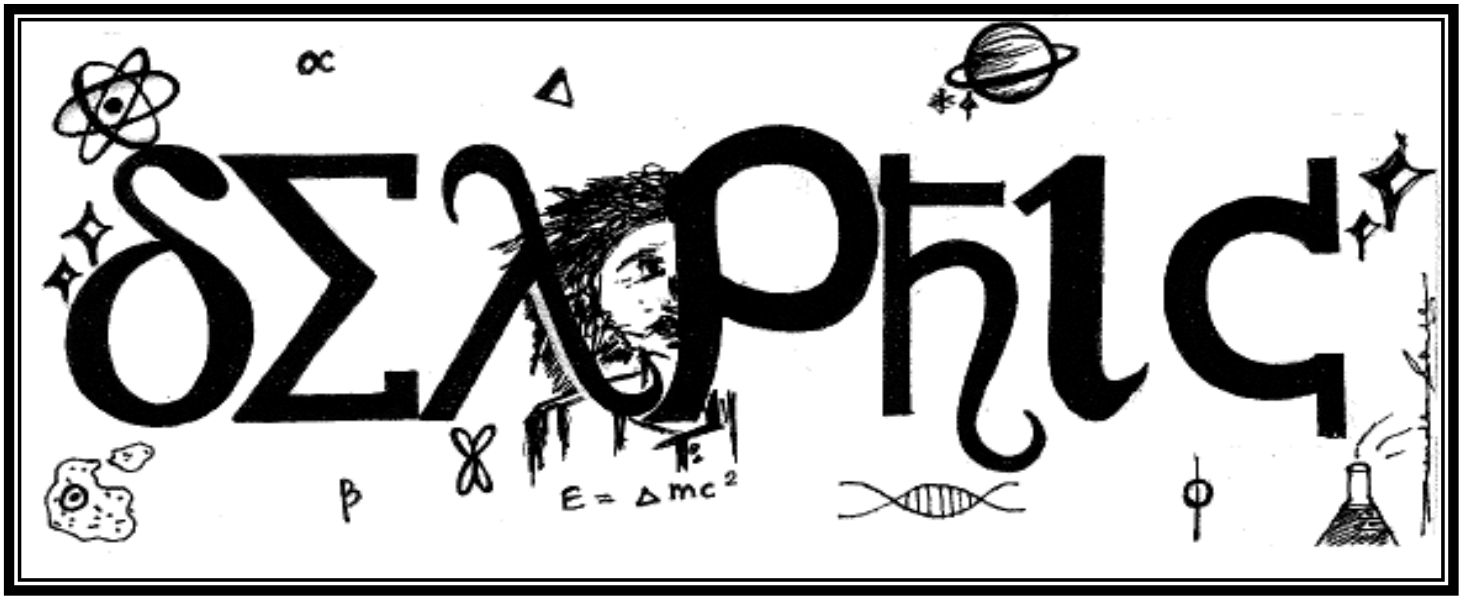


Stay Curious!

August, 2018

"The good thing about science is that it's true whether or not you believe in it."
— Neil deGrasse Tyson

Dear Reader,

The August issue of the Delphic is an amalgamation of various topics related to science. From covering the science of food and cooking, to the future of computers that may come in the form of DNA, we have tried to make this issue as diverse as possible- and all this is an effort for you to become inquisitive and questioning individuals. As Carl Sagan said, 'Somewhere, something incredible is waiting to be known', and you might be the person to know that incredible something.

The Delphic has been and always will be a platform for young, curious minds to express themselves. This magazine is for those who want to know, and those who want to tell. It is one of the few places where it is possible for students to educate other people, even teachers. Every time that I compile an issue, I am surprised at the sheer amount of information that we do not see in our textbooks and classrooms. But it is a wonderful surprise to know that no matter where we are or what we are doing, there will *always* be something new for us to discover and explore.

This issue also includes facts about alternate realities and different techniques of photography, the use of drones in the field of healthcare and a car that may run for a hundred years. We have also included a book review and a fictional story, as well as some jokes that may brighten up your day. I am proud to present to you this edition of the Delphic, and hope that it will encourage you to put on your thinking cap. Until the next issue,

Editor-in-chief,
Diya Kalsi

General Science

The Science of Cooking

"Gastronomy is and has always been connected with its sister: the art of love."

The word gastronomy, derived from the ancient Greek words 'gaster', meaning stomach, and 'nomos', meaning laws that govern , literally means 'the art or law of regulating the stomach'. The term includes cooking techniques, nutritional facts, food science, and everything that has to do with palatability. It also studies how food mingles with a wider culture. In addition, it is about knowing and understanding what you eat.

Gastronomy involves discovering, tasting, researching, understanding and writing about food preparation and the sensory qualities of human nutrition as a whole. It also studies how nutrition interfaces with the broader culture. Nowadays, the application of biological, physical and chemical knowledge to cooking has become known as molecular gastronomy, yet gastronomy covers a much broader, interdisciplinary ground. Molecular gastronomy is a sub-discipline of food science that seeks to investigate the physical and chemical transformations of ingredients that occur in cooking. Molecular cuisine is a modern style of cooking, and takes advantage of many technical innovations from the scientific disciplines.

Pascal Ory, a French historian, defines gastronomy as the establishment of rules of eating and drinking, an 'art of the table', and distinguishes it from good cooking (bonne cuisine) or fine cooking (haute cuisine). Ory traces the origins of gastronomy back to the French reign of Louis XIV when people took interest in developing rules to discriminate between good and bad style and extended their thinking to define good culinary taste. The lavish and sophisticated cuisine and practices of the French court became the culinary model for the French, from where they spread to the rest of the world.

There have been several writings about gastronomy throughout the world that capture the thoughts and aesthetics of a cultures cuisine during a period of time. Gastronomy is one of the most booming careers at the moment; the reason being that it is about the knowledge of how to prepare food. So, if you love food, gastronomy is the right thing for you!

-Ananya Khanna
Class Ten

Clean Energy

WTF(c)

All of us have heard of Batman's Batmobile, and all of us love Tony Stark's concept of clean energy, aka the arc reactor. Imagine if these two ideas were combined. They would produce a brain child that Cadillac proposed in the 2009 Chicago Auto Show on the 100th anniversary of Cadillac. They termed it the World Thorium Fuel Concept (WTF for short). This car was designed by Loren Kulesus.

This concept car will run for 100 years on thorium, a mildly radioactive metal found naturally as Th-232. This futuristic car doesn't just stop at having a nuclear engine: it also has six mini wheels per wheel. This brings it to a total of a mind boggling 24 mini wheels, each with their own induction motors (so 24 motors in total). This means that the car would only require the tires to be adjusted every 5 years and no other additional materials.

The thorium would power a laser, which in turn would heat water, creating steam that will turn a small turbine and propel the car forward. While the entire body of this incredible car flexes like a muscle to allow highly intuitive handling characteristics, the angle with which the wheels contact the surface of the road automatically adjusts according to the movement of the vehicle while maximizing the energy used to power the vehicle.

Some companies actually took this idea seriously, like the Laser Power Systems (LPS) from Connecticut. LPS is actually the company which invented the thorium engine, and it weighed a mind boggling 500 pounds. The company designed it so that it will use 8 grams of thorium to power the car for 100 years. The only residue, which is more than 7,396 gallons of gasoline, can be used as fuel. And that's just from one car. So let's cross our fingers and hope that someone actually builds this car.

-Mohini Chandra
Class Twelve

Genetics

The Future of Computing

DNA, which is short for deoxyribonucleic acid, is the genetic code which determines the physical features of all living things. It stores a vast amount of data regarding the chemical make-up of the organism. This storage capacity of the DNA has enabled scientists to store great amount of data in these biological molecules.

Computation (arithmetic calculations) can be done in the form of an algorithm, which is essentially a step by step instruction manual that processes the information we provide and gives an output. In DNA computing, we represent information in the four letter alphabet which consists of A (adenine), T (thymine), C (cytosine) and G (guanine). These are all nitrogenous bases that make up DNA. This alphabet is used in place of the binary (0, 1) alphabet used by computers. This can be achieved because we can rearrange the short DNA strands in any sequence to store data. Therefore, the input of an algorithm is stored in the form of short sequences of DNA.

