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SENSE N' SCIENCE

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THE RACE FOR THE VACCINE

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"the world is beautiful,
but has a disease called,

man"

-friedrich nietzsche

Editors Note

This year has brought the nations and the scientific community together and mobilized them towards a common goal of preparing the world to fight pandemics like the COVID-19 and serve the society with affordable vaccines and therapy.

Amidst the towering count of the COVID-19 cases in India and around the world, coupled with the endless uncertainties in our life, the bonding with our family members grew stronger with each passing day when they tried to make our otherwise gloomy day, a little chirpier - Everyone trying to understand each other more than we previously did.

In this attempt, this edition of Sense N' Science gives you another opportunity to witness a small, yet important contribution made by our students towards this magazine and making us believe that this quest for knowledge will continue...

Teacher in charge - Meenu Gupta

Student editor - Kush Agarwal

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The Black Hole Image

By - Garvit Agarwal, 10B IGCSE

On April 10th 2019 the Event Horizon Telescope released the first image of a black hole. It is an astounding accomplishment because it was previously thought of being impossible! Taking an image requires light to reflect off or be emitted by the object being photographed, but it is impossible for light to do so from a black hole- due to its strong gravitational pull; therefore the team behind the telescope had to photograph not the blackhole but its silhouette against its glowing surroundings.

This was very theoretical as the blackhole in question ,M87*, is 53 million lightyears away making an angle of only 40 micro arc seconds- even though it has a huge mass which is 6.5 billion times that of our sun and nearly the size of our entire solar system- and the current technology can not observe this far directly. Based on diffraction calculations in order to observe the blackhole's silhouette we would need a lens which has a diameter close to that of earth's own. This being impractical the event horizon telescope compensated by collaborating with eight telescope sights across the planet with at least one of it always pointing at the blackhole. This mimicked a single telescope as large as the earth observing directