



**PLATINUM JUBILEE YEAR 2018-19**  
**VIDYA NIKETAN BIRLA PUBLIC SCHOOL**  
**PILANI, RAJASTHAN**

---

# NOVA

**NEW OPPORTUNITIES FOR VISIONARY ACHIEVEMENTS**



**SPECIAL MENTION - DR. M. ANNADURAI (MOON MAN)**

**ISSUE-1 | AUGUST 2018**



## CAPT. (IN) ALOKESH SEN (RETD.)



**C.B.S.E. BEST TEACHER'S AWARD 2016-17**

## FROM PRINCIPAL'S DESK

Phenomenal advancement of educational technology has led to a paradigm shift in the way the science is taught these days. With every passing day there is a change taking place and it is a big challenge for the science teachers to keep abreast of these changes. There is no second opinion that advancement in the teaching technology of science has not been able to elbow out the science journals or science magazines. The role of a science journal or a science magazine has always been important. The number of science magazines being published has always been on the rise. A science magazine published by a school catering to the specific needs of its students is of immense educational value for the target learners. The team of teachers and students of Birla Public School have made a commendable effort to publish a magazine of this genre. It is a compilation of immensely useful articles and other contents which will go a long way in supplementing the science classroom and science laboratory teaching learning process and enrich the learning experiences of the students.

I am sanguine that BPS science faculty will continue its efforts to make the teaching of science interesting and enriching and to build on this ethos just as much during the upcoming academic years.



**Capt (IN) Alokesh Sen**  
**Principal, Birla Public School**

## EDITOR'S REVIEW



Science means constantly walking a tightrope between blind faith and curiosity, between expertise and creativity, between bias and openness, between experience and epiphany, between ambition and passion, and between arrogance and conviction – in short, between an old today and new tomorrow.

**-Heinrich Rohrer**

It gives me immense pleasure to share the quote with all of you. Publishing science magazine caters to each and every key word of the quote. It will provide a strong platform to nurture young minds and provide them opportunity to express their ideas and creativity. Teaching science is a challenging task and to continue creating scientific minds is even more difficult job for a teacher. I feel that the magazine will develop a democratic science culture where every child and teacher will be free to express and publish their ideas and enlighten the young readers.

I am very thankful to Principal Capt. (IN) Alokesh Sen for his valuable support and guidance. I must acknowledge my sincere gratitude to my colleague Mr Alok Marwal for his tireless work and support. Thanks to the students of the editorial board for their constant support.

**Manoranjan Kumar**  
**H.O.D. Physics**

## AMUSING AURORA

There are many wonderful phenomena which occur in the earth's environment which amuse us totally, one such phenomenon is occurring of Aurora. An aurora sometimes referred to as polar lights, northern lights (aurora borealis) or southern lights (aurora australis), is a natural light display in the Earth's sky, predominantly seen in the high-latitude regions (around the Arctic and Antarctic). Auroras are produced when the magnetosphere is sufficiently disturbed by the solar wind that the trajectories of charged particles in both solar wind and magnetospheric plasma, mainly in the form of electrons and protons, precipitate them into the upper atmosphere (thermosphere/exosphere) due to Earth's magnetic field, where their energy is lost.

**Harsh Baranwal**  
Associate Editor  
XII A

## WONDROUS AEROGEL

With science evolving exponentially, newer materials, with astonishing properties, are being synthesised every day. One such material is the Aerogel. Entitled as the world's lightest material, there exists quite a few kinds of it, some of which are made of metal oxides while others have carbon tubes and graphine. By the way, aerogel is a few times lighter than air. Quite hard to believe, right!

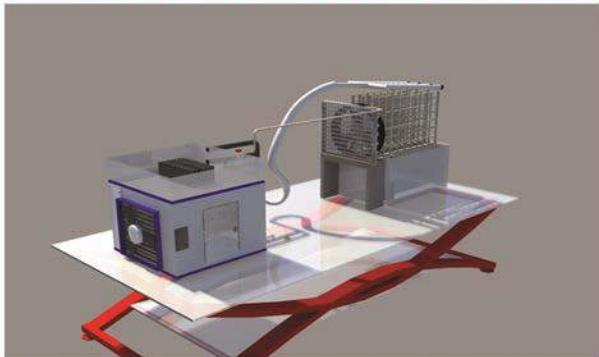
Aerogel has a density which is extremely small, about  $1/10$ th of a gram per cubic cm, which is compatible to that of air and this fact isn't surprising as aerogel mainly consists of air. Aerogel is like any other gel-like substance, for example shampoo, with the liquid water replaced with air. Aerogel is also a very good insulator which can withstand temperatures greater than  $1000^{\circ}\text{C}$ .

There is a lot more to know about this material and things waiting to be discovered. Maybe one day we'll have books lighter than air, but for now nothing as such can be assured of.

**By: Harikesh Pratap Singh**  
XII A



## OUR INVENTION (PETCAT)



This is a very unique concept in order to fulfill the desire of a common man to live in a house which is fully air conditioned. Nowadays affording an A.C for a common man is very expensive both in terms of energy efficiency and money. Even if anyone who is willing to install an A.C in his house, has to spend at least 25k. Purchasing an A.C is not a big deal but its maintenance & its energy consumption is so high that a middle class family cannot afford the expenses and in a country like india A.C. is not a luxury but a nessecity. Moreover Conventional A.C's are based either on the concept of compressed air technology, which uses a heavy motor to compress the air or most of them still use harmful gases like HFC. Both types of AC are harmful for the environment and are expensive too. In order to develop India, wastage of energy and natural resources must be stopped of environment.

