the Massachusetts Alzheimer's Disease Research Center. Out of these patients, 70 had normal cognitive functioning, 74 had subjective cognitive problems (this is where patients complain of memory and thinking problems, but these can't be diagnosed with cognitive tests), and 29 had mild cognitive impairment (MCI).

Each participant took part in four separate tests created by the MGH team assessing their olfactory senses: the Odour Percept IDentification-10 (OPID-10) test, the Odor Awareness Scale (OAS), the OPID-20 test, and the Odor Discrimination (OD) test.

The OPID-10 test required subjects to smell 10 different odors - including menthol, clove, strawberry, smoke, and lemon - for 2 seconds and report whether each scent was familiar. They were then required to choose one of four words that best describes each odour. In the OPID-20 test, they were asked to smell the same 10 odors from the OPID-10 test, also some others which include banana, garlic, cherry, peach, and chocolate. Participants were asked whether they were given with any of these odors in the OPID-10 test, as a way of understanding their recalling capacity. Depending on their replies, they are given a **percepts of odor episodic memory (POEM)** score. The OAS is a questionnaire used to determine participants' attention to odours in the environment and how scents affected their behavior and emotions, while the **OD test** assesses participants' ability to repeatedly differentiate between two different odours.

Participants who didn't perform well on the OPID-20 test were more likely to show **thinning in two regions of the brain: the hippocampus and the entorhinal cortex**. Such brain changes are generally associated with Alzheimer's disease. The researchers also found that they were able to distinguish between participants with normal cognitive functioning and those with Alzheimer's using POEM scores, the lower scores being linked with greater cognitive degradation. To account for this variation, the scientists compared the POEM scores of the groups with normal cognitive function and mild cognitive impairment with predicted scores, based on their grades in the OD and OAS tests, and confirmed that it helped in better identification of individuals being good or bad at recognizing odors.

He says, *"It is well recognized that early diagnosis and intervention are likely to produce the most effective therapeutic strategy for Alzheimer's disease-preventing the onset or the progression of symptoms."*

After genetic analysis, the team observed that adults who had poorer POEM scores had more chances of possessing a variation of the APOE gene known as APOE e4 which is linked to increased risk of Alzheimer's. These participants also showed gradual thinning of the entorhinal cortex. Still, these experiments are needed to be conducted on a larger scale, so that the statistics are more sophisticated and advanced, giving everyone the idea of early identification of Alzheimer's through olfactory senses.

Quick Facts:

Alzheimer's disease is the 6th leading cause of death in the United States.

Platypus Venom – The New Cure For Diabetes?



The platypus is already well known to be a strange animal – it is one of the only 2 mammals to lay eggs. But did you know that the male platypus is also venomous in nature?

The male platypus has a half-inch long spur at the heel of each rear foot. This spur is capable of releasing venom

when stabbed into the skin. Venom is made by the crural glands, a sweat gland co-opted by evolution ,that swells with venom during mating seasons.

Although this venom has been found to be non-fatal for humans, the pain that is derived from the platypus stabbing its spur into your skin is so severe that it requires manual disengagement. But morphine is not enough – local anaesthesia is required to numb the pain. In addition, there is no anti-venom currently known.

Platypus venom may have a benefit though. Researchers have found that platypus venom may contain a hormone that can help cure diabetes. The hormone is known as GLP-1 (glucagon-like peptide-1) and is also found in the gut of humans and other animals. It promotes insulin release, thus lowering blood glucose levels.

Normally, GLP-1 degrades very quickly. In people with type 2 diabetes, the GLP-1 triggers a short stimulus which is insufficient to maintain a blood sugar balance. Instead platypuses are found to have a longer lasting version in their venom. Scientists have found that the degradation of GLP-1 occurs with a completely different mechanism in platypuses. It has dual function – being present in both the gut and in the venom. It has been hypothesized that the presence of GLP-1 in venom has lead to its evolution and therefore, stabilisation. This long-lasting version of GLP-1 in platypus venom could mean a lot for the future of diabetes.

The platypus is the state animal of New South Wales (NSW).

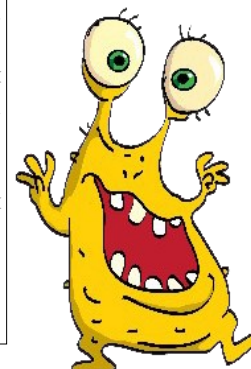
The platypus sleeps on average up to 14 hours per day.

