



What can be the “why” of these happenings?”

-Peyton Rous

Dear reader,

It seems as if 2021 is not giving up yet, hitting us with the second wave of COVID-19 just as we had all started seeing hope on the horizon. And though these times seem rough and unbearable, they have given us the opportunity to progress. The fact that we have been able to create not just one but several vaccines in just a span of a year is a remarkable feat. For centuries, scientists, doctors and physicians discovered cures for diseases without knowing the reason behind the disease or the cure. For instance, chemotherapy was developed way before the world was aware of the mechanisms of a cancer cell and the cytotoxic drugs that were killing them. This led to years of disfiguring surgeries and poisonous treatments performed on patients pushing them all to the brink of death, in the hope that at least one would survive. The world has now realized the importance of finding the ‘why’ behind every phenomenon. In this edition of the Delphic, each article aims at explaining this ‘why’ as a way of inspiring readers to look beyond what is visible at the surface.

From gender bias in medicine to why even scientists like Einstein believed that nuclear weapons would only remain a part of science fiction, this edition takes a deep dive into the most important aspect of science: why.

This edition would have not been possible without the illustrators who provided appropriate visuals for each article.

I am proud of this edition of the Delphic and hope that it encourages you to put on your thinking cap.

Till the next edition,

Diya Dhyani

Editor in chief

COMMENTARIES

1. THE NORTHERN LIGHTS

ANANYA MAKKAR

2. GENDER BIAS IN MEDICINE

KRISHA KHANNA

3. THE MIGRATION OF MONARCH BUTTERFLIES

BHAVYA SANGAL

4. CAN THE MAORIS SAVE ANTARCTICA

ANJAL AGARWAL

5. IS THE SUN JUST A HUGE BALL OF FIRE?

PAKHI PRACYA SINHA

6. THE FUTURE OF FARMS

HIMANSHI GUPTA

7. BROKEN HEART SYNDROME

JEEVAL CHOUDHARY

8. WHY EINSTEIN THOUGHT NUCLEAR WEAPONS WERE IMPOSSIBLE

DIYA DHYANI

9. THE EFFECT OF SOCIAL DISTANCING ON CHILDREN'S IMMUNE SYSTEMS

ANUSHKA PRAKASH

10. MELODIES: BRAIN FOOD

11. THE EVOLUTION OF THE ANUS

SUSHUMNA UNIYAL

12. SWARM

REVA AGRAWAL

13. THE ACTIVE USE OF INERT GASES

BHAVYA UNIYAL

THE NORTHERN LIGHTS

You've probably heard of the northern lights, but have you ever stopped to wonder what causes those colorful ribbons to appear in the sky? Physicists only recently proved what they're all about – and turns out, it's all because of electrons hitching a ride with super fast waves.

The sun is a very volatile body. The violent events that take place on its surface ripple out into the rest of the universe. Sometimes these disturbances are so strong that they yank on the earth's magnetic field, pulling it away from our planet. But, just like a rubber band, the magnetic field snaps back into place. This action is so powerful that it causes the Alfvén waves.

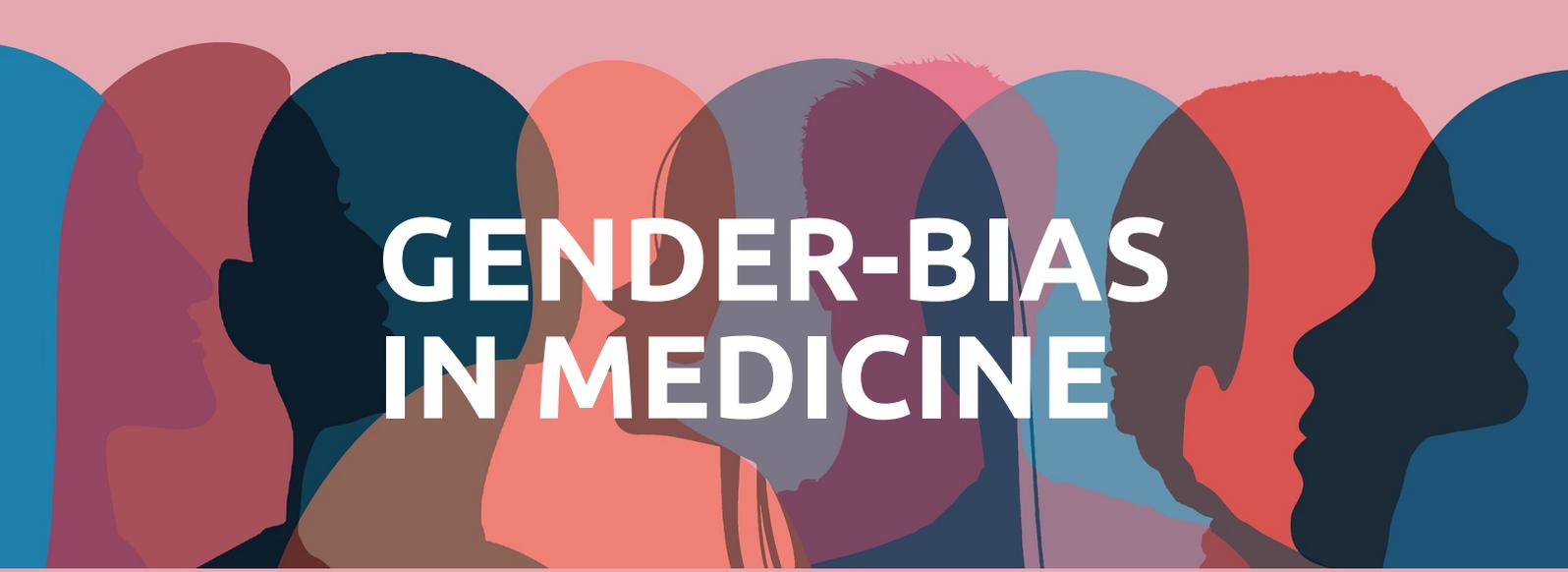
These powerful waves get closer and closer to the earth's surface, and on the way, they pick up electrons traveling on the same space highway. It's actually a lot like surfing.

While surfing, one paddles up to the right speed to be picked by an ocean wave and then accelerates. Similarly, these electrons, if traveling at the right speed relative to the Alfvén waves, get picked up by them and “surf” to the earth's surface. They get accelerated by such an amount that their speeds may reach as high as 72 million kilometers per hour!

When these charged particles hit the upper atmosphere, they collide with nitrogen and oxygen molecules, causing their atoms to get excited. On excitation, the electrons of these atoms move to higher energy orbits. When they return to their original position (lower-energy orbits), they release photons – the fundamental particles of light.

When this phenomenon occurs at a large enough scale, it causes dazzling strips of light – lights we call the 'Aurora Borealis.'

ANANYA MAKKAR
PRESC



GENDER-BIAS IN MEDICINE

Each cell in our body has 23 pairs of chromosomes. The 23rd pair of chromosomes is the sex chromosome. Hence, every disease and medication has a different effect on different sexes, but medical research has overlooked this difference for the longest time. A UCB study, while analyzing articles in medical journals, found that a gender gap persisted in 86 medications that had been approved by the Food and Drug Administration. Between 1997 and 2000, 8 out of 10 drugs were removed due to the adverse side effects occurring mainly in women. Despite being three times more at risk of a heart attack, women are less likely to be included in cardiovascular studies. A study in the journal *Circulation* revealed that women made up 38.2 % of all cardiovascular research participants. Women have different symptoms of a heart attack than men and owing to lack of research around these, women have evidently suffered.

Ironically, male-centric research is justified on the basis that women's bodies react differently due to their hormones, stages of the menstrual cycle, and menopause, which would not provide standard results. Instead, this is the very reason why women should be included in research otherwise they would follow the medications and treatment for a particular disease without accurate information about its adverse effects on their bodies. Another common justification provided is that the clinical trials may affect women's reproductive organs and hence lower their chances of bearing children. While this is accurate, it reduces a woman to a child-bearing machine, which reflects preconceived notions. Similarly, physicians are less likely to diagnose men with depression despite their high scores on the depression scale, as compared to women, which again reveals a gender bias.

Due to the dangerous effects of drugs and other variations shown by women's bodies, greater funding is required for their research. The scientific community has seen a lack of funding in this field. The NIH itself allocates the majority of its resources to diseases that primarily affect men.

While efforts, like those of the National Institutes of Health (1994) have been made to include women in clinical trials and research, there is still a lack of gender specified instruction in the guidelines followed. Several studies generalize their results to all humans, despite only performing the trials on a specific sex population. Instead, they should clearly state that their results are only applicable to the sex researched for and should refrain from generalization.

THE MIGRATION OF MONARCH BUTTERFLIES

While most of us are familiar with the migration of the Arctic tern, we might not know about the migration of orange-black monarch butterflies, which is more evolved than the migration of any other species of their kind.

As the spring gives way to winter, the butterflies begin to leave the eastern coast of Canada and USA for the overwintering ground in the central mountains of Mexico. More than half of the population finds their way to the 'Monarch Butterfly Biosphere Reserve,' or El Rosario butterfly sanctuary. For decades, tourists have flocked to these grounds, to observe the exceptional sight of thousands of monarchs clustered on the oyamel fir trees that provide them warmth to live through the winter.

Once the days of winter have passed, the butterflies take the sky and fly up to areas around Texas. Here, they mate and lay eggs on the milkweed plants. In just a few days, the eggs hatch into brilliantly striped caterpillars of black, gold, and white. These monarch larvae mark the next generation of these creatures. As the larvae turn into butterflies, they fly again for a few hundred yards, where they look for milkweed trees to mate and lay eggs on. This process goes on until the butterflies make their way to the coast of Canada and the USA.

By the time the monarchs reach their original ground, four generations of butterflies have already touched the blue skies. That means that a monarch who left El Rosario is the great-grandparent of a butterfly who arrives there the next year!

However, the butterflies do not have technology like the GPS system that helps them locate themselves in the vast country of Mexico. The orientation of these creatures is rather mysterious, with the 'sun compass' emerging as the only guide they follow. As monarchs move during the daytime, the sun is the celestial body that points the way to the overwintering sites. This proposed route is called the solar compass. Monarchs use the sun's angle at the horizon in conjunction with an internal body clock (like a circadian rhythm) to keep the southwest flight path.

We might still have quite a lot to discover about monarchs, but what we do know is that they have an exceptional migration pattern.

BHAVYA SANGHAL
A1



CAN THE MAORIS SAVE ANTARCTICA?

Like most historical narratives, we see the narrative of the discovery of the Antarctic heralded by European male explorers such as Amundsen and Scott. Even the credit for first sighting the Antarctic islands dates back to only 1820. However, recent studies have revealed that the first inhabitants of our seventh continent were in fact the Maoris: an indigenous people from New Zealand. It goes all the way back to the year 650 AD, Hui te Rangiora discovered Antarctica, and named the land, Te tai-uka-a-pia, translated as sea-foaming arrowroot (shaved arrowroot resembles snow). The first study detailing this discovery was published in the Journal of the Royal Society of New Zealand where they dug through oral archives, ancient carvings, and texts as a testament to the active Maori presence on the island. Archaeologists have even discovered tools and bones from the 1300s, which indicate that the Maoris spent at least 3 months there.

Antarctica enjoys a special status, blanketed by the 1959 Antarctic Treaty and its core value to protect Antarctica's environmental and scientific values. However, signatory states do anything but preserve them, by conducting mining and fishing operations in the name of research expeditions (far too close to the south pole region). According to scientists, Antarctica is considered to be a vital global indicator of how drastic climate change impact is, depending on temperature changes or sea level escalations

While profit-oriented nations see more land to exploit, the Maoris consider themselves guardians of the land rather than owners of it. Researchers in New Zealand hope that international bodies consider the far-fetched idea of implementing *kaitiakitanga*, a primitive but relevant Maori tradition. A non-rigid concept, in it, a *kaitaki*, or guardian, safeguards the sky, the sea, and land, and is the stewardship that ensures the protection of fragile natural features. This has already been administered by the New Zealand government, with the Maoris having been granted 'legal personhood status' of Whanganui River and Mount Taranaki among others.

Although this campaign may seem like an implausible fantasy, initial steps to further avert damage to the Antarctic zone would include inclusion and active involvement of the indigenous people in the discussion of policies and poignant decisions of the same. This revelation of the Maori connection has created a new branch of research, where scientists are now dissecting oral narratives to discover more in-depth information, and give the pedestal that the Maoris deserve in the Antarctic discussion.

IS THE SUN JUST A HUGE BALL OF FIRE?

The Indian Space Research Organization (ISRO) has upheld its objective of bringing space to the service of humanity and the nation over the years. In the process, it has grown to become one of the world's six major space agencies. The current Chandrayaan-2 project was launched to conduct extensive mapping of the moon in order to examine variations that were necessary to trace back the Moon's genesis and evolution, as well as evidence for water molecules identified by Chandrayaan-1.