We proudly present a unique solution to this problem. We have made an eco friendly A.C. which is not only cheap but also very energy efficient. It is a dream come true for a common man to live in a house which is fully air conditioned. This unique A.C works on our innovative technique which we have named PETCAT (Peltier Eco-Friendly Thermo Insulated Conditioned Air Technology).



All the materials used in making this project are eco- friendly and do not harm the environment. The parts used in this project have helped us to reduce the E-Waste on our school campus. There is no air compressor or harmful gases like CFC used in our model. Moreover this A.C can also be used for producing hot water during winters and also be used as a hot blower with a very low power consumption. It is highly efficient in terms of energy consumption and also very cost effective. It is a 5 in 1 multipurpose A.C. It becomes your A.C, Geyser, Mini Refrigerator, Room Heater & Water Dispenser which consumes less than 300W electricity & can run on battery and it cost only Rs. 8000 which can be further decreased.

## APPLICATIONS

This device can become your A.C , Room heater, Geyser, Mini Refrigerator & Water dispenser

- It can run on your inverter battery.
- Consumes less than 300W power.
- So far it is the best portable, low power and less space consuming device for cooling and heating a normal 13X13 feet room.
- It is cost effective and energy efficient. If produced on large scale this model can fulfill the dream of lower-middle class family of staying in an air conditioned house with lower electricity bill.

**Rahul Sharma and team**  
**T.G.T. Science**

## DR. M. ANNADURAI (MOON MAN)



The person behind successful Mars orbiter Mission in a year, launching of Indian space satellites, remote sensing who paved the path in space researches and put the India among the developing country in technology, popularly known as Moon man Dr Mylswamy Annadurai is one of the most renowned Physicist and distinguished Scientist in India. He was listed among 100 Global thinkers of 2014 and topped the innovators list.

He was born 2 July 1958 in Kodhawady, Coimbatore in Tamilnadu in the family of a primary school teacher, who drew a monthly salary of around Rs 120. Reminiscing his childhood days, Annadurai says it was his duty as the eldest among five siblings to preserve his clothes well for his younger brothers to wear after him. His school textbooks too were well-maintained. You would find no scribbling or dog-ears on them and at the end of the academic year they would still appear brand new ready for the next sibling to use.

“My parents said the books would be used by my siblings, and asked me to be careful with them. So I would not tear the pages or scribble on them as children normally do,” says Annadurai.

Dr Annadurai began his career at ISAC as the team leader to design and develop Software Satellite Simulator. During the period 1992 -2005, Dr Annadurai was the lead member of ISRO's satellite mission team and managed eight INSAT Missions as the Mission Director and brought about the efficient ground automation for satellite operations. As Project Director, Dr Annadurai made the most crucial contribution to the realisation of India's first Lunar Mission, Chandrayaan-1. Chandrayaan-1, was India's first mission to the Moon launched by India's national space agency, the Indian Space Research Organisation (ISRO).

## HIS ACHIEVEMENTS

India launched the spacecraft by a modified version of the PSLV C11 on 22 October 2008 from Satish Dhawan Space Centre, Sriharikota. The vehicle was successfully inserted into lunar orbit on 8 November 2008.

In 2011, Dr Annadurai became the Programme Director of Indian Remote Sensing Satellites (IRS) and Small Satellite Systems (SSS) and realised five satellite projects. Dr Annadurai also supervised two student satellite projects. He writes a regular column, "Kaiyaruge Sevvai" ("Mars is at our Reach") in the Tamil Daily Dina Thanthi. His works are mentioned in 10th standard Science Text Book of Tamil Nadu.

He has written three books in Tamil namely, "Kaiyarukey Nilai", "Siragai virikkum Mangalyaan", and "Ariviyal Kalanjaiyam". The Book "Kaiyarukey Nilai" has won S.P. Adithanar Literary award for the year 2013.

He received many awards like the Hariom Ashram premit Vikram Sarabhai Research Award for his outstanding Contributions to Systems analysis and Space systems management (2004).

Some international awards like Laurels for Team Achievement Chandrayaan-1, International Academy of Astronautics, 2013, Beijing China.

Certificate of Appreciation from Boeing Asian - American professional Association, Houston, USA.

Space Systems award, 2009 from American Institute of Aeronautics and Astronautics, USA.

He received awards from social and public forum like Vivekananda Award for Human Excellence by Rama Krishna Mission and many more.

He was awarded Padma Shri by Indian Government in the year 2016.