This method was invented back in 1994 by famous cryptographer Leonard Adleman. He used DNA computing to solve the "traveling salesman" problem. This problem was aimed at finding the shortest route between numerous cities by only traveling through a city once. He showed that a single drop of DNA, which had billions of molecules, had such great powers of computation that it could easily overpower silicon chips and powerful man made computers. In his experiment, the DNA strands represented 7 cities and the sequences of A, T, C, G represented cities and paths. When the DNA strands were mixed in a test tube, they stuck together and the chains of strands became the probable answers. When he performed certain chemical reactions, the "wrong" molecules were removed.

Though it will take a few more years for DNA computing to become mainstream, it is possible that in the foreseeable future, DNA computers will be common possessions. Computations will become faster as DNA computing will enable multiple functions to take place simultaneously. Scientists are also working on a DNA computer which will grow as it computes. Soon, the technology that we only read about or see in science fiction will become a reality.

-Sulagna Tripathi
Class Eleven

For more information, please visit- https://www.britannica.com/technology/DNA-computing

Collaboration

Scutoids– the New Cuboid

Humans have always believed that the epithelial cells present in their bodies are cuboidal in shape. They were correct, but only until scientists discovered an entirely new geometrical shape which helps the cells remain in a tightly packed 3D structure. This new shape, which scientists call a 'scutoid', plays a key role in explaining how the cells that line and protect the skin and body cavities pack themselves. It has been believed for a long time that epithelial cells packed themselves in prism-like shapes, such as frustums and prismatoids. But the discovery of the scutoid explains how the cells pack themselves using the least amount of energy possible by taking this new shape during tissue growth.

Not only will the discovery of this shape help scientists and doctors in improving the construction of artificial organs and refining the process of artificial organ replacements, but also help in understanding the numerous problems faced by humans related to the packing of cells in the human tissues and the ways of correcting them.

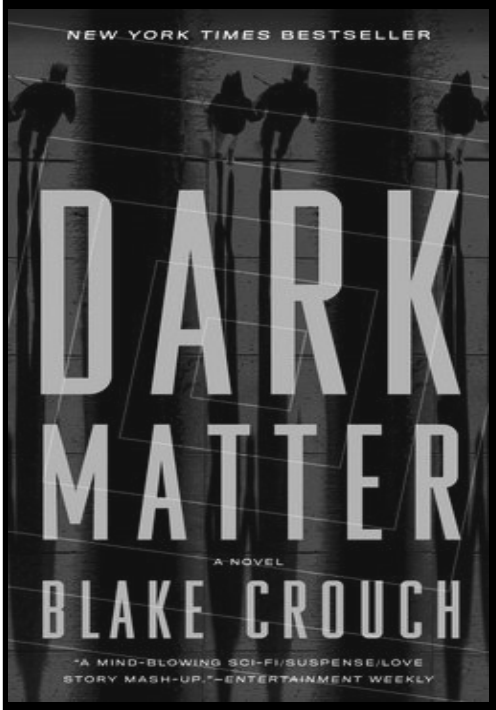
According to American mathematician Laura Taalman, "A scutoid is a prismatoid to which one extra mid-level vertex has been added. This extra vertex forces some of the 'faces' of the resulting object to curve. This means that scutoids are not polyhedrals, because not all of their faces are planar".

Officially, the name scutoid was coined because of its resemblance to the shape of the scutellum, a small triangular plate in insects such as beetles. Unofficially, Clara Grima has stated that while working on the project, the shape was temporarily called an Escu-toid as a joke after the biology group leader Luis M. Escudero. Since his last name, "Escudero", means "shield". The temporary name was modified slightly, and they coined "scutoid".

(... to be continued in the August issue of the Pirate)

Book Review

Dark Matter: a Review



The first thing that you should know about Blake Crouch's 'Dark Matter' is that while it may be a book in the technical sense, it is by no means a conventional book. Normally, we are asked not to judge a book by its cover, but I'll ask you to make an exception for this one, because the title 'Dark Matter' will make you expect a heavy read and not this impossible to put down science-fiction thriller. Like the mysterious cube-like chamber invented by Jason Dessen, the physicist in Crouch's novel-or at least by one version of him- 'Dark Matter' is a threshold into another dimension of reality.