-Niketa Nerurkar (4BCZ)

S V F W H T E K T D P L M J O V L H D L
A I T T I U M W N H M D P M A E J S U C
L B D R P B I Z O F V W V N Y X J T V Z
M R P I Y Y D L W L I H R U P F B R U M
O I G C W B M A W X B E B M C F Z E E Y
N O W K G U B C B Y M A E U O Y G P Y C
E C G E D L N T A Q Q G C D F W S T R O
L H Q T L R T O C H N Z C H E B K O X P
L O N T N A G C I P C R D J I M H C Z L
A L D S N B D O L P V C G W H A Q O B A
T E T I E Y C C L N A H W X B R T C L S
Y R A A V I V C U Y W R C M D H R C R M
P A X P B Z R U S M T Z R S E C S U S A
H E N S K Z L S B J N C H W B B Q S T H
I K U I F H K L R D D H T M E V B L S O
U H S T R D R A E S G P Q D U S K A V M
E Q B T K G A C V V E F U G L C G C E I
Q Q Z A F G K T I N G A C W Q H X T R N
C Y X C H F K I S J I J R J V P X I Z I
X C L I O R N S C Y M P X R X U M S N S

Bacterio! (word search)

Bacillus brevis
Lactococcus lactis
Salmonella typhi
Vibrio cholerae
Wolbachia
Streptococcus lactis
Rickettsia psittaci
Mycoplasma hominis



- LakshmiNayayana (4BCB)

Quick Facts:

The American Cleaning Institute (formerly The Soap and Detergent Association) has compiled this historical and technical record on the role of sanitation, medical advances, cleanliness and hygiene on public health and infection control.

Toxicity of Disinfection by-products

Toxicity is the degree to which a substance can damage an organism and also effect the substructure of the organism (cell (cytotoxicity), liver(hepatotoxicity), etc).

One such unintended consequence of trying to kill pathogens in drinking water and swimming pool water are Disinfection By-Products(DBPs) which lead to toxicity at a different level.

DBPs are formed by the reaction of disinfectants such as chlorine, chloramines, ozone or carbon dioxide with natural organic matter present in the water . More than 600 DBPs have been identified so far. Popular DBPs are compounds like Trihalomethanes(THMs) and Haloacetic acid(HAAs). THMs include chloroform (In 1976, chloroform was shown to be carcinogenic in rodents.), bromodichloromethane (BDCM), dibromochloromethane (DBCM) and bromoform. HAAs include nine substances. The most common being dichloroacetic acid (DCAA) and trichloroacetic acid (TCAA).The volatile and skin permeable DBPs are Trihalomethanes(THMs) and Haloketones. High nitrogen content of organic matter forms nitrogenated species like haloacetoneitriles, nitrosamines, N-nitrosodimethylamine, chloral hydrate and chloramines in swimming pool water.

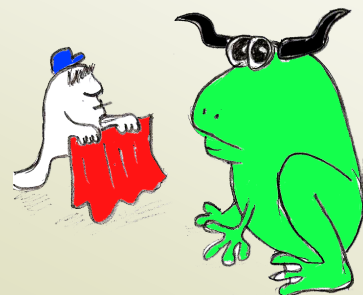
The multivariate linear regression analysis of the concentrations observed shows that the levels in total and specific HAA can be predicted from the THM content.

Its estimated that swimming in chlorinated swimming pool waters is carcinogenic to human health and can induce chromosomal aberrations, DNA damage and other lethal mutagenic deformations. The disinfection properties of chlorine are linked to its oxidant capacity. Hence chlorine reacts with the organic matter present in the water and leads to the formation of DBPs. Inhalation and dermal absorption of THMs are the primary routes for the exposure to DBPs during swimming than to oral expoures. This leads to higher blood level. Chronic exposures through different routes can lead to bladder cancer.

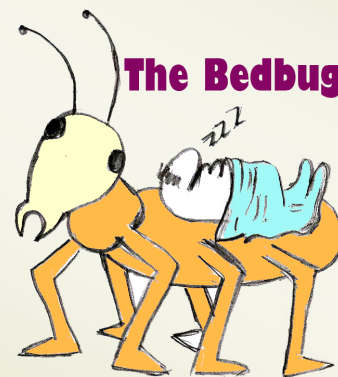
- Moulisha Roy(4BCZ)

Wonders of Genetic Engineering

The Bull frog



The Bedbug!



The Spider Monkey



- Sneha K (4BCZ)

DNA Origami: Scaling up the future.

When people talk about origami, we picture a beautiful paper swan or even a paper plane. But when you associate DNA with origami, it becomes harder to imagine. Which paper swans have not been attempted, DNA origami has been used to create Van Gogh's complex painting, "The Starry Night". Paul Rothemund, the original creator of this technique, along with a colleague Ashwin Gopinath of California Institute of Technology, have created this masterpiece to show the first application of this concept in 2016.

The original concept came about in 2006, where Rothemund used single stranded viral DNA along with small, complementary strands of single stranded oligonucleotides that he called "staple DNA" to create 50 billion copies of smiley faces in one drop of water. This concept seems very basic on paper, which includes designing the staple DNA on a computer program based on the template strand taken and shape to be created, then ordering artificially synthesised DNA that is now quite easily available from laboratories and then putting the template and staple DNA together in optimum conditions to get the required shape in about 4 hours.

But this technique also had its pitfalls. Some questioned the applications of such a technique, problem of scaling up, while some others asked how the shapes in a solutions could be held on a solid surface. Overcoming these problems over the past ten years, the scientists at Caltech have come up with a method to stabilise the DNA on silicon chips, essentially creating a gateway into the future of DNA chips which could control DNA- based supercomputers. For now, "The Starry Night" shows how they have precisely placed the DNA onto the plate and attached fluorescing molecules called Photonic Crystal Cavities (PCCs), which show how they can use this technique as a "pegboard" for molecules.

Another application of DNA origami is a technique known as "tiles" of DNA origami, which are essentially tiles of double stranded DNA with complementary "bridge" free ends that could attach to one another based on the input command provided, like the 0s and 1s of binary code and can "count". This method could be the basis of self- assembled circuits and a DNA supercomputer. Another application is to create drug carriers, by making DNA origami "boxes" that can carry the drug molecule inside it.

Other than these techniques, the limits are endless, going as far as one's imagination. Maybe, as Rothemund envisions, one day we may be able to design molecular computers using electronic computers and vice versa.

- Nandini R

"Science is a way of thinking much more than it is a body of knowledge"
-Carl Sagan

Nobel Laureates (Please unscramble the words below)

- | | |
|---------------------|--|
| 1. UALP CHEHILR | "in recognition of their work on immunity" |
| 2. PNYOET USOR | "for his discovery of tumour-inducing viruses" |
| 3. RKAL NSENEADRITL | "for his discovery of human blood groups" |
| 4. ROBTRE DEASRWD | "for the development of in vitro fertilization" |
| 5. RHAGEDR AGDKMO | "for the discovery of the antibacterial effects of prontosil" |
| 6. DANORL SRSO | "for his work on malaria, which has laid the foundation for successful research on this disease and methods of combating it" |
| 7. REBORT KHCO | "for his investigations and discoveries in relation to tuberculosis" |
| 8. SUMUSU NTWAAEOG | "for his discovery of the genetic principle for generation of antibody diversity" |
| 9. EALYSTN SNRRPEUI | "for his discovery of Prions - a new biological principle of infection" |

- Vivek P(4BCB)

Answers:
1)PAUL EHRLICH 2)PEYTON ROUS
3)KARL LANDSTEINER 4)ROBERT EDWARDS
5)GERHARD DOMAGK 6)RONALD ROSS
7)ROBERT KOCH 8)SUSUMU TONEGAWA
9)STANLEY PRUSINER

“The good thing about science is that it's true whether or not you believe in it.”

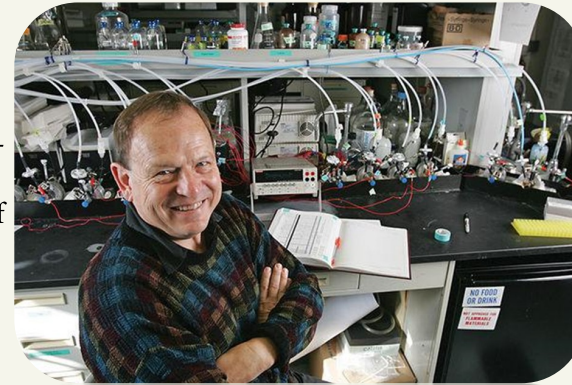
— Neil deGrasse Tyson

Exoelectrogens

Ever wonder what happens at the core of all vital metabolism – Respiration? Electrons get transferred through a series of substances present in a specific connection known as “pathways”. When it passes through those substances, on a molecular level, energy is expended to those chemical substances during the electron's stay. This energy is obtained from various sources initially (sunlight in plants, for example). This entire process happens in mitochondria of cells.

Now, one curious thing remains. What are those sources or energy for the electron? Can they be anything? Is it artificially replicable and changeable?

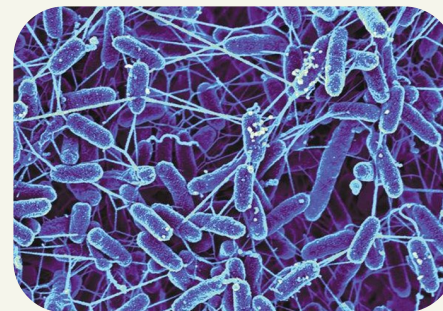
Dr. Kenneth Nealson of University of Southern California answers those questions. He and his team discovered bacteria that “breathes” rocks! The completion of that electron's cycle in a pathway is when the electron is deposited onto a chemical known as acceptors. The bacteria Dr. Kenneth Nealson discovered and named as *Shewanella oneidensis* deposits that electron on rocks. The ‘charging’ of that electron is done by reducing oxides in rocks – like calcium oxide is made into calcium and oxygen and that energy is taken by the electron and used to ‘respire’. Basically, we breathe air and it breathes rock.



Dr. Kenneth Nealson

The Discovery

In 1982, Dr. Nealson was a professor at Scripps Institution of Oceanography. He then heard about a strange phenomenon at Lake Oneida in upstate New York. During spring, the snowmelt the waters allow the manganese in water washed from around into the lake to combine with oxygen in air to form oxides of manganese, which sinks to the bottom of the lake. But, that formed manganese oxide was vanishing at 1,000 times expected geological rate! He quotes “if rates were really fast, I knew it had to be due to biology”. He suspected that bacteria in the lake was processing that manganese oxide and proceeded to research the situation.



Shewanella oneidensis

After two years of research, Dr. Nealson succeeded in identifying that manganese thief: *Shewanella*, “a bacterium that functioned unlike anything that we know” he said. He says, “I called all my students into the lab and I said, ‘This is a very, very important organism to understand. Nobody's going to believe it. It's going to take us 10 or 15 years to convince the world it's true’.”

- Sounthira Deepan (4BCB)

Say hello to milk chocolate!



Do you love chocolate? Of course, you do! We all must have heard that dark chocolate is healthier than milk chocolate and if you're like many people, you would prefer the latter, which is sweeter and less bitter. This would mean that you are missing out on the health benefits of dark chocolate. But worry not because researchers have just discovered a method to give milk chocolate the same nutritional gain as the dark variety. What's even better? This process doesn't change the taste!

As healthy as it is said to be, we should not be eating too much chocolate - after all, it contains fat and sugar. But dark chocolate does contain antioxidants that improve heart health. Antioxidants stop a chemical reaction in the body known as oxidation which can damage cells, too much of which could also lead to cancer and heart disease.

All chocolate is made from cocoa beans, which are broken down to yield cocoa solids and cocoa butter. If you combine these two, you would get unsweetened chocolate. Adding a dash of sugar is what you find as dark chocolate. Milk chocolate contains these two components but it has more sugar than dark chocolate. It also has milk, which makes it lighter in colour and smoother in texture. But as it contains less cocoa, it means it also has fewer antioxidants.

Scientists have not been able to add antioxidants to milk chocolate without altering the taste. But Lisa L. Dean from the U.S. Department of Agriculture at North Carolina State University in Raleigh have crossed that problem. So what is the secret? Peanuts!

Dean and her team were looking for a way to use up peanut skins - most peanuts are used to make peanut butter; the skins end up in landfills. So they decided to extract the antioxidants from the skins and maltodextrin was added to mask the bitter taste. This mixture was then added to milk chocolate which not only raised the antioxidant levels, but also did not change the taste.

To confirm the result, the team tested 100 volunteers with three pieces of milk chocolate. Only one piece in the three contained the peanut-skin extract and maltodextrin. 8 in ever 10 volunteers did not taste any difference between the regular and altered milk chocolate. This new research could reduce food waste as well as create a new health-boosting food ingredient. Now you can have milk chocolate without guilt (in moderation)!

Sangeeth Sivan (4BCB)

*The **smell of**
chocolate
increases
theta brain
waves, which
triggers
relaxation.*



Quick Facts:

Sweat itself is odorless. It's the bacteria on the skin that mingles with it and produces body odor.

The Microscopic Villain

Prologue:

Alan: This can't be happening to me. I am not going to die so soon. I have just started to enjoy life. I am only 23!!! I am about to get a job!! My first salary!!

What had happened to him? What was it that was taking away his life? What was it that was about to pour cold water over his dreams? Was it a small mistake due to carelessness or was it something else?

Five years back

Scene 1:

Black Rose Tattoo Parlour

Shervyn: O! M! G! Wowww!! Awesome!! Have to check it out!!!

Enters

Vanda: Heyya mate! Welcome to Black Rose!!! You have just come to the best tat too store in the world!! Love ain't gonna last long but our tattoos definitely do!! That is our slogan!!

Shervyn: Oh nice!!! Er... how much will it cost?

Vanda: Ohhh!! You don't get much pocket money do ya? Don't ya worry; this store has been made for kids like you. Our tattoos are very cheap but the best. It is 300 for a temporary tattoo and 500 for a permanent one!!!

Shervyn: What!!! I must be dreaming!! Please, I want a permanent tattoo.

Vanda: Alright, just hold tight. Remember, no pain no gain.

Shervyn: Wait!!!! Is that needle sterilized? Please sterilize it in front of me!!!

Vanda: Oh my!!! Of course it is sterilized!!! You are doubting the best tattoo store in the world?

Shervyn: Hehe!!! Not at all!!! Carry on!!

After the tattoo is done,

Shervyn: It looks so nice!! Here you go!!(Gives her the money)

Vanda: Dayyum!!! You just got served, kid!!!! Thank you for visiting us!! Hope to see you soon!!

Scene 2:

McDonald's

Katherine: Hi!! That is a nice tattoo!! Where did you get it done from?

Shervyn: Black Rose. It is an awesome parlour!! You will not believe the price at which they made this wonderful tattoo!!

Katherine: Extremely costly, right?

Shervyn: No! Just 500!!

Katherine: What??? Why did you go to such a cheap store??

Shervyn: You think I am made of money?

Katherine: I have heard a lot of rumours on cheap tattoo stores. They tend to use infected, unsterilized needles. You should do a blood test immediately.

Shervyn: Oh come on!!! Just because it is cheap!! What do you think I will get? AIDS?

Katherine: Please, I am begging you, do a blood test. I know you will not get AIDS or something like that but still, it is better to be sure.

Katherine: Ok I just hope my fears turn out to be false.
Unfortunately, Katherine’s fears turned out to be very true. The tattoo artist had used an unsterilized needle. The needle had already been used on an HIV carrier and was already contaminated with the HIV virus. Shervyn turned out to be HIV positive and was now an HIV carrier.

Shervyn: This is impossible!! This is not happening!! There must have been a mistake in the report. I will ask them to rectify it.
There was no mistake in the report. It was extremely shocking but true!! Shervyn was in total denial. He started avoiding his friends and family. He knew what would be his fate 5 years from now.

Shervyn: I am an HIV carrier!!! I feel so lonely!!! I need some friends!!! Friends who carry HIV too!!! I need to find out!!! If there are none, I will make some!!!

Scene 3:

Silverbird Cinemas

Deborah: Yeahhhh!!! The movie is starting!!!
Alan: Owwww!!! Something jabbed my arm!! It is bleeding!!
Deborah: Oh God!! It is a needle!!
Alan: Who in their right mind would stick a needle on the back of a seat? Silly kids!!
Deborah: Are you alright?
Alan: Yes, it is just a needle. (Sees her worried face)Please don’t worry!!!
Shervyn (side): Yes, yes it is just a needle, my friend, just a needle. A needle filled with HIV!!!! Nothing to worry at all!!!!
5 years later,
Alan: How did I get AIDS? HOW??? This cannot be happening!!! This cannot be happening!! This cannot be happening to me. I am not going to die so soon. I have just started to enjoy life. I am only 23!!! I am about to get a job!! My first salary!!
Explanation of the symptoms of AIDS and the incubation period

Part 2:

We saw a heart-touching story of what AIDS can do to a person both physically and mental-ly. The worse part of AIDS is that you only get to feel it after 5-10 years and once it strikes, there is no cure. It slowly weakens you and ultimately takes away your life from you!! So what exactly happens at the cellular level? How does this microscopic villain HIV get inside us? Why doesn’t our immune system fight against it?
In a capillary,
HIV virus: Hi!!
T-lymphocyte: Hi!! Who are you? You seem to be part of this body but I don’t think I have seen you before.
HIV virus: Oh that is because I always stay in another capillary. I just decided to shift my location a bit. You see I don’t get enough oxygen there.
T-lymphocyte: Ohhh!! I see!! I am a T-lymphocyte.
HIV virus (whispers): Just what I needed!!! **(Aloud)** So we can be friends?? I too am a T-lymphocyte (extends her hand)

“ **Similar to fingerprints, everyone also has a Unique Tongue Print** ”

Quick Facts:

*All of
the bacteria in
our body
collectively
weighs about
4 pounds.*

T-lymphocyte (shakes her hand): Please feel at home!!!
HIV virus (not letting go of the hand): Ok take a look at these! (Shows her the viral DNA)
T-lymphocyte: I know it!!! Those are DNA strands!!
HIV virus: Please help me to replicate them!!! You see I never got proper oxygen, I feel too weak.
T-lymphocyte: Ohh!! Poor you!!
 After a few years,
T-lymphocyte: I don't understand why I am feeling so weak!!! Oh God!! I can not even get up!! What in the world is this? (About to faint when she sits down)
HIV virus: Relax!! It happens when we don't get proper oxygen. Come on, replicating these strands will make you feel better!!
 After some time (talk on AIDS is going on),
T-lymphocyte: I am extremely sorry!! I don't have any more energy!! I feel weak!!! I... (She faints)
HIV virus: Of course, you will feel weak!! Now that my work is done!! Sleep, lympho, sleep!! Its time you took a little rest!! You work very hard all day!! Well, now to instigate our B-lymphatic friends!!!
 There had been too many HIV viral strands produced which totally weakened all the T-lymphocytes. HIV knew that the immunity of the body was at stake. It now decided to destroy the B-lymphocytes so as the body will have zero immunity.

Scene 2:

B-lymphocyte: Hi!! I have not met you before.
HIV virus: No, you have not. I too am a B-lymphocyte like you (holds out her hand), I stayed in another capillary but oxygen deficiency moved me here. I received little oxygen. I am too weak to replicate my DNA. Please help me to replicate my DNA.
B-lymphocyte: Oh sure!! Please take rest!!!
HIV virus: Enjoying your life here?
B-lymphocyte: Yes!! (Clutching his head), oh my head!! I feel so terribly weak!!! I can't even produce antibodies!!! Oh!! I am sick!!!
HIV virus: Awesome!!! I can't believe it!!! I just outwitted the smart lymphocytes!!! I doubt if any other virus has been able to do this!!!

Scene 3

Typhoid bacteria: Now this is strange!! All the leucocytes are sleeping!! No response at all!! They usually start their phagocytosis business as soon as we enter.
HIV virus: They will never wake up, Salmonella!! Guess what? I have put them to permanent sleep!! It is a golden opportunity for you!! Start working immediately!!!
Typhoid bacteria: Oh hi HIV!! I knew that you were brilliant but not so much that you could outwit these smarties!!!

HIV virus: Have no fear while HIV is here!! Go and infect to your fullest!! Golden moment!!!

Typhoid bacteria: You said it!!! I need to inform all our bacterial and viral friends!!! We can have a party here!!! I doubt if the scientists will ever find a cure for this!!! Did better than H1N1! Let us call everyone!!!

HIV virus: Ha!!! This is just the starting!!! Isn't it strange that these powerful humans with their marvellous brains lose in front of microscopic creatures like us? All the harmful pathogens enter.

Cornyeobacterium: Oh my!! Finally a diphtherial treat!!! These leucocytes were always driving me out!!!

H1N1: Ok, I accept that HIV is truly the ruler of all of us!!! It just did what we could n't!! It will probably take years for the scientists to come up with something against us!!!

HIV: And even if they do, our work will be done!!!

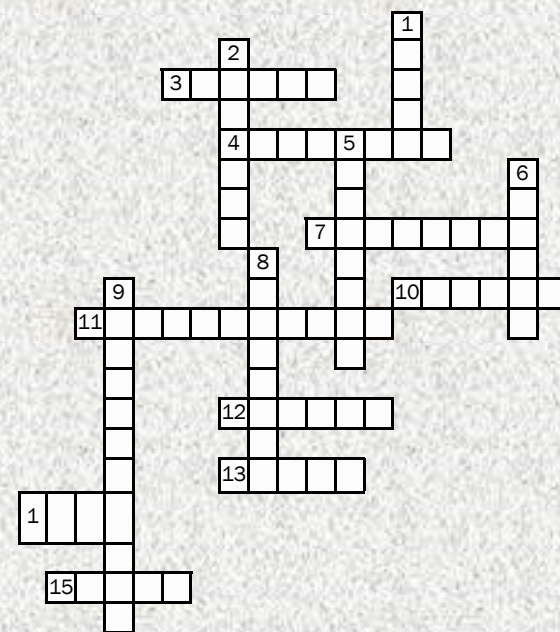
Typhoid bacteria: Long Live the Microscopic Villains!!!!!!

The End

-Pallavi Sengupta (4BCB)

Name The Scientist!

Which influential scientist is responsible for these discoveries?



Answers –
Down: 1.Hooke 2.Fleming 5.C.Chargaff 6.Jenner 8.Griffith 9.Leeuwenhoeek
Across: 3.Mullis 4.Melischer 7.Franklin 10.Sanger 11.Mitchinkoff
12.Lister 13.Chase 14.Koch 15.Avery

Down

1. Discovery of the microscope
2. Discovery of penicillin antibiotics
5. Determination of equal base ratio
6. Discovery of vaccines
8. Proof that DNA is a molecule of inheritance
9. Discovery of bacteria

Across

3. Drastic improvement of the PCR
4. Isolation of DNA
7. Use of X-ray diffraction to determine the double helix structure of DNA
10. Sequencing of DNA by dideoxy method
11. Discovery of phagocytes
12. Discovery of antiseptic surgery
13. One of the scientists that first proved that DNA was the genetic material of the cells
14. Creation of a set of postulates that described the causative relationship between microbes and disease.
15. Discovery that DNA is the material of which genes and chromosomes are made of

- Niketa Nerurkar (4BCZ)

Quick Facts:

The Madagascar periwinkle is the source of drugs used to treat diabetes and certain cancers, such as Hodgkin's disease and acute leukaemia.

Medicinal Herbs, Antibacterial Drugs and Drug Resistance:

- Medicinal plants have a large variety of importance in the field of medical science. These plants have been in use since time immemorial. These plants are used to not only cure diseases but to also help our body in preventing them. Herbs such as tulsi, turmeric, neem among many others, help in the cure as well as prevention of many dangerous diseases with lesser adverse effects. Compounds extracted from natural herbs are also employed in the design of synthetic drugs and medicines.
- Antibacterial drugs can harm pathogens in many ways. Drugs like Pencillin, Cephalosporins, Vancomycin and Bacitracin have a high therapeutic index as they target structures not found in eukaryotic cells.
- **PENCILLINS**:-Penicillin was discovered by Alexander Fleming in the 1920s. Pencillin kills bacteria even in the absence of autolysins and murien hydrolases. Pencillin stimulates special protein called bacterial holins to form holes or lesions in the plasma membrane of the bacteria, leading directly to membrane leakage and death.
- **CEPHALOSPORINS**:-They contain a Beta-lactam structure. This is a second generation drugs. developed after the first generation, have improved effect on the gram negative bacteria with some anaerobe coverage.
- **VANCOMYCIN**: It is a glycopeptides based antibiotic produced by *Streptomyces orientalis*. The antibiotic has a bactericidal effect on micro-organisms belong to genera of *Clostridium*, *Bacillus* and *Enterococcus*.

- Shincy Mary Shaji (4BCB)

- Over 10^{16} human immunodeficiency virus genomes are produced every day, consequently resulting in the production of 1000s of viral mutants (by chance) every day that are resistant to every combination of antiviral compound in use or in development.
- *Magnetospirillum magneticum* is a species of bacteria which actively takes in iron, converts it to magnetic magnetite, aligns it like a back bone along its body and moves through the atmosphere with the help of magnetic fields.
- The smell of the first rain which we all enjoy is caused by the species of bacteria known as *Actinomyces*.
- It's very hard to kill yeast. You can starve it, dry it out or even freeze it. Give it a little bit sugar and water and bam... booz... they're as active as though they were never starved or frozen.
- One spoonful of *Clostridium botulinum*, equally distributed, can kill the entire population of the USA.
- MDR-Tb is an acronym for Tb bacteria that doesn't respond to standard treatment and is found in 109 countries according to WHO.
- The Rotavirus is a deadly virus that causes gastroenteritis and is known to have killed 215000 children (below the age of 5) in the year 2013.
- Once you've had chicken pox, the *Varicella zoster* virus remains in your body (forever) in a dormant stage in the nerves near the spinal cord.
- The influenza virus is known to have killed more people (30 million) in 1918 than the first world war (10 million).
- The *Candida* species of fungi are known to be natural inhabitants of the human oral cavity that become harmful only when the immunity is compromised.

- Rishi Rajesh (4BCZ)

Interspecies Organ Regeneration

Our knowledge and ability to use stem cell technology has been growing in recent years. Principal studies have shown that it is possible to grow and successfully transplant organs of one species in the body of another. Researcher Hiromitsu Nakauchi and colleagues were able to demonstrate that mouse pancreatic islets grown inside rats and transplanted into diabetic mice could survive and function normally for prolonged periods of time. The team injected pluripotent mice stem cells into embryonic rats that were bred to be incapable of growing their own pancreases. Once the rats were adults, their pancreases, which were comprised mostly of mouse cells, were transplanted into diabetic mice. The transplanted organs, with immunosuppression applied only in the first five days after the transplant, were able to sustain blood glucose levels in the diabetic mice for over a year!

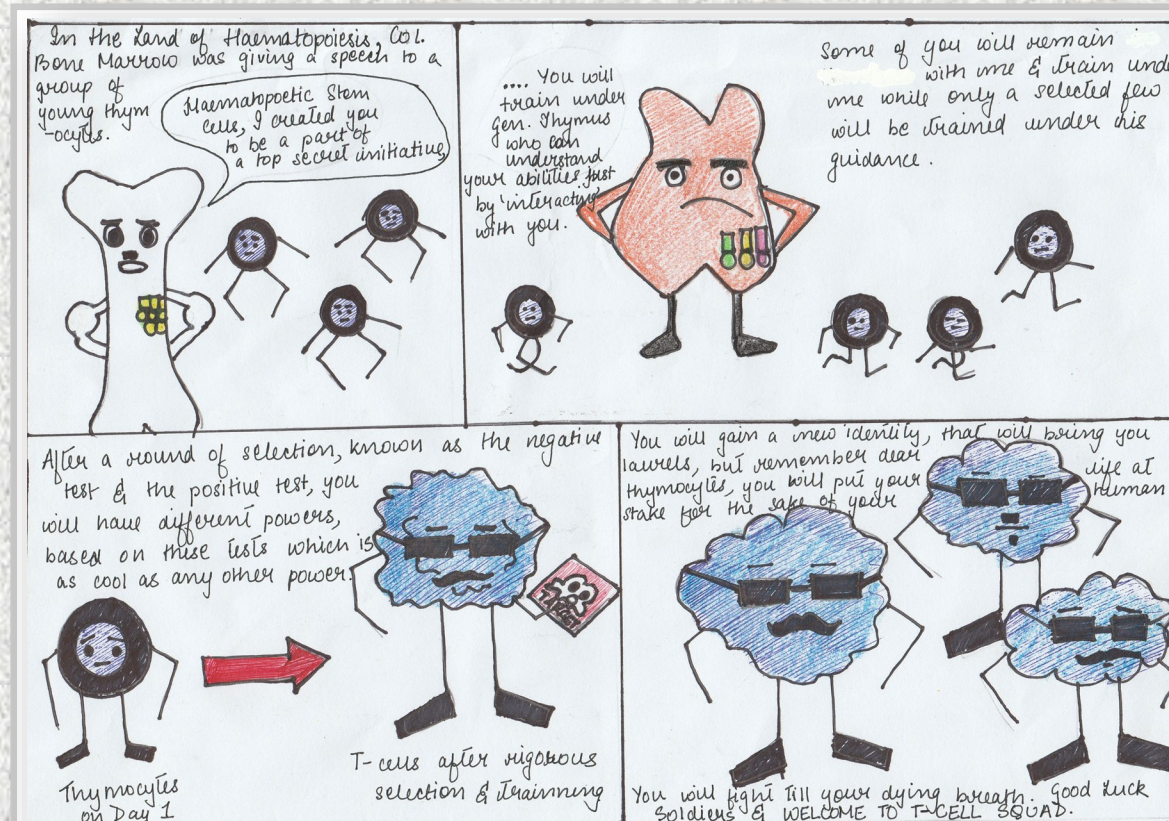
This study could become a viable solution to the problem of organ donor deficiency. This is especially relevant since organ transplantation “remains the only cure for a growing number of patients suffering from a broad range of debilitating and fatal diseases”, as researchers write. “An increasing clinical burden with continued donor deficiency means that, for example, over 76,000 patients in the U.S. are currently waiting for a transplant operation.”

Applying this study on humans, is of course, a little far-fetched. For human organs to be grown, the host should be genetically and thus evolutionarily related to human beings. Scientists were able to confirm that pluripotent stem cells have the potential to produce replacement cells and tissues of an unlimited quantity. Moreover, they managed to prove that these can survive, normalize, and function long after transplant. With continuous study and research, it remains only a matter of time before the method could be adapted for human application.



An adult human ear successfully grown on the back of a rat using stem cells by the scientists of University of Tokyo and Kyoto university.

- Rohan kalappa (4BCZ)



- Aatrayi Das (6BCB)

T-Cell Journey : A life of Secrecy

Glimpse!