# LI-FI (LIGHT FIDELITY)

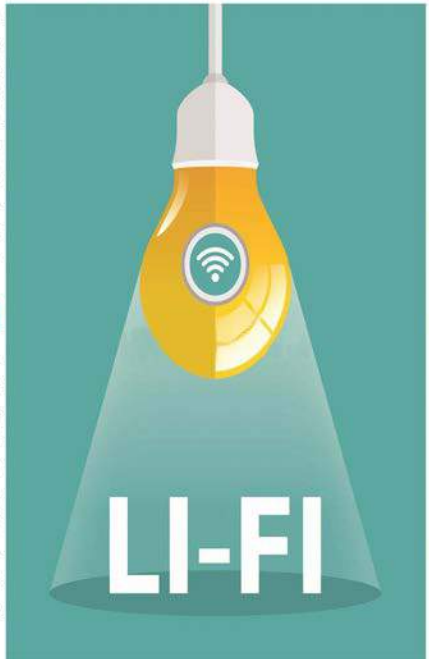
Imagine a world where every light can connect you to internet. Lights that illuminate our work spaces powering our growing demand for connectivity.

## WHAT IS LIFI AND HOW IT WORKS

Li-Fi is high speed bi-directional networked and mobile communication of data using light spectrum. The way Li-Fi works is simple but powerful. It allows data to be transmitted by modulating the intensity of light which is received by photo-sensitive detector. The light signal is then demodulated into electricform.

## APPLICATIONS AND BENEFITS

It enables secure wireless communication, connectivity in hostile interesting environments such as hospitals and petrochemical planes. The part is any public lightening including street lamps can be used to provide Li-Fi hotspots and same communications infrastructure can be used to monitor and control lightening and data.



Dear readers, in a nutshell, for example use of Li-Fi is equal to having 64 GB/s speed, which means downloading a couple of movies just in seconds.

**By- Anshuman Singh  
XI-A**

# **Monster Black Hole Is Discovered That Consumes Mass Equivalent to Sun Every 2 Days**

Australian researchers have discovered what they've described as the fastest-growing black hole in the universe. "This black hole is growing so rapidly that it's shining thousands of times more brightly than an entire galaxy, due to all of the gases it sucks in daily that cause lots of friction and heat", Dr Christian Wolf, a researcher from the Australian National University who was on the team that made the discovery said according to a statement. Researchers believe that this monster of black hole consumes the mass equivalent to our sun every two days.

**By- KarmanyaPrahladka  
VII-A**

## **New organ discovered in human body**

A new organ was discovered by the scientists, and they hope that this discovery can help them to understand the spread of cancer within the body. It is surprising that this organ remained unobserved in spite of being so large. Layers long thought to be dense, connective tissue are actually a series of fluid filled compartments researchers have termed as "interstitium".

The team behind the discovery suggest that the compartment may act as shock absorber that protects body tissues from damage.

The compartments are found beneath the skin as well as the lining, the gut, lungs, blood vessels and the muscles.

**By- OjasTanwar  
VII-A**



# EAT RIGHT FOOD TO STAY HEALTHY

According to ayurveda - 'TrayaUpstambhaitiaharah, svapno, brahmacaryamiti .....'  
{That is, there are three supports of life –food, sleep, and celibacy }

The gross physical body is called annamaya kosha or the food body, because it is nourished by food and grows by absorbing the nutrients and energy from the food. Therefore, food is verily the most important basis of a happy and healthy life.

Such a food is the best for the body. The Gita defines rajasik food as the one that is bitter, sour, salty, very hot, full of chilly, dry and acidic; it produces sorrows worries and diseases. Similarly, half cooked, foul smelling, without natural juices, left over and rejected food is called tamasik food .

In the present times, sattvik food has become rare and tamasik and rajasik food have got proliferated everywhere. Most food products available today are prepared to please taste buds; there is no consideration given to how unhealthy they may be for people who consume them . The markets and hotels are inundated with food products which are instilled with ingredients to augment taste. Even foreign companies are now investing huge amounts of money in food industry. These products are extremely attractive to look at and are very tasty as well but are harmful for health.

These modern foods have become very popular, but people are totally unaware of the harmful effects they have on our body. The latest scientific study has found that excess of junk food causes a great damage to neurons in our brains. These brain cells once damaged cannot be replenished and their destruction creates a number of diseases related to the brain. Excessive consumption of junk food leads to loss of memory ,headache, heaviness in the eyes, fatigue obesity etc.

A research study was published in American journal of Clinical nutrition in 2011 related to junk foods. In this study healthy people were given junk food for 5 days and were subjected to tests thereafter. It was found that there was a clear reduction in their cognitive abilities like memory and attention. In order to make junk food tasty, several specific chemicals are added and these affect the hippocampus region of our brain. Since hippocampus is related to memory and attention, it gets severely affected by such food products.

Polluted foods are the main reasons for the reduction of our life spans. Our eating habits too are in disarray. If our food is good, our brain will develop well and mind will get steady and balanced. Our Rishis of yore had given this sutra – May you live for hundred years. And they said not just stay alive, they added – may your eyes see for hundred years, your ears hear and your voice speak for hundred years, may you maintain good health for hundred years. This is possible only when our eating habits and lifestyles are refined and balanced.

**By- B.D. Sharma**  
**H.O.D. (Biology)**

# SELF REGENERATING CONCRETE

Of all the carbon emitters that surround us every day it's easy to overlook one of the most ubiquitous concrete.