Sent out to buy ice-cream, Jason is abducted and drugged, and wakes up to find himself in a version of Chicago that is not his own: he's not married, he has no child, and he now appears to be the winner of the coveted Pavia prize for his astounding research. The only catch is that he never did all these things in his actual life. When he learns of his girlfriend Daniela's pregnancy, he is happy to turn his back on his career and start a family with her. He is content with his life for the most part. So, in this new version of reality, he has a chance to live life the other way round.

However, he soon realises that these were not his choices and therefore not his world, and now he must find a way back to *his* Chicago before it's too late and he loses his wife and son. His research, or should I say *one* of the Jason's research, has made them capable of tapping into an infinite number of universes. He traverses through various multiverses with his sidekick Amanda. Then again, time, or rather, the 'mysterious psychoactive compound' which allows them to travel between the universes is running out.

His experiment is based on Schrödinger's cat experiment- you need to be alive and dead at the same time for his machine to work. "You figured out a way to turn a human being into a living and a dead cat", a clueless Jason is told at one point. It also shows us that for every choice made by Jason, or for that matter anyone, an entire new universe is created. Crouch's exploration of the 'road not taken' fantasy is intriguing. In the end, Jason's love and concern for his family is highlighted. This is what makes the book so different from other sci-fi books. There is a touch of tenderness in this race-to-the-finish-line thriller. Jason also helps us realise that life is mix of greys and it's not about being either this or that. We have the choice of being a little of both sides if we want to.

-Ishita Agarwal
Class Twelve

Paleontological Humour

Healthcare

Not Just an Eye in the Sky

'Privacy concerns soar as drones spy without consent in New Zealand'. 'A third of US public fears police use of drones'. 'Officials fear that ISIS may deploy bomb-carrying drones'. 'Are spy drones watching you?'
These are some news articles that many of us may have seen on the internet in the past few years. These headlines make it seem like Unmanned Aerial Vehicles, or drones, are spying on everyone like some 'giant eye' in the sky. Questions about privacy invasion are being raised every day, and governments are regularly being caught up in controversies regarding the use of drones in their military. However, the same technology can also be used to help save lives. There are many applications of drones in medical care, some of which include dropping off emergency equipment or medication, and the collection of blood and tissue samples. In fact, a company called Zipline started the world's first national drone delivery network in Rwanda, and has delivered blood in more than 950 life or death situations. Most villages in Africa do not always have access to the right blood type that is needed, but now doctors in Rwanda, and soon in Tanzania, can order blood by text and it will be delivered by Zipline's drones.
Not only can drones be used for delivery, but they also have the potential to save people in emergency situations. In fact, the prototype of a kind of 'ambulance drone' was developed by graduate student Alec Momont last year. This drone delivers a defibrillator to heart attack victims, and uses live streaming audio and video to instruct by-standers on how to save the victim's life. Considering that in the US alone, 600,000 people die due to heart attacks every year, the widespread use of this technology could save millions of lives worldwide.
However, there are still a number of obstacles standing in the way of more widespread use of drones. Aside from the technical challenges like reducing the size and weight of the drones and their payloads, there are many legal and regulatory challenges. Integrating the drones into an already crowded airspace, training and licensing operators, and respecting national sovereignty are only the tip of the iceberg.
But it's still encouraging to think about this inevitable development. The listed healthcare applications will undoubtedly soon be joined by many others so that lifesaving assistance can be extended wherever it's needed.