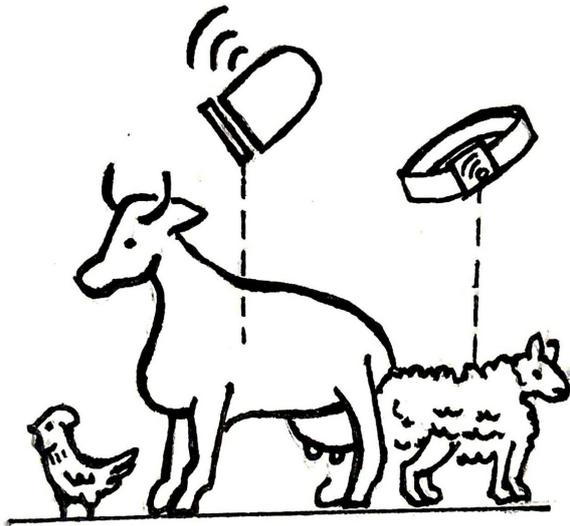
The Solar X-ray Monitor (XSM) on India's Chandrayaan-2 mission is geared to carry out broadband spectroscopy of the Sun from the lunar orbit. It observes the Sun and measures the spectrum at every second. The primary objective of the XSM is to provide the necessary incident solar spectrum in order to observe the properties and characteristics of the hot outer atmosphere of the Sun, known as 'corona'.

Our Sun, being the primary source of energy for our solar system, has a significant impact on our existence and has long piqued humanity's interest. During the deepest solar minimum of the past century, a team of scientists from the Physical Research Laboratory (PRL) in Ahmedabad, used observations of the Sun in soft X-rays with the XSM onboard ISRO's Chandrayaan-2 mission, to learn fresh details about the solar corona, which is made up of ionized gases at temperatures above one million Kelvin, emitting ultraviolet and X-ray radiation.

Absolute abundances of elements - Mg, Al, Si have been discovered in the quiet solar corona for the first time. The latest results from the XSM provide insight into the 'coronal heating problem,' which is the observation that goes against the natural expectation that the temperatures should reduce as we move further away from the center of the sun. The Ahmedabad team discovered and characterized around 100 "sub-A class" microflares in the quiet corona providing new insight into this coronal heating puzzle.

Both the Chandrayaan-2 orbiter and the XSM instrument are operating well and are likely to deliver a slew of fresh and intriguing results in the future.

Pakhi Pragya Sinha
AI



THE FUTURE OF FARMS

The rapid and undeniable growth in world population, the steady rise in demand for food, the ongoing and incoming climate crisis, and the acute water scarcity have all created an enormous need for reform in our farming and food systems.

To increase efficiency, we must develop smart ways to maximize yield with the same resources or less. Some countries, like the Netherlands, have taken up extensive projects to research more innovative ways of crop production. They have experimented the use of Artificial Intelligence in indoor farms. Mention may be made of climate computers that monitor plants and replicate climates most suitable for them by adjusting temperature and humidity, drones that sprinkle fertilizers over farms and some even kill plant-eating moths and caterpillars. Moreover, some farms have begun to use robots to pluck fruits and pick weeds. A keen scientific approach towards farming is also showing promising results, some have begun using only red and blue wavelengths of light, to better activate chlorophyll.

Keeping in mind land constraints in the modern world, vertical farming is gaining popularity. It is the practice of growing plants in vertically stacked layers with controlled environments and soilless farming techniques.

Soilless farming techniques might just be the ground-breaking innovation that revolutionizes farming as we know it. Hydroponics, the most common soilless farming technique, is the growing of plants in a solution of water and nutrients. It uses tubes and electricity, is much faster and, can be used year-round. Aquaponics, another soilless farming technique combines hydroponics with aquaculture, introducing fish to the system. The third soilless farming technique is aeroponics, which, as its name suggests, is the growing of plants in air.

The challenge to feed the world and double the rate of food production might seem unsurmountable but it is not, not if we act fast. Indoor farming- greenhouses, and the usage of technology in farms has proven to be abundantly fruitful (quite literally) in the Netherlands. The rest of the world must adopt these techniques and adapt to the new methods of farming to fight the prospects of a global food shortage that seems to hover over our future.

BROKEN HEART SYNDROME

The first thing that comes to our minds on hearing the term – ‘a broken heart’ is a failed relationship. However, this broken heart can be extremely menacing. Stress cardiomyopathy or takotsubo (the Japanese name for an octopus trapping pot), commonly known as broken heart syndrome, is a heart condition in which the left ventricle becomes weak. It is often induced by stressful events and intense emotions such as losing a loved one or being involved in a serious tragedy. One might ponder, how do nerve-racking situations lead to this syndrome? Well, to cope with stressful conditions, the body produces hormones like adrenaline and non-adrenaline. This can sometimes burden the heart, causing the arteries near the heart to suffocate, resulting in a decrease in the blood flow to the heart. Along with this, adrenaline can also let harmful amounts of calcium enter the heart cells, which prevents them from beating properly. Fortunately, these effects of adrenaline are reversible.

Interestingly, this syndrome occurs mostly in women, with 90 % of cases affecting women ranging from 58 to 77 years of age. This might be due to the diminishing levels of oestrogen in older women, as it is known to protect the heart from the detrimental effects of these hormones. Some prominent symptoms include sudden and severe chest pain, arrhythmias, shortness of breath, and hypotension. This disease can also lead to more complications such as heart failure and backup of fluid into the lungs.

One should practice yoga, meditation, journaling, and mindfulness because although, the broken heart syndrome is not what the metaphor suggests, it is a malady that can truly affect your heart!

WHY EINSTEIN THOUGHT THAT NUCLEAR WEAPONS WERE IMPOSSIBLE

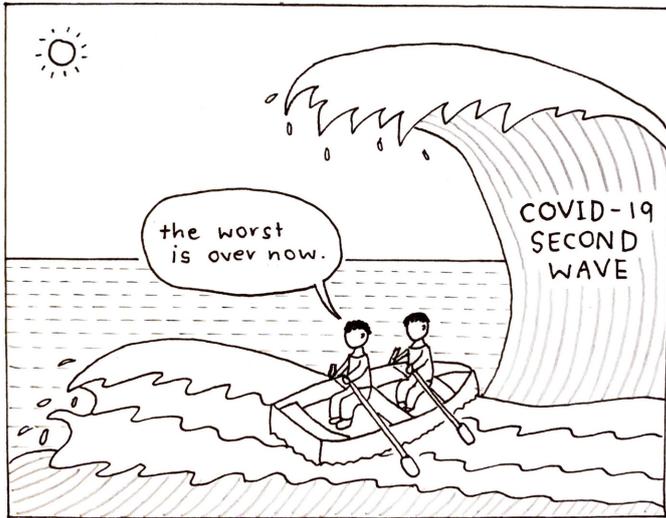
Now that we have nuclear weapons and nuclear power plants, you might think that it was inevitable that we would be able to harness the energy inside the nucleus of atoms. But that was far from the case. In fact, famous scientists thought the idea was laughable. Nobel laureate Robert Millikan, in 1928 said,

“There is no likelihood that man can ever tap the power of the atom. The glib supposition of utilizing atomic energy when our coal has run out is a completely unscientific utopian dream.” or as Rutherford put it, “Anyone who expects a source of power from the transformation of these atoms is talking moonshine.”

Now there was a good reason for their pessimism. When Becquerel first observed radioactivity, he thought it was a phenomenon similar to phosphorescence. That's when you shine radiation like light onto an object and it absorbs that energy and later re-radiates it in a different part of the spectrum. The uranium ore was known to do this, it can absorb UV light and re-radiate it as visible light. In 1896, Becquerel performed experiments where he placed uranium ore in the sunshine on top of some wrapped up photographic film. He found that the film was exposed, seemingly by invisible rays from the uranium ore that penetrated the paper when it was excited by sunlight. But one day when he went to do his experiment, the weather in Paris was gloomy, so he put the uranium and the photographic film inside a drawer and a few days later, even though the uranium hadn't seen the sun, he decided to develop the film anyway. And what he found was that the photographic film had been exposed just as before, even though the uranium was not excited by sunlight, indicating that this was not a phosphorescence phenomenon but some type of radiation that was causing energy to come out of the ore unprovoked. But how could a seemingly inert object like a rock give off energy? Where was it getting that energy from? It was a mystery that seemed to violate the law of conservation of energy, that is until Einstein published his famous $E=mc^2$, which suggested that a source of energy for the radiation might be the mass of the nucleus. This premise was enough for science fiction writers to let their imaginations run wild. Like H.G Wells who in 1914 published the book, 'The World Set Free' which includes the first mention of the word 'atomic bomb'. He envisioned a uranium-based hand grenade that would continue to explode indefinitely. But to scientists, this was completely detached from reality, as Einstein in 1933 said, “There is not the slightest indication that nuclear energy will ever be obtainable. It would mean that the atom would have to be shattered at will.”

