BioLink

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A DEPARTMENT OF BIOTECHNOLOGY INITIATIVE

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EDITORIAL COMMITTEE

STAFF EDITOR: Dr. Suma S

STUDENT EDITORS:
Aparajita Chatterjee
Nisshtha Khattar

INSIDE THE ISSUE

DEAN'S MESSAGE

I understand that the department of Biotechnology is coming out with the annual newsletter, BioLink, for the fourth consecutive year. The department of Biotechnology being one among the youngest departments in Christ University has shown consistent progress since its inception in 2007 and has conducted innovative seminars, guest lectures, certificate courses and innovative activities for the students to enhance their learning beyond the curriculum. Being a young branch of science, biotechnology offers great scope for talented and interested students to take up ventures both in industry and research. Mandatory internal and external projects help the students to get a glimpse of the research activities going on in industries and advanced laboratories. I hope the newsletter will serve as a platform to our budding biotechnologists to make fruitful contributions in the coming years. I congratulate the editorial team for their efforts in bringing out the newsletter.

Dr Nanjegowda N M

FROM THE EDITORS' DESK

The department of Biotechnology has been successfully publishing BioLink since past three years. We started this venture in 2012 with an aim of showcasing the recent trends in this upcoming field, depicting the talents of our students and to highlight the activities of the department. At the start of the academic year, we promised ourselves to make this dream a reality. It was difficult to collect, compile and format all the articles with the expertise of our undergraduate students. But we believe that the students have done a wonderful job. They have worked tirelessly to execute this challenging task and finally make the blueprint. Hope that our readers will enjoy BioLink 2015 and will look forward for the next annual edition of BioLink.

Dr. Suma (Staff Editor), Aparajita and Nisshtha (Student Editors)

LOGIC WILL TAKE YOU FROM A TO Z. IMAGINATION WILL TAKE YOU EVERYWHERE. –ALBERT EINSTEIN

Major discoveries In Biotechnology

B- Boyer and Cohen in 1973 discovered rDNA which revolutionized the field of biotech.

I- introduction of Flavr Savr after its approval by USFDA as first GM food.

O-okt3 was approved to be used as a first immunosuppressant for clinical purpose in 1986.

T- Till and Mcculloh introduced the field of stem cell research in 1960.

E- Edward Jenner discovered first vaccine for smallpox.

C- Clyde Hutchinson showed it's possible to introduce mutation at specific sites in DNA (site directed mutagenesis).

H - Hybridization techniques for identifying and locating specific sequences in DNA was introduced by Edward Southern and is called SOUTHERN HYBRIDISATION.

N- National Biomedical Research Foundation established the protein information resource (PIR) in 1984 to assist researcher in the identification and interpretation of protein sequence information.

O- Osmometer was introduced to maintain the osmolality of culture media to avoid cell death.

L- Lederberg highlighted the promising future of genetic engineering along with Paul Berg and Boyer in late 20thcentury

O- Oncogenic HeLa cell lines were established by George Gay in 1950 which led to extensive and routine animal cell culture.

G- Gottolieb Haberlandt (Father of plant tissue culture) first attempted in 1902 to cultivate mechanically isolated plant leaf cells in nutrient media.

Y- Yield of Vitamin A in rice was increased by introducing three genes involved in the biosynthetic pathway of carotenoids by Dr Ingo Potrykus and Peter Beyer. This led to development of golden rice.

Darshika Bohra, 2BCZ

Virus and host

Poor Sir virus, all alone
Gliding through the dust with a sigh and a moan
Poor Sir virus, with his retro do
In his 70's capsid jacket, looking all blue

Finally, his wait was over
Little bread crumbs gave him cover
An unexpected journey through the tunnel
He found his way through the buccal funnel

His world was burst with vibrant hues
And there he saw her, his target muse
Adorned in her CΔ™ gown
His RNA skipped a sugar and he fell down

'The name is phage, Macrophage', said she
'And you shall be my host', he said with glee
In a trance he moved towards her
And in their embrace, the body immunity stirred

With all his love is RNA became hers
So vulnerable was she that it became a curse
For she did not know his true intention
Blinded by love, he became her damnation

His RNA, her most prized possession
Unbeknownst to her underwent replication
For Mr. Virus' accomplice Reverse Transcriptase
Gave life to a million DNAs

These DNA crippled her slowly
Her very essence, ripped away gruelly
From her depths emerged countless viruses
As she lay there, resting, in pieces

And in her dying breath, she whispered 'why?'
Mr. virus stroked her cheek and said 'goodbye'
In the pandemonium did he aquire
A new muse, a new host and thus fulfilled his desire

Nisshtha Khattar and Surabhi R.Rao, 4BCZ

"Veggie" on Space Station

It is known that humans lose bone density in space because it isn't required for supporting weight unlike on Earth. Scientists are now trying to grow plants in microgravity with an intension of detecting whether they can be safe to eat for the crew members. This was initiated by Orbital Technologies Corporation (ORBITEC) in Madison, Wisconsinn and was tested at the NASA's Kennedy Space Centre in Florida.

Expedition 39 flight engineers and NASA astronauts Steve Swanson and Rick Mastracchio installed "Veggie" in the Columbus module on May 7 in a rack. A root mat and six plant "pillows", each containing red romaine lettuce seeds were inserted into the chamber. Each pillow was supplied with 100 ml of water to initiate plant growth, a growth media that contains fertilizer and a type of calcined clay that is used on baseball fields was incorporated into the pillow.

" The farther and longer humans go away from Earth, the greater the need to be able to grow plants for food, atmosphere recycling and psychological benefits" said Dr. Gioia Massa, NASA science team lead for "Veggie". These plants grew for about 28 days on the space station. The pillow wicks were opened to help the seedling emerge. They were continuously monitored and samples were taken to check for any microbial contamination. Later the plants were harvested, frozen and stored for return.

Later this year Simon Gilroy's team inspected other species of plants that were grown on the space station. They intend to generate their RNA and measure the activity of all of their 30,000 genes. Gilroy says that this study may lead to a lot of data that one lab cannot analyze all together, so labs around the world needs to participate as well.

Mouli Mukherjee, 6BCZ

MIND CONTROL TO SWITCH ON GENES

Swiss researchers have discovered a way of "switching on" specific genes in specifically engineered cells using mind control. The system uses human brainwaves to turn on an infrared light that then activates a gene to produce the desired protein. The researchers have engineered cells, whose genes can be turned on by the presence of infrared light nearby, subsequently producing the protein SEAP (secreted alkaline phosphatase). These cells are placed in a chamber in an implant, which also contains a wireless-controlled infrared light. This implant is then put under the skin of mice. Volunteers wearing headsets were made to play Mindflex, a game in which the player controls a ball using their thoughts. The brainwaves produced turn on a field generator under the mice, turning on the infrared light, initiating the implant to produce SEAP. The concentration of SEAP, which seeps out into the blood stream from the implant, is tested.

The implant is an electroencephalography (EEG)-based brain computer interface (BCI). It processes mental-state-specific brain waves and programs the wireless implant. The engineered cells are designed for near-infrared (NIR) light - adjustable expression of the protein SEAP. The signaling pathway in the cells contain an NIR light activated bacterial cyclase, which produce a second messenger (cyclic di-GMP), triggering the interferon-beta promoters. Humans generating various mental states (meditation, concentration) can differentially control the production of SEAP.

Scientists are elated with this discovery because it could help to treat a variety of diseases, including epilepsy. For example, the brainwaves that occur prior to a epileptic seizure could be used to trigger the release of the treatment without the patient's knowledge. Martyn Boutelle, professor of biomedical sensors engineering at the Imperial College London, says that by using this technology, patients can learn to use their mental states to control the implants to release relief-giving therapies.

Praveen Kasmas, 6 BCZ

Biotech Crossword

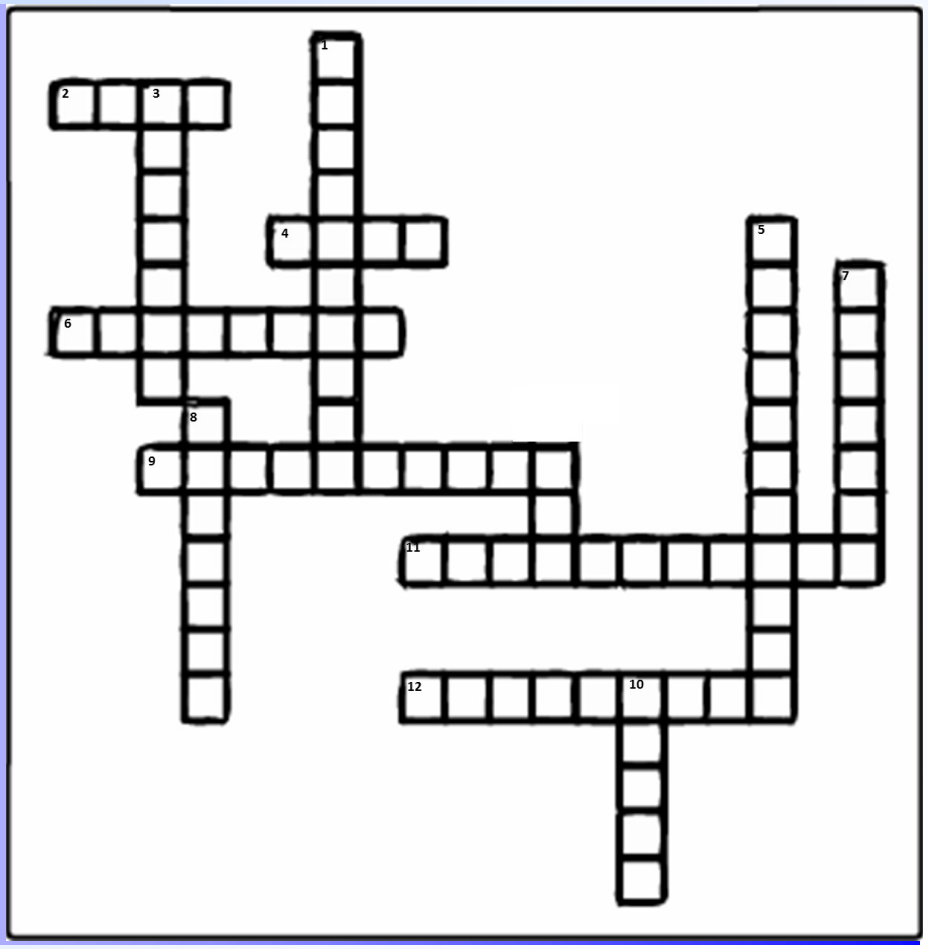
Across

2. Most abundant RNA in the cell
4. Immortal cells derived from cervical cancer tumours
6. Father of genetic engineering
9. Ultramicroscopic sub unit of chromatin
11. Queen Victoria was a carrier of this sex-linked disease
12. The scientist who coined the term 'biotechnology'

Down

1. A transgenic food crop which may help prevent night blindness in developing countries
3. The place where DNA naturally occurs within the cell
5. The majority of Mendel's works were related to this field
7. A type of tumour developed from the stem cells of granular leucocytes
8. First biochemical to be produced commercially through genetic engineering
10. The first transgenic cow

Neena Nair, 2BCZ



Light "ears"

Hearing, sight, touch, smell, and taste are the five main senses, each having their own distinct purpose. Hearing is the ability to detect and interpret sound waves and sight or vision is the ability to see, to detect light waves and interpret them into the objects around us and so on right...but what if light could restore lost hearing?? Sounds like an apple tree giving bananas doesn't it? but a team of scientists from Germany, South Korea, and Singapore have discovered that it can, and they believe that optics instead of sound waves can evoke a redefined class of auditory prosthetics.

In people with functional hearing, spiral ganglion neurons in the inner ear allow precise identification and classification of sound. We can recognize different people or objects by distinguishing different frequencies of sound. In traditional cochlear implants the external microphone picks up sound and transmits it to these neurons through electrodes, but the resolution is very poor. Using electrodes to stimulate the neurons lined up in the inner ear is like using shades instead of reading glasses to read.

Researchers used viruses to implant genes for light sensitivity into mouse embryos of a deaf lineage. The genes worked in the auditory pathways of the mouse brains, by creating light sensitive patches on the membrane of their spiral ganglion neurons and other neurons. The scientists directed LED light onto these neurons and then monitored and recorded brain stem activity. The activity indicated that the deaf mice perceived the light as sound. In comparison to stimulation from traditional cochlear implants, light produced more accurate neural activity in the brain stem, similar to normal hearing. The mice showed a high level of sound classification that current prosthetics have not yet achieved. In the future, deaf people can benefit from gene therapy where their cochleae could be manipulated to express these light sensitive channels. A chain of LED lights could be inserted in the ear, which would light up based on the properties of an external sound, allowing auditory neurons to convey their rich viable information to the brain. The brain is like a magnificent universe on its own where anything is possible!

Nidhi Jagadish, 4BCZ

FROM CONSERVATION TO CURE

As researchers were narrowing down the suspect list for the transmission of the Ebola virus, with bats at their usual position at the top of the list, recent advancements have shown that these bats may not only be the cause, but also the cure for this dangerous disease. Bats are known to be natural reservoirs for a plethora of viruses. Unlike humans, the immune system of bats seems to be permanently activated, without producing an adverse effect on the body, as it would if the immune system of a human was permanently active. Hence, in the time we take to develop immunity towards a disease, the bat has already fought it.

The latest advancements in the field of zoology and biotechnology revolve around the study of these immunological features of bats, and the translation of these abilities into human treatment. However, bats have been killed and considered harmful to human health for centuries. Rob Mies, Executuve Director of the nonprofit Organization for Bat Conservation says"ct "Bats offer insect control, pollination, seed dispersal, all over the world, for free. Unfortunately, losing bats means we end up losing those ecological services, and maybe even having to pay for those,"

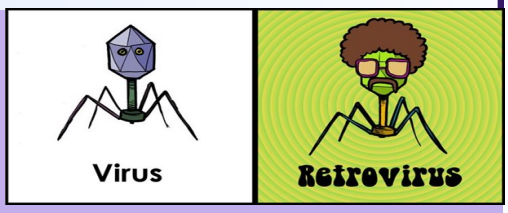
The habitats of bats being destroyed by deforestation and human encroachment, human wildlife interactions, as well as conflict, have seen a consistent increase. Evidence suggests that the primary cause for Ebola is direct contact of humans and bats via, hunting, meat eating, etc. At this point, the sustenance of bats in our environment is crucial to finding a cure for many harmful viruses including Ebola and Hendra's virus as researchers dig deeper and deeper into the immunology of this organism and the pathology of the virus and ultimately try to find a way to make us all future bat-men!

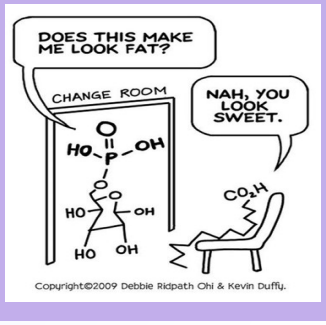
Divya Krishnan, 2BCZ

Biology Puns

1.Two blood vessels met and fell in love. But alas! It was all in vein.
2.Did you hear about the guy whose whole left side was cut off? He's all right now.
3. If I'm lost in translation, just blame my RNA
4. These biology jokes just keep getting cornea and cornea
5. If you're not part of the solution, then you're the precipitate.
6. Don't trust cells. They make up everything.
7. "Hey Ligase! What you been up to?" "Oh, nothing much. Just making ends meet."
8. What did one cell say to his sister cell that stepped on his toe? Mi-to-sis.

Dalia Saldanha, 2BCZ





JONAS SALK'S 100TH BIRTHDAY!

First and foremost, the Google team should be heartily congratulated for lheir lovely doodle commemorating the hundredth birthday of one of the greatest medical researchers of all time- Jonas Salk.

Don't we all love the concept of Google doodles? Every day, a single click on a doodle can give us so much knowledge and insight into the lives of people who we've never heard of before but have yet made remarkable strides in their lifetime. Reading and researching the lives of scientists is truly a worthwhile task for it makes us realize how often we tend to undervalue the works and efforts of people that have impacted our lives significantly.

Polio is an acute, viral infectious disease that had plagued mankind for centuries. Also known as infantile paralysis, this disease results in the malfunctioning of the neural system and improper muscular development. Since there was very little awareness about this disease, in the olden days people usually resorted to dangerous techniques like shock therapy to treat polio patients. Though, in the following years, many scientists attempted to find a cure for this disease, it was only in 1952 that a true solution came into existence in the form of the Inactivated poliovirus vaccine (IPV)

I PV, commonly known as the Salk vaccine, in honor of its developer has saved millions of lives over the world and has indirectly caused the development of several nations by ensuring a healthier, more productive workforce. In the days of yore, polio was a name to be feared. It not only ruined the lives and destroyed the aspirations of the individual but it also in turn broke relationships, families and societies as a whole. The amount of heartbreak and suffering that a single virus could cause through this disease was immense and yet, Dr. Jonas Salk with his seven years of hard work and research in this field, had managed to bring an end to this horrific saga.

Dalia Saldanha, 2BCZ

LIFE IN 3D

Picture this: Year 2050

A friend or family has met with an accident, the damage, well, is irreparable. But wait, don't you worry child, Science has a plan for you. Just go ahead and get the damaged organ printed. Few clicks and you're sorted, all made possible by the technology of Bio-printing or as I call it, life in 3D.

Bio-printing promises to change the way the medical community deals with organ failure. Every year thousands of people die because they could not receive an organ transplant soon enough. The demand for organs far exceeds the supply, leaving helpless patients and waiting to live.

3D printing was first described in 1986 by Charles W. Hull. As of now there are several approaches to 3D bioprinting, including biomimicry, autonomous self-assembly and mini-tissue building blocks. Even though there's a huge gap in complexity between printing an organ and printing a typical plastic figurine, the processes are quite similar. The machines used for both have cartridges and nozzles that squirt out ink (biological ink), on a platform. But, they do have a few key differences:

1. We know what most organs look like, but to be able to create them for individuals, scientists need to perform CT scans or MRIs on the patient. Then, they need to run the results through computer software to create a blueprint as their guide on how cells are positioned in each layer.
2. Instead of PVC plastics, bio-printers use human cells, along with binding agents to keep everything together. Once a specimen is printed, it needs to go into the incubator so the cells can fuse and start working together like a real organ. In 2007, one of the first bioprinting companies was founded: Organovo. At the moment, Organovo is printing liver tissue samples used for drug testing and research. The company's hoping to develop a functional liver in the near future.

With that said, there is still one major hurdle, that hurdle is the Vascularization of those organs. Every cell within a human organ is in a connected blood supply. Without an adequate vascular network, the cells would be starved of oxygen, as well as a means to excrete waste, causing them to die. Scientists from the Universities of Sydney, Harvard, Stanford and MIT have been working together to overcome this hurdle. In June 2014, the University of Sydney made a groundbreaking announcement. The team of scientists has figured out a technique making such Vascularization possible.

The researchers used an extremely advanced bio printer to fabricate tiny fibers, all interconnected, which would represent the complex vascular structure of an organ. They coated the fibers with human endothelial cells, and then covered it with a protein based material, rich in cells. The cell infused material was then hardened with the application of light. The human endothelial cells were left behind, along the tiny spaces created by the fibers, which after a week self organized into stable capillaries.

"While recreating little parts of tissues in the lab is something that we have already been able to do, the possibility of printing three-dimensional tissues with functional blood capillaries in the blink of an eye is a game changer," said study lead author and University of Sydney researcher, Dr Luiz Bertassoni. .The discovery of this technique should hopefully quicken the pace of bio-printing research, and lead to a time, in the not too distant future, when we can meet the demand of the growing need for organs transplants. We are still likely several years from such a time, but progress is certainly being made quite rapidly.

Anubha Bisht, 6BCZ

1. Is 'Biotechnology' keeping pace with the current growth of 'science in general'?

Biotechnology is supposed to be an area of 'applied science' - applying the knowledge of cells and molecules for the benefit of human and other life forms. Biotechnology itself requires some level of integration of multiple science subjects. But there is a bigger level integration happening and about to happen: I think the quest in biology has been overwhelmingly influenced by the growth in other sciences. Technological growth in other fields such as electronics, mathematics, computers, chemistry etc, and their integration with molecular biology have helped the development of new bio-techniques such as the microarray, mass spectroscopy and next generation sequencing (NGS). Such integration of knowledge and techniques across the domains of molecular biology/ biochemistry, chemistry, mathematics, computer science and statistics are common in bioinformatics. But a stronger integration of cell and molecular biology, bioinformatics and other science subjects is likely to be witnessed in 'synthetic biology' in the coming years.

2. What type of activities are common in Indian biotech sector today?

Indian biotech sector, as identified by most of the media, is a very broad sector from pharma-manufacturing companies to pure service providers in molecular biology or bioinformatics. Pharma and agricultural companies share the major part of revenue generation within the Indian biotech sector. Development of 'biosimilars' creates a new dimension of biotechnology in pharma companies. In future, there is likely to be a higher role of biotechnology in pharma companies.

3. Do BSc/Msc. students face a disadvantage over BTech/MTech students? If so, why? How can this be rectified?

No. I heard people preferring only MSc students and some others preferring engineering students. Engineering students are expected to have an edge with maths and engineering (fermentation, down-stream processing etc) while science students are expected to have a better conceptual understanding of the cell and molecular biology. But the truth, most of these courses are similar - at least in terms of the outcome. Of course, degrees and marks matter. But, I think, what you learn and what you grow into matters more than the degree you get!

4. What are the educational qualifications you look for in a trainee/employee?

Any science degree is fine. But, then again, I focus on abilities. I assess them using our SOTS-JSA to find their suitability. The specially designed online test system screens students for different job-responsibilities. Someone may be suitable for one project and the other for something else. Students who have used this online test system are already being hired by us and other companies.

5. What is your message to the students pursuing their studies in the field of biotechnology?

No big messages. But I do have a humble, friendly checklist for every student:

a) Get your basics right: 'understand' the fundamental concepts well [only then you can ENJOY science]

b) Get decent marks [it is a matter of discipline and doing 'minimal justice to your time']

d) Get involved - in the class rooms or outside: ask questions, answer questions, discuss science, discuss hobbies, follow hobbies, participate actively in as many activities you can...

e) Work in groups, have fun in what you like doing - developing your communication skills and the right attitudes is extremely important!

f) Try to pick a few topics of your own interest (within cell biology, molecular biology, genetics, biochemistry etc) and explore it for your own satisfaction. Remember, it is not reading to score marks or finishing chapters! It should be effort you enjoy over a long period - something you like following up in your free time. It may be to quench your thirst or to seek 'satisfying' answers to questions such as: why DNA repair is linked to cancer? How did they manage to create rice with more vitamins? You may begin with multiple questions/topics and later pick one or two only. A lot of times, you would begin with Google, reach You Tube for simple explanations, read books and eventually end up reading research review articles and papers .