-Diya Kalsi
Class Twelve

For more information, please visit- https://www.telegraph.co.uk/news/0/pointing-way-medical-drones-saving-lives-africa

Psychology

The Mandela Effect

The Mandela Effect is a collective misremembering of a fact or event. Various theories have been proposed to explain what causes it, some more sensible than others. Human memory is a peculiar thing, at once astonishing in its scope and power and dismaying in its fallibility. There's much we don't know about how memory works, but we can be sure that it isn't perfect. Psychologists call the phenomenon of misremembered events confabulation.
Nelson Mandela's death in 2013 was the initial event to spark the conspiracy because multiple people remembered him dying while in prison in the 1980s. People claimed they recalled news clips and TV coverage of Nelson's funeral, even though he became the president of South Africa and lived for three more decades after being released from prison.
Another example of this effect is in Snow White- you might remember the evil queen asking the mirror- "Mirror, mirror on the wall, who's the fairest of them all?" Well, you remember wrong because the evil queen never said this; her actual words were," Magic mirror on the wall, who's the fairest of them all?"
If you still don't believe me then I have one last example for you. If you were a part of the Pokémon Go crowd last year, you probably became pretty reminiscent of your childhood watching Pikachu and Jiggly Puff battle Pokémon on screen. However, you may have also realized that Pikachu's tail looks a little different. Many Pokémon fans say they remember his tail having a black stripe. Did it, or didn't it?

- Vaanya Singh
Class Eleven

Fiction

The Life Changing Letter

I always thought that I had led a life as normal as anyone else's, till my 21st birthday. My mother, who I thought had never hidden anything from me, had in fact hidden the biggest secret of my life.
On my birthday morning I received a letter from my mother. It read-
My dear daughter,
A very happy birthday! You've turned into a young woman today, and I am really sorry for not being there with you on this special day. Since you are now old enough to understand what happened to you, I am going to tell you the truth about your childhood.
It all started when your nursery school teacher told me that you had decreased your participation in class activities, and mostly spent your time by drawing lines everywhere possible. Then in the evenings, when I took you to the park, you would take no interest in the swings and other children around you. You would just sit on the grass and stare at it. You started acting strange unless you were given your iPad or you were shown your favourite TV show. One day, even your father said that you usually waved at him before he would go for work but you had stopped doing that too. You started talking less, and would usually just say some words which were difficult to understand. One day, when I started noticing the pattern, I tried taking your iPad away. You started acting violent and just got out of control. I was helpless and I had to give it back to you. You had also stopped responding to your name, and the worst was when you stopped recognising me. The very next day I took you to the hospital.
There I met Dr. Kingsley, who was the resident child psychologist. She asked me to give her every piece of information about you and all your unusual habits. She thought for a while and after observing you for some time, came to the conclusion that you had Autism Spectrum Disorder. This sort of autism occurs when a child is introduced to screens at a very tender age. All these are signs of autism as these children tend to have another world of theirs and they tend to lose touch with ours.
I couldn't believe my ears. I was in shock. I couldn't sleep for the next few days. Dr. Kingsley began your therapy which went on for two years. Those years were the most sensitive years of my life and gradually a miracle happened. You started talking, and things changed. That was the time I realised that some of life's best lessons are learnt at the worst of times.

-Zarah Choudhary
Class Ten

FAQs

From a Teacher's Desk

Being a teacher is like being a dartboard- questions fly at you from all sides. Some leave you baffled, while some lead to chains of other questions. In my years as a biology teacher, here are some recurrent questions that I am asked each year-

1. If apes evolved into humans, why do apes still exist?
2. Why does the stomach not digest itself?
3. If evolution is supposed to make you smarter and better, why do we not have eyes on the back of the head?
4. Why do veins look blue if the blood in them isn't actually blue?
5. Do ants have eyes?
6. What and how do blind people dream?
7. Are we animals or humans?
8. How do humans know that they are the most intelligent species?

-Mrs. Richa Joshi Pant

(Catch hold of Mrs. Pant if you would like to know the answers to these questions)

Scientists

Women in Science

THE DRUG DETECTIVE-DR. FRANCES KELSEY

Frances Kathleen Oldham Kelsey, CM (July 24, 1914 – August 7, 2015) was a Canadian-American pharmacologist and physician. Born in Shawnigan Lake, British Columbia, Kelsey attended St. Margaret's School in the provincial capital, graduating at age 15. From 1930-1931 she attended Victoria College (now University of Victoria). Upon completing her Ph.D., Kelsey joined the University of Chicago faculty. In 1942, like many other pharmacologists, Kelsey was looking for a synthetic cure for malaria. As a result of these studies, Kelsey learned that some drugs are able to pass through the placental barrier. While there she also met fellow faculty member Dr. Fremont Ellis Kelsey, whom she married in 1943.