The material that builds our buildings, paves our roads and spans our bridges is the most widely produced and consumed material on earth apart from water, according to a WBCSD report. Although its environmental impact is far from benign, concrete – defined as the mixture of aggregates, water and the hydraulic powder material known as cement – is incredibly useful and widely applicable. Thanks to its durability, easily-sourced raw materials and thermal resistance, it is unlikely that an alternative building material will replace it on a large scale any time soon.

Hendrik Jonkers, a microbiologist at Delft University and a finalist at the recent 10th annual European Inventor Awards, has a plan to increase the lifespan of concrete. His innovation, which embeds self-activating limestone-producing bacteria into building material, is designed to decrease the amount of new concrete produced and lower maintenance and repair costs for city officials, building owners and homeowners.

Jonkers' self-healing concrete marries two fields: civil engineering and marine biology. When it comes to Jonkers' concrete, water is both the problem and the catalyst that activates the solution.

Bacteria (*Bacillus pseudofirmus* or *Sporosarcinapasteurii*) are mixed and distributed evenly throughout the concrete, but can lie dormant for up to 200 years as long as there is food in the form of particles. It is only with the arrival of concrete's nemesis itself – rainwater or atmospheric moisture seeping into cracks – that the bacteria starts to produce the limestone that eventually repairs the cracks. It's a similar process to that carried out by osteoplast cells in our body which make bones.

Healing these cracks the old-fashioned way is no small expense. According to HealCON, the project working on the self-healing concrete, annual maintenance cost for bridges, tunnels and other essential infrastructure in the EU reaches €6bn (£4.2bn) a year.

The invention comes in three forms: a spray that can be applied to existing construction for small cracks that need repairing, a repair mortar for structural repair of large damage and self-healing concrete itself, which can be mixed in quantities as needed. While the spray is commercially available, the latter two are currently in field tests. One application that Jonkers predicts will be widely useful for urban planners is highway infrastructure, where the use of de-icing salts is notoriously detrimental to concrete-paved roads.

**By- Mudit Khandelwal**  
**IX-A**



## THINKING LIKE A SCIENTIST

I want to think like a scientist  
observing animals, the earth, and the sky.  
I want to ask good questions,  
wondering how, and what, and why.

I want to make smart guesses.  
Hypothesizing what might happen and when.  
I want to do cool experiments,  
Questioning my thoughts again and again.

I want to write up all my data,  
Recording pictures, charts and words.  
I want to go through all that I've done,  
Drawing conclusion about what I've learned.

Wondering, asking, testing, concluding,  
Is this what scientists do?  
If you want to think like a scientist  
Then you must do them too.



**By- Shreyansh Agarwal**  
**X-C**

## WHAT DO YOU SAY.....

Don't be shy! Email us at  
[bps.sciencemagazine@gmail.com](mailto:bps.sciencemagazine@gmail.com)

- Q 1-Will we ever cure cancer? What is the major difficulty we are facing to have a cure for it?
- Q 2 -Ninety-five percent of the ocean is unexplored. Still we are busy exploring the 99 % universe. Do you think spending such a huge sum of money is a decent choice?
- Q 3-What's at the bottom of a black hole?
- Q 4-Micro organism are primitive living being, still they have survived millions of years & will survive in future. Why do humans always worry about their existence ?

- Q 5- Latest theory suggest that universe is made of matter and anti matter, So far we are able to find only matter. Where has exactly the whole anti-matter gone?
- Q 6- Nothing travels faster than light. Is it really so?
- Q 7- According to Einstein theory of relativity  $E = mc^2$ , mass of any object can be converted into energy & vice versa only if the body attains the speed of light. But law of conservation of mass tells a different story. How?
- Q 8- Is time travel possible? If yes then how come it's possible to go back to past & change the events or going to future which practically doesn't exist at all?
- Q 9- We say our brain needs rest. Still during sleep it continues lots of involuntary actions in which dream is one of them. Why do we dream during sleep?
- Q 10- As per reports from NASA the existence of aliens is still a mystery. If they exist ,why haven't we encountered them yet? Only myths are spreading all around with no concrete evidences.

**By- Rahul Sharma**  
**T.G.T. (Science)**



Cicero defined superstition as “Fear of God”. In earlier times people thought that every natural phenomenon is a sign from Gods. Lightning of Thunder is a sign of lord Indra’s anger and havoc of floods are lord Varuna’s displeasure. It is considered holy to bathe in the Ganges, to get rid of ones sins. According to me, if sins could be washed by a holy dip, then fish would be the first ones to be placed in heaven.

When one goes for an examination, it is a must to eat sweetened curd or to view a bucket full of water. I don’t think that the city or state topper does that. Its just our mindset, we have to change that. A young boy in an interview, who is armed with high qualification, often returns home or chooses another path, if a black cat crosses his path. Why we do so? As I mentioned above also, its our mindset.

To the Greeks a sneeze was a good sign, while for the Indians it is considered a dreaded omen. A Hindu Bride is not allowed to wear black or white in their marriage but for the Christians, the grooms are married in black and the brides in white.



Women are considered more superstitious. It is their desire to get their husbands a long life span. For that married ladies fast on Karva Chauth from dawn and eat only after sighting the moon. For many, it is a herculean task, yet the fast is observed. No one can beat our hypocrisy! Scientifically, if a husband's life span were dependant on their wife's fast, there would not be widow in this land of about ninety millions. Number "13" is considered unlucky. As far as I know, Chandigarh is divided into '47' sectors and sector '13' is absent. This shows even the modern city planners had fear of the numerical '13'. Ironically my best academic result was declared when my roll no. was '13'.

Superstitious is a hydra-headed monster and must be crushed with the heavy blow of education and a positive mind. In this fast changing world, we need to comprehend the essence of our heritage, learn to analyze and modify. Only then our country will excel. This is what scientific temper is all about.

**By- Aman Sohail  
XI-B**

## **SIR C.V.RAMAN : FROM ACCOUNTANT TO NOBLE PRIZE WINNER**

**BORN:** 7 November 1888, Triuchirappalli (Tamilnadu)

**DIED :** 21 November 1970, (Bengaluru)

**SPOUSE :** Lokasundari Ammal (1907-1970)

**Awards :** Bharat Ratna, Nobel Prize in Physics,  
Hughes Medal, Lenin Peace Prize, Matteucci  
Medal, Franklin Medal

**EDUCATION:** University of Madras (1907), Presidency  
College, Chennai (1902-1904)



In 1907, at the age of 18, Chandrasekhara Venkata Raman joined the finance department in Calcutta as assistant accountant general. One day, on the way to work, he noticed a signboard "The Indian Association for Cultivation of Sciences". He had almost abandoned his love for physics when he had appeared for the Civil Services exam. But after a glance at the signboard, he resolved to start his experiments once again. He started using the facilities at the associations premises for conducting scientific experiments, While working full time as accountant word of his genius soon spread in academic circles. In 1917, Vice Chancellor of Calcutta University Ashutosh Mukherjee invited Raman to join the University of Calcutta as Tarakanath-Palit Professor of Physics. Even, Sir Ashutosh Mukherjee got permission to change the rule which was required for a candidate for professorship to be trained in a foreign country .

Raman joined the university and went on to do some of his most brilliant work during his tenure. The atmosphere at the university under the leadership of Ashutosh Mukherjee was conducive to experimentation and innovation. But the Institute "The Association for the Cultivation of Science" didn't have any money. Raman was interested to work on Optics but he had no instruments. He had no other option except his own eye. He convinced himself that eye is the best detector of light and he would continue his experiments with his own eyes. He started doing experiments by closing all the windows of the lab to adjust his eyes with darkness and then open the window a little bit and allowed narrow beam of light to come through the window. He and his student Krishnan suddenly discovered the strange phenomenon that apart from the original light ( yellow ) that he made to fall on the liquid after passing through filter, two new light waves ( green and red ) one with wavelength higher than and one with wavelength lower than the incident wavelength are coming out from the liquid . Initially he didn't understand the phenomenon.

After 7 years of this strange observation, in 1927 Arthur Compton got the Nobel prize for discovering X - Ray scattering in material where he showed that X - Ray when passes through material produces two new wavelengths one higher and one lower than the original wavelength. Raman immediately understood what he saw earlier was the similar scattering that Compton saw , but not in X ray rather in visible light. He immediately jumped up with a joy. But to publish his result he needed to do his experiment again and had to record the result and so he needed a professional grade spectrometer but he did not have one and the institute has no money to buy an expensive spectrometer.

In desperation he went to Shri G D Birla and told him that if Birla could buy a spectrometer for him then he promised that he would bring Nobel prize for India within 6 months. G D Birla bought a spectrometer from London for £230 (pounds) , and it came by ship after 3 months, Raman did the same experiments and sent a paper to Nature ( journal ) and it was accepted in 1928. It was a phenomenal discovery as for the first time someone found something which you can call a " Chemical Fingerprint " of molecules. Now one can differentiate between chemical molecules and a purely optical method.

After 2 years of publishing the paper, in 1930, he got the Nobel prize for discovering the effect of scattering of light that produces new wavelengths which is known as Raman effect . During the Nobel Prize ceremony Raman cried and said I am so unfortunate that my beloved country India does not even have a flag. ( Union Jack - British Flag was in display during ceremony as he was a British subject of colonial India ).

We do great science by passion, by vision, by leadership, not by sheer amount of money or array of expensive instruments . Nowadays when Indian Scientists often complain about shortage of money, lack of instruments for the reason for lack of world class quality science research in India, it just reminds us how people like Bose, Raman , Saha did research without virtually any money, without any expensive instruments and without any help, but still were able to do world class work, became Fellow of Royal Society, got Nobel prize and also created new branch of science .



## 5 CHEMISTRY INVENTIONS THAT ENABLED THE MODERN WORLD



### **PENICILLINS**

Alexander Fleming discovered penicillin in 1928, but it wasn't until 1939 that Howard Florey worked out how to make in useful quantities. They are amongst the first drugs effective against multiple bacterial infections.

### **HABER-BOSCH PROCESS**

Plants need nitrogen, but a major limiting factor in agriculture is its availability. German chemists Fritz Haber & Carl Bosch worked out a way of combining hydrogen & nitrogen to form ammonia, which can be used as crop fertiliser.

### **CONTRACEPTIVE PILLS**

Russel Marker, an organic chemist discovered a chemical in Mexican yarns could be turned into the hormone progesterone in a single step. This made its production affordable, and led to the development of first contraceptive pills.

### **POLYTHENE**

A large number of plastic objects you come across are made of some form of polythene. It was discovered in 1898, but a practical method for producing it was not developed until 1933.

### **LIQUID CRYSTAL DISPLAY**

Chemists have known about liquid crystals for some time, but room temperature LCD displays only became possible after George Gray's discovery of 5CB in 1972. 5CB derivatives are still present in TV, phone and laptop screens.

**By- Ms. Geetanjali Rajput  
P.G.T.(Chemistry)**



## NEW DISCOVERIES

### ARTIFICIAL MOUSE EMBRYO MADE IN A LABORATORY

Researchers have used three types of stem cells to create a mouse embryo in a dish, according to research published in Nature Cell Biology. The cultured embryos transformed into a multilayered structure, which helps establish subsequent cell types and axes of the body. When the mixture of cells attained the appropriate density, they independently self-organized into a clump.

### FASTER PHOTONS COULD ENABLE TOTAL DATA SECURITY

Researchers at the University of Sheffield have solved a key puzzle in quantum physics that could help to make data transfer totally secure. Each photon, or particle of light, represents a bit of binary code - the fundamental language of computing. These photons cannot be intercepted without disturbing them in a way that would alert the sender that something was amiss. Single photon pulses offer total security,

## Proud Moment for INDIA

**5 Participants, 5 Golds: India Shines at International Physics Olympiad**

- 1. Pawan Goyal   2. Lay Jain   3. Siddharth Tiwary  
4. Bhaskar Gupta   5. Nishant Abhangi**



**By- Mr. Alok Marwal  
P.G.T.(Physics)**

## CRYO VOLCANO

With the experimental progress in the world of sciences in the past few decades or so, and with the constant surge of man to satisfy his curiosity, has led to many new discoveries and rationalization of beliefs – and above all, man and his mind. A lethal combination of intelligence and conscience.

As an inertia to this statement, we humans have recently discovered a path breaking phenomena, alien completely to the warm and hospitable environment of planet Earth. But not every planet in the solar systems lie in the 'GOLDILOCKS ZONE' which is said to host all the conditions that are necessary for the very existence of life. But, Titan, Saturn's largest moon is 1.44 billion kilometers away from Goldilocks zone

In a series of experiments and observations carried out by the CASSINI probe orbiting Saturn and its' moons, has revealed of what are called CYROVOLCANOES, and traces of unicellular life in one of the most inhospitable conditions known to our Solar System.

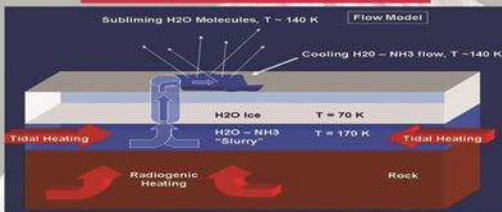
What are **CRYO VOLCANOES**?

Ans: A Cryo Volcano is a type of volcano that excepts Volatile Such as Water, Ammonia( $\text{NH}_3$ ) and Methane( $\text{CH}_4$ ), instead of molten rock(lava).

Collectively referred to as 'Cryomagma', these Substances are usually liquids and in vapor States. Post exception, the Cryomagma is expected to condense to a solid form when exposed to the low surrounding temperature

It is believed that tidal friction and translucent deposits of frozen materials could create a sub-surface greenhouse effect that would accumulate the required heat. Signs of past warming of the Kuiper belt object Quaoar have led scientists to speculate cryovolcanism in the past. Radioactive decay could too provide the energy necessary for such activity, as these emit water mixed with Ammonia, which would melt at 180 K ( $-95^\circ\text{C}$ ) and create an extremely cold liquid that would flow out of the volcano.

# CRYO VOLCANO



From the vapor Samples collected by the CASSINI probe, an astonishing truth has surfaced about the possibilities of existence of life (Well, Intelligent life wasn't yet been conclusively proved, no, and we aren't even close to).

Tardigrades were found in the sample of vapors from the cryovolcano in the atmosphere of Enceladus.

Tardigrades are 8-legged, water dwelling micro animals.

On Earth, Tardigrades have been found everywhere from tropical rainforests to Antarctic. Tardigrades are among the most resilient species known to men and can survive extreme conditions that would be rapidly fatal to nearly all the other life forms Such as

- ▶ Extreme Temperatures & Pressure
- ▶ Air deprivation
- ▶ Radiation
- ▶ Dehydration
- ▶ Freezing etc.

Of the 1150 known species of Tardigrades, The Ezyphode class has been Spotted by the researchers.

**TARDIGRADES:** Can grow up to 0.02 in when fully grown. Can resist temperatures from 84 K to 1600 K

## FIGURES:

- Cryovents can eject gasses up to 270 Km high and particles of ice are estimated to reach speeds of up to 212mph while being into the atmosphere.

- Titan alone houses more than 7000 cryovolcanoes.

- ▶ A typical cryomagma contains:
  - ▶ 20-50% Hard dry ice
  - ▶ 10%  $\text{CH}_4$
  - ▶ 20%  $\text{NH}_3$
  - ▶ 20-50% Water vapor
  - ▶ And traces of  $\text{N}_2$  and other Hydrocarbons.
- ▶ A Cryomagma is appx. at 77K i.e. appx.  $-200^\circ\text{C}$ .