And that's just the thing, people could not make a nucleus do anything. All they were observing was the natural process of radioactive decay- atoms of a particular unstable isotope decaying at random with some characteristic half-life. And the energy given off, although immense on the scale of an atom, is pretty insignificant. The fission of a single uranium atom releases 20 times less energy than the amount required to raise a grain of sand. Now up until 1932, the only known particle in the nucleus was the proton, so if someone wanted to alter a nucleus, they would have to fire a proton at it. But since the nucleus and the proton are both positively charged, they repel so the proton would have to be fired at a very high speed and with great accuracy to get to hit and stick to a target. And even then, only one nucleus has been affected successfully, which at best can't even lift a grain of sand. But then comes the discovery of the neutron. And the neutron changes everything because as an uncharged nuclear particle, it can drift undeflected through matter until it hits the nucleus, transforming it into something else. And this leads to the epiphany of a man named Leo Szilard. Now Szilard had read 'The World Set Free', so he had already imagined a future in which nuclear energy is harnessed by weaponry. He realized that the neutron enables us to trigger nuclear reactions at will, and if there is a nucleus when it splits in this way releases 2 neutrons, it could trigger more and more fissions at an exponentially increasing rate. The nucleus that has this property is uranium-235. In fact, on average it releases 2.5 neutrons every time it divides. Now all of a sudden, it is possible to split zillions of nuclei simultaneously and release incredible amounts of energy all at once. That's an atomic bomb. If you want more control over this release of energy, as in a nuclear power plant, then you have to absorb a few neutrons so that the fission of one nucleus only causes the fission of one other nucleus on average. Then you have a steady chain reaction that emits the same amount of energy each instant. The challenge is that this is like balancing on a knife-edge, absorb too many neutrons and the chain reaction quickly decays to nothing, absorb too few and the rate of reaction increases exponentially, and soon you are back to a bomb or Chernobyl. So if not for the existence of the neutron, a neutral nuclear particle to trigger reactions, that occur in greater numbers relative to protons in the larger nuclei, meaning they are likely to be given off when a large nucleus splits, well then maybe as many brilliant suspected, it would be impossible to harness the energy in the nucleus. But as it is in our universe, the neutron is the hero and the villain of nuclear physics.

THE EFFECT OF SOCIAL DISTANCING ON CHILDREN'S IMMUNE SYSTEMS



We human beings, being social animals, are used to going out and interacting with people. We can't survive being isolated from one another, which is why this pandemic has been a big challenge for us. It is a known fact to us that all people in our generation are going through the same physical and mental toll as we are, but we often forget about the effect the pandemic is having on our natural immunity. Starting off with younger children, scientists claim that measures to fight COVID (wearing masks and staying at home) have weakened their immune systems as they have not been exposed to viral

pathogens that usually help them build resistance to common bugs. Wearing masks has hence, not just reduced the risk of COVID, but also other respiratory bugs such as the flu which would in a normal circumstance ensure immunity build-up in a child's body. Before COVID, most children encountered almost all seasonal viruses before they were 18 months old. Now scientists fear that children below the age of one are becoming increasingly susceptible to viruses such as RSV (Respiratory Syncytial Virus) that can cause serious lung infections. Scientists are also worried that respiratory viruses will shoot up when life goes back to normal, the way COVID did.

We teenagers have already been exposed to a number of pathogens in our childhood, however, this pandemic has affected our immune systems in a different way as well. It has been proven that the psychological effects of social isolation can affect our immune system, the root causes being loneliness and stress. Having to stay away from our loved ones for over a year now has affected some of us in harsh ways. An experiment found that people with fewer social ties are more susceptible to the common cold. Stress has similarly harmful effects on our immunity, because the hormones involved in stress response — cortisol, epinephrine, and norepinephrine—interfere with the function of immune cells.