Probably you are doing most of them! If not, its time to get motivated, disciplined and focused You will not get dedicated time for learning and growing again!

(Dr. Kshitish Acharya is the Founder Director of Shodhaka Life Sciences and is also a Scientist at Institute of Bioinformatics and Applied Biotechnology, Bengaluru)

- AS TOLD TO APARAJITA CHATTERJEE 4BCZ

FEW BIZARRE FACTS ABOUT GENETIC ENGINEERING

Spider goats – A spider, a goat or both? A spider goat is basically a goat whose DNA is equipped with a spider's dragline silk gene. Spider dragline silk is incredibly strong and flexible and can be used to form a variety of products from artificial ligaments to parachute cords. However, mass production of spider silk cannot be done using spiders. Hence, a spider's dragline silk gene is inserted in a goat's DNA due to which the goat produces long strands of spider silk in its milk which can be harvested from the silk with a spool in large quantities. The silk can then be used to manufacture a web like material called Biosteel.

Glow in the dark cats

South Korean scientists have developed a method of altering a cat's DNA in such a way that it glows in the dark and that DNA was used to clone other cats from it. Researchers took skin cells from the Turkish Angora female cats and used a virus for inserting genetic instructions to make a fluorescent red protein. This gene altered nuclei was put in the eggs for cloning which was implanted back in the donor cat. Clones were made hence producing a set of fluorescent felines. Now here is a pet that can also act as a nightlight.

Enviropig: Enviropig or Frankenswine is a pig genetically altered in such a way that it digests better and produces lesser amount of phosphorous content. Regular pig manure is high in phylate which is a form of phosphorous. When farmers use this manure as fertilizer for their crops, it runs off into nearby water bodies, thus causing algal bloom and destruction of the aquatic life within. The embryos of enviropigs are inserted with an E coli bacteria and a mouse DNA. Hence, these enviropigs produce lesser phosphorous and are therefore environment friendly.

Cabbages containing scorpion poison

Recent scientific studies include scientists trying to combine the gene responsible poison in scorpion tails with cabbage. The reason for making venomous cabbages is to reduce the usage of pesticides while still killing pests. The venomous cabbage would produce a toxin in its leaves which upon being eaten by a caterpillar would kill it. But the toxin would be modified and hence would not be harmful for human consumption.

Anshu Saran, 2BCZ

The wonder I have had, have you?

It feels nice when I see people spinning around , and that makes me want to do the same. Two spins and I lay flat on the bed seeing everything around me spinning. This is not something un common, all of you must have also felt dizzy. In scientific terms this is called 'vertigo'. What is the science behind this?

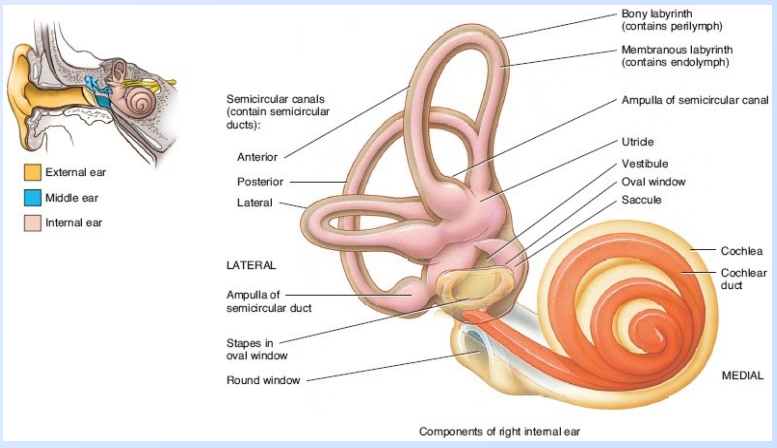
The science lies in one of our sense organs, ears. The inner ear has a system that helps us maintain balance called the vestibular system. This system has three semicircular canals oriented in three respective axes X- axis, Y-axis and the Z-axis. Depending on which of these three axes our head moves, the endolymph fluid inside the respective canal also moves. Their movement is immediately reported through the hair cells to the brain.