By :Aumkaar Iyer Ganesh  
XII A



## PARALLEL UNIVERSE

Imagine a world where dinosaurs hadn't become extinct, Germany had won World War II and you were born in an entirely different country. Isn't it interesting?

From science fiction to science facts there is a concept that suggests that there could be another universe besides our own. The concept is known as Parallel universe and it is the fact of the astronomical theory of multiverse.

The idea is pervasive in comic books, video games, television and movies like "Buffy the vampire slayer", "Doctor Who", "Digimon", "Star Trek" etc. They all use extended plotline.

How the idea of parallel universe emerged?

It started 13.7 billion years ago, simply seeking everything we know of in the cosmos an infinitesimal singularity. According to big bang theory some unknown trigger caused it to expand and inflate in their dimensional space. As the immense energy of this expansion cooled, light began to shine through. Eventually the small particles began to form into larger matter we know today as galaxy, stars, and planets.

The big bang theory has left us with certain unanswered questions, Are we the only out there in the universe? With our current technology we are limited to the observations within universe because universe is curved and we are inside the fishbowl unable to see the outside of it.

However, the new theories have resound some of the irregularities in quantum mechanics that have baffled scientists for centuries. Some of them being

1. Infinite universes theory
2. Bubble universes theory
3. Daughter universes theory
4. Mathematical universes theory

And last but not the least is this "Idea of parallel universe" to understand multi universes. It is considered that the space is flat, so the number of possible particle configuration in multiple universe is limited to  $10^{10^{122}}$ . Distinct possibilities of possible arrangements are infinite, so with infinite number of cosmic patches, the particle arrangements within them must repeat infinitely many times over. This would mean there are infinitely many parallel universes.

This concept is something which goes beyond imagination and not everyone agrees with it.

But PARALLEL UNIVERSES do exist??.....

By-Anurag Agarwal  
XI-A



## HYPERLOOP

Hyperloop is a new form of ground transport currently in development by a number of companies, which could see passengers travelling at 700 miles an hour in floating pods within low-pressure tubes. There are two big differences between Hyperloop and tradition rail. The pods carrying passengers travel through tubes or tunnels from which most of the air has been removed to reduce friction. This should allow the pods to travel up to 750 miles per hour. Rather than using wheels like a train or car, the pods are designed to float on air skis, using the same basic idea as an air hockey table, or use magnetic levitation to reduce friction. A number of different companies are working to turn the idea into a functioning commercial system.

Supporters argue that Hyperloop could be cheaper and faster than trains and car travel, and cheaper and less polluting than air travel. They claim that it is quicker and cheaper to build than traditional high-speed rail; as such, Hyperloop could take the pressure off gridlocked roads, making travel between cities easier and potentially unlocking major economic benefits as a result. Hyperloop technology is still in development even though the basic concept has been around for many years. At the moment, the earliest any Hyperloop is likely to be up and running is 2021. The idea of using low pressure or vacuum tubes as part of a transport system has a long heritage.

Musk outlined his vision of what Hyperloop would look like in his Hyperloop Alpha paper. He set out the case for a service running between Los Angeles and San Francisco, which would be cheaper and faster than a proposed high-speed rail link, arguing that his Hyperloop could be safer, faster, more affordable, weather-proof, self-powering and less disruptive to people living along the route. Musk said that a Hyperloop service could be the answer to travel between cities less than about 1500 km or 900 miles apart beyond that, supersonic air travel would be more efficient, he said.



The Hyperloop capsules in Musk's model float above the tube's surface on a set of 28 air-bearing skis, similar to the way that the puck floats just above the table on an air hockey game. One major difference is that it is the pod, not the track, that generates the air cushion in order to keep the tube as simple and cheap as possible. Other versions of Hyperloop use magnetic levitation rather than air skis to keep the passenger pods off the tracks. The pod would get its initial velocity from an external linear electric motor, which would accelerate it to 'high subsonic velocity' and then give it a boost every 70 miles or so; in between, the pod would coast along in near vacuum. Each capsule could carry 28 passengers (other versions aim to carry up to 40) plus some luggage; another version of the pods could carry cargo and vehicles. Pods would depart every two minutes (or every 30 seconds at peak usage).

Engineers from Delft University of Technology in the Netherlands are taking tech entrepreneur Elon Musk's Hyperloop travel idea very seriously. The pods will get their velocity from an external linear electric motor comes in; effectively a round induction motor (like the one in the Tesla Model S) rolled flat. Under Musk's model, the Hyperloop would be powered by solar panels placed on the top of the tube which would allow it to generate more energy than it needed for operation. Supporters argue that Hyperloop is significantly better than high-speed rail. It is lower cost and more energy efficient because, among other things, the track doesn't need to provide power to the pods continuously and, because the pods can leave every 30 seconds, it's more like an on-demand service. It's also potentially two or three times faster than even high-speed rail (and ten times the speed of regular rail services).