In tough times like these, since we can't go out to boost our immune systems, we can do other things such as maintain optimum sleep and eat nutritious diets. But the fact remains that the quicker everybody gets vaccinated, the faster children will be able to return to school and re-establish their normal routines.

ANUSHKA PRAKASH
PRESC

Melodies: Brain Food

Visual Cortex:
Reading music,
looking at a
performer's
movements

Prefrontal Cortex:
Controls
behaviour,
expression and
decision making



Cerebellum:
Involved in
movement while
playing an
instrument a

Nucleus accumbens
and amygdala:
Involved with
emotional reactions
to music

THE EVOLUTION OF THE ANUS

While other organ systems have been investigated thoroughly, the story behind the evolution of the anus remains a mystery. One of the reasons it has been neglected is because it is really hard to have a serious conversation about this topic.

Though the origin and evolution of the anus remains unclear it is believed by many researchers that it all began from a common opening, usually found in the lower phylum. The appearance of the anus is inextricably linked to the evolution of the entire digestive tract. The digestive tract is one of the most important organs of the body. It plays a key role in efficient digestion, sustaining nutrients and helps us go about eating whatever we want unbridled. Despite its importance, many organisms seem to work perfectly without the digestive tract and anus, for instance the porifera phylum, while others evolved to have an anus of sorts; one which ingests food but also participates in expelling excrement. There are only a select few organisms who seem to have a 'transient' anus. Throughout evolution, this particular part of the gut has shown itself in many forms, in some phases even disappearing all together.

Though many animals lack an anus, some species have independently evolved one. For example, most flat worms lack an anus but the polyclad flatworm (*Thysanozoon nigropillosum*) has multiple anuses on its back. Most deuterostomes (a superphylum of kingdom animalia that groups together all animals that have bilateral symmetry) have a blastopore that develops into the anus during embryonic development and also have an anal opening that is fused with the reproductive opening called cloaca.

The reason why different organisms have a different modification of the anus is simply due to the fact that their body shape is unable to cope with a sac like gut. When it comes down to the simplest explanation of evolution of the anus it is this; the shape and structure of any organ and its specialized cells depends on a network of genes that carry the code to make it. Over the long-time span of evolution these genes have been inherited in different variations hence the different structure found in each organism.

We cannot clearly map the evolution and origin of this particular organ but the latest hypothesis states that there is an evolutionary link between the anus and gonopore.

SWARM - THE ROBOT THAT GETS SMARTER AS IT WORKS

The employees at a Hong Kong warehouse work 24x7 without getting exhausted. Sounds unbelievable, right? A swarm of autonomous robots have turned this unbelievable feat into a reality.

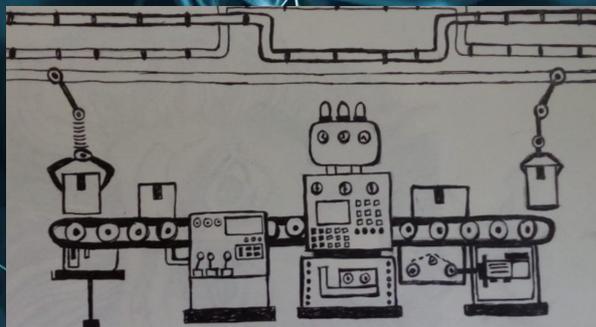
Geek+, a Chinese start-up, created these Autonomous Mobile Robots. Thanks to AI, these robots are guided through the warehouse by QR codes on the floor, and they can make their own judgments, such as which route to travel and which path to follow to reach their destination.

Robots have become popular in warehouses around the world, with Geek+ claiming to have over 15,000 robots in over 30 countries, including warehouses of Nike and Decathlon. Robots that become more efficient over time, according to managing director Lit Fung, enable companies to meet the demands for speedy delivery while decreasing labour expenses and human error. He explains, "Everyone is seeking for an automated solution to use in their warehouse."

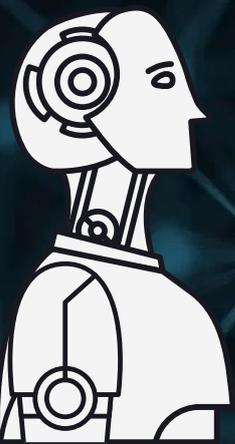
The robots track their movements in the warehouse by scanning QR codes on the floor as they drive over them, allowing a team of engineers to constantly improve the swarm's algorithm, making it more efficient. So, while the robots are not technically teaching themselves how to function more efficiently, work is being done behind the stage to improve their performance.