In 1960, Kelsey was hired by the Food and Drug Administration in Washington, D.C. At that time, she "was one of only seven full-time and four part-time physicians reviewing drugs" for the FDA. One of her first assignments at the FDA was to review an application by Richardson Merrell for the drug thalidomide (under the tradename Kevadon) as a tranquilizer and painkiller, with specific indications to prescribe the drug to pregnant women for morning sickness. Even though it had already been approved in Canada and more than 20 European and African countries, she withheld approval for the drug and requested further studies. Despite pressure from thalidomide's manufacturer, Kelsey persisted and requested additional information to explain an English study that documented a nervous system side effect. Her concerns proved to be justified when it was shown that thalidomide caused serious birth defects. Kelsey's career intersected with a passage of laws which strengthened FDA oversight of pharmaceuticals. Kelsey was the second woman to be awarded the 'President's Award for Distinguished Federal Civilian Service' by President John F. Kennedy.

Kelsey continued to work for the FDA and was appointed deputy for scientific and medical affairs in 1995. She retired in 2005. Kelsey died in London, Ontario, on August 7, 2015 at the age of 101, less than 24 hours after Ontario's Lieutenant-Governor, Elizabeth Dowdeswell, visited her home to present her with the insignia of 'Member of the Order of Canada' for her role against thalidomide.

-Archie Khanduja and Devika Agrawal
Class Eight

Humour

Seriously Science?

Have you ever heard someone cracking lame jokes on various things related to science and technology? Well I have, and most of them are quite pointless, but I'd like to share some of the funniest ones I've heard-

- Two men entered a bar. One asked the bartender to give him some H_2O. The second one said that he would have some H_2O too. The second man died.
- You should never drink water while studying, because chemistry says that concentration decreases on adding water.
- What do you call an acid with attitude? A – mean – o Acid!
- My favourite frequency is 50,000 Hz. You've probably never heard it before.
- Why did the white bear dissolve in water? Because it was polar!

-Himaanshi Sharma
Class Ten

Pictures of the Soul

Kirlian photography is a form of photography that supposedly captures the 'aura' around non-living and living bodies. It is named after the Russian scientist and inventor, Sameyon Kirlian, who accidently discovered this phenomenon along with his wife. It took his wife and him ten years to develop the proper apparatus for Kirlian photography.

Kirlian photography involves a collection of techniques used to capture 'corona discharges'. It is a relatively simple process and begins by placing a photographic film on a metal discharge plate. The object to be photographed is placed directly on the film and high voltage is applied to the object for a short while. The corona discharge between the object and the metal plate is captured by the photographic film.

Sameyon Kirlian claimed that it photographed the aura of all the beings. He believed that images created by this method of photography might depict a 'conjectural energy field' and that this technique could be used to diagnose diseases. His claim drew the attention of many researchers and scientists. He photographed a dying leaf over many stages and discovered that the intensity of the aura was decreasing as the leaf approached death. Many scientists countered his argument by saying that it was because of the decreasing water molecules in the dying leaf. The mystery of Kirlian photography and Sameyon Kirlian's claims fuelled heated debates in the scientific and metaphysical community.

An article on spiritualityhealth.com says, "A Kirlian photograph is a picture of your energy field as it existed the moment the photo was taken." It clearly supports Sameyon Kirlian's claim. Jeffery Allen, an energy healing coach on Mindvalley also supports the claim. It is very easy to discard the claims of these spiritual teachers due to lack of experimental evidence. But have you ever wondered what it would mean if Kirlian's claim were a reality? It is hard for many scientists to believe since it is something they cannot describe with a series of complicated mathematical equations.

We are still uncertain on what Kirlian photography depicts and what it can be used for. Since research in this field may not have a significant contribution, it is often neglected and is put in that pile of topics which many scientists do not want to address. Thus Kirlian photography, or as many might say, the Kirlian Effect, still remains shrouded in mystery.

-Palak Porwal
Class Eleven