**SIDDHARTH ROY**  
**VIII A**



## FACTS

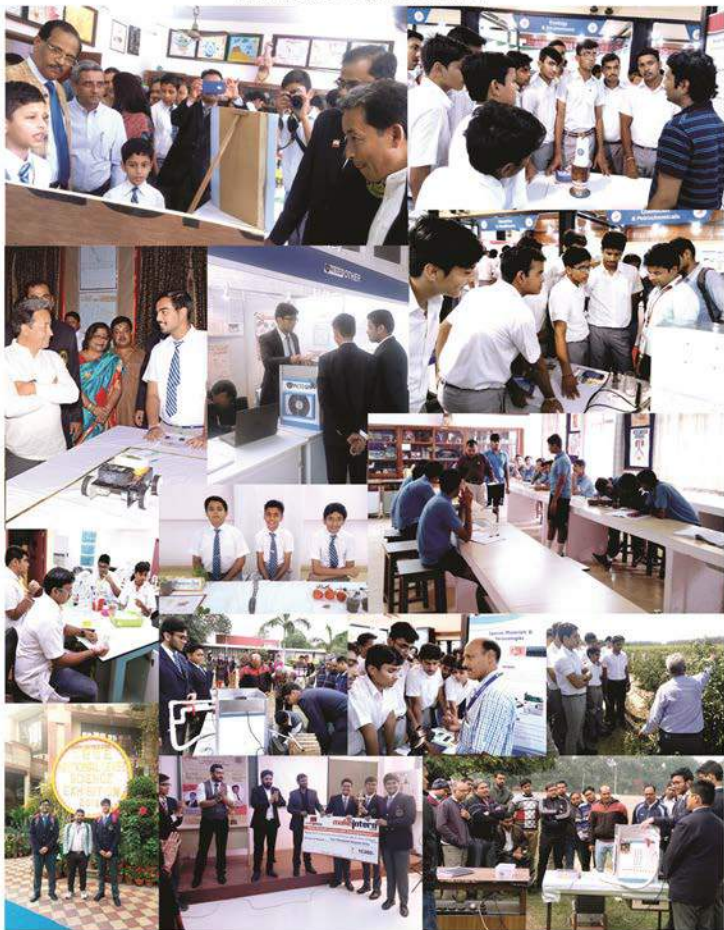
1. Vinegar is one of the most healing gifts of nature and its millennium long usage proves it.
2. It is believed that it has been used for treatment for at least 10000 years.
3. The father of medicine, Hippocrates, recommended it as a healing elixir.
4. Since time immemorial people have used it as preservative, deodorant and tonic for vitality, strength, disinfection and fast healing of wounds.
5. Apple cider vinegar contains 19 out of 22 important minerals for growth, regeneration and health of our body, including potassium, sodium, magnesium, calcium, boron, phosphorus, sulfur, iron, fluorine.
6. It also contains vitamins C, E, A, B1, B2, B6, beta-carotene, bioflavonoids, pectin, malic and acetic acids.
7. The name vinegar comes to us from the French, "vin aigre," literally meaning sour wine.
8. November 1st is National Vinegar Day.
9. Around 5,000 BC, the Babylonians used vinegar as both a condiment and preservative; they are also credited with the practice of adding herbs and spices to flavor it.
10. Vinegar can help soothe a queasy stomach! The queasy curing cocktail is made of apple cider vinegar, water and honey.



## PHOTO GALLERY



## PHOTO GALLERY





# MEET THE TEAM

## PEOPLE BEHIND THE IDEA



**EDITOR-IN-CHIEF  
CAPT(IN)  
ALOKESH SEN(RETD.)  
PRINCIPAL**



**EDITOR  
MANORANJAN  
KUMAR  
H.O.D.  
PHYSICS**



**TEACHER  
INCHARGE  
ALOK MARWAL  
P.G.T. PHYSICS**



**ASSOCIATE  
EDITOR  
HARSH  
BARANWAL**



**ASSISTANT  
EDITOR  
HARIKESH  
PRATAP SINGH**

**OTHER MEMBERS-** DR. K.K. TIWARI (H.O.D. CHEMISTRY)

MR. B.D. SHARMA (H.O.D BIOLOGY), MR. M.M. PATHAK, MR. MANISH SINGH

MR. RAHUL SHARMA, MR. KAPIL MARHETTA, MS. GEETANJALI RAJPUT

MRS. BABITA SHARMA, MR. ANIL JANGID, MRS. SMRITI PANDEY

MRS. KUSHAGRA BHATI, MR. ANIRUDDHA S. RATHORE, MS. PRIYANKA TOMAR

**LANGUAGE SUPPORT** - MS. VARSHA RATTI, MR. A. H. KHAN

**IT SUPPORT** - MR. RIGVED ARYA

**STUDENT MEMBERS-** MANAN JAIN, SHASHANK SINGH, ASHWIN KR. YADAV

MUDIT KHANDELWAL, SHAURYA YADAV, BHARAT GHANWANI, OJAS TANWAR

KARMANYA PRAHLADKA



**Website : [www.bpspilani.edu.in](http://www.bpspilani.edu.in)**  
**Email:-[bps.sciencemagazine@gmail.com](mailto:bps.sciencemagazine@gmail.com)**

**Disclaimer:**

Student and Teacher Writers may have taken down the information from websites and various other Sources in order to disseminate and share the knowledge among readers.