Lit Fung also declared that the robot has the ability to make decisions for itself, such as judging direction, going forward and backward, and choosing the optimal path for the destination. Geek+ claims to have deployed its autonomous robots in several nations, but the real learning takes place in an autonomous warehouse in Hong Kong. Every hour of the day, every day of the week, the swarm whizzes around the floor, delivering groceries and other supplies ceaselessly.

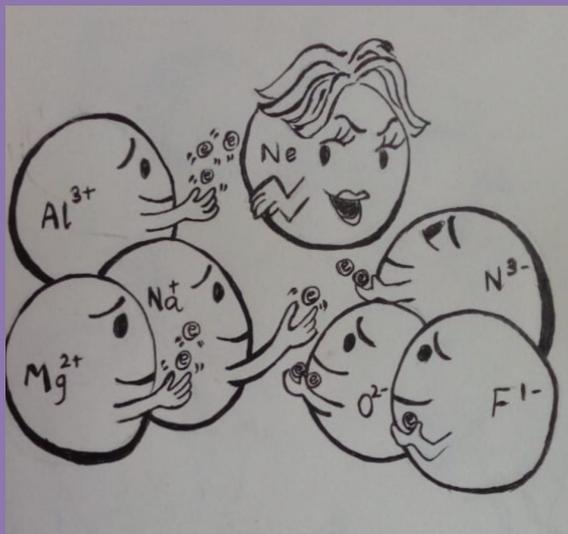
Meanwhile, the entire warehouse serves as a large-scale swarm robotics experiment, with each robot's choices — and the dynamics of the entire swarm — improving with time. And it appears that the modifications are paying off: In the previous four months, the warehouse has reportedly supplied over 1 million different products to Hong Kong convenience stores. That said, don't say you were not warned if you see a swarm of little Roomba-like robots circling around you.



REVA AGRAWAL
SC



THE ACTIVE USE OF INERT GASES



Apart from being known to do justice to their names, the importance and functions of these gases are seldom known to the layman. These 18th group gases are placed on the extreme right of the Periodic Table and their nonreactive nature is due to their completely fulfilled valence shells. The majority of them are Octets with Helium being the exception having only 2 electrons in its valence shell.

The noble gas family consists of six different elements, five of which have stable isotopes (helium [He], neon [Ne], argon [Ar], krypton [Kr], and xenon [Xe]), and one that only has radioactive isotopes (radon [Ra]). From being used in MRIs to 3-D printing and to being filled in balloons, these gases have a wide range of functions to perform.

The first on the list is Helium which is usually associated with inflating balloons, but it has much more to offer. Helium has extensive industrial uses such as being used to prevent large-scale explosions and cryogenics. Liquid helium is also used for MRI scans, but the lesser-known fact about Helium is that it is used to produce a certain fiber which is used in the development of 5G. These uses have impacted the market demand of this product and its price has doubled in the past five years.

Other than representing a much-appreciated color, Neon is also an inert gas with numerous uses such as shielding electric equipment from lightning and is present in some parts of aircrafts to passivate fuel tanks and prevent their explosion on days with high temperatures.

Argon is used in radioisotope dating and 3D printing. Quite fascinatingly, it is also present in the tires of luxury cars to reduce the noise caused due to the friction between the tires and the road.

Not only is Krypton used in high-speed photography and fluorescent lighting, but it also has applications in the field of nuclear science as it is used in nuclear medicine for lung ventilation and nuclear fusion energy research experiments. Similarly, Xenon is also used in photographic flashes and high-pressure arc lamps.

In the field of medical science, Radon, the unique inert gas with a radioactive isotope, is considered a major asset as it helps in the treatment of tumors. It is also used in conducting hydrological research and making Earthquake predictions.

By having a look at all these merits and uses of these inert gases we can finally conclude that despite being chemically inactive, these gases have an active role to play across many fields ranging from medicine to industry and are nothing less than a boon to our existence.

CREDITS

Teacher-in-charge

Ms Richa Joshi Pant

Editor-in-chief

Diya Dhyani

Editorial Board

Krishna Khanna

Sushumna Uniyal

Himanshi Gupta

Artists

Anushka Prakash

Ananya Gupta

Bidisha Dam

Archie Khanduja

Special Thanks

Reva Agrawal