Yet another part is called the 'otolithic organs' meaning they consist of stones. STONES!!! yes, they are calcium oxalate crystals within the sac like organs called the utricle and sacculus. They are in contact with hair cells and their movement is towards gravity. As the head changes its position, these stones move around pulling the hair cells and signalling to the brain.

When we spin ourselves, we are changing the direction of our body. It is necessary that we realise so. So, the endolymph in the canal moves along the spinning direction . Continue spinning, and the endolymph also continues to spin. Once we stop, the eyes signals to the brain that the body is no longer spinning. But, the endolymph obeys the first law of motion, of inertia. Inertia is the tendency of a substance by which it continues to move or rest unless and until an external force acts on it. Abiding by this law, the endolymph moves and signals to the brain that the body is still moving. A confusion, is thus created in the brain, where two completely different signals are received and this confusion is what we perceive as diziness or vertigo.

Dancers use spotting to avoid an imbalance, where the continuous rotation of the head is avoided. Studies conducted have shown that in dancers, their brains are accustomed to such movements.

Several problems can be caused to the balance of our body by damage to this system which makes it necessary to seek medical advice.



Components of right internal ear

Jainy Samuel, 6BCB.

PRIZE LIST

Operon 2015
Synthesizing Shakespeare – 1st prize; Surabhi. R. Rao and Nisshtha Khattar.
Mind Twister – 1st prize; Surabhi Rao.
Master Cracker- 3rd prize; Aditi Kandlur, Patricia and Narain
Techtooning - 2nd prize; Sudheer, 3rd prize; Shalomi

BIONAKSHA 2014 Dept. Of Microbiology (St. Joseph's College, Autonomous)
Pot pourri- 1st prize.
Master mind – 1st prize.
Photography- 1st prize.
Lab genius – 1st plize.

FERMENT 2014- Dep. Of Microbiology (St.Joseph's College, Autonomous)
Mixed bag – 1st prize ; Aparajita Chatterjee, Upasna Kashyap, Surabhi.R.Rao
Quiz – 3rd prize; Aparajita Chatterjee, Surabhi.R.Rao

National Level Science Fest BMSCE 2014
Research Proposal '1 st prize.
Jainy Smauel, Aarzoo, Rohan Mohandas, Praveen Brian, Noyonika Sanyal, Amrita Dwivedi.
Bio Race event –1st prize-Aparajita Chatterjee, Upasna Kashyap, Surabhi.R.Rao

KALEIDOSCOPE 2014- NMKRV Women's College
Lecture contest – 1st prize; Surabhi.R.Rao
3rd prize; Aparajita Chatterjee

ICSCCB, Pune 2015
Best Poster Award - Aparajita Chatterjee and Aditi Kandlur

ANSWERS

ACROSS
2. rRna
4. HeLa
6. Paulberg
9. Nucleosome
11. Haemophilia
12. Karl Ereky

DOWN
1. Golden rice
3. Nucleus
5. Genetics
7. Sarcoma
8. Humulin
10. Rosie

IMAGE SOURCE : Google Images

KUDOS

The Department of Biotechnology organized a Science Fest on August 19, 2014 . There were a variety of events conducted such as Pot Pourri,. Collage, Quiz, Mind Twister and Cartooning which were highly informative and entertaining. Enthusiastic participants came from different colleges like Garden City College, St.Joseph's, NMKRV,Kristu Jayanti College, Jyoti Nivas College. The department, volunteers and the organizing committee made the programme a great success. A one day seminar on Transgenic Animals was conducted which witnessed active participation of students and staff . Students of our department have made us and the department very proud and won prizes in various events, fests and international conferences conducted nationwide. The students are also active members of CSA, Green Army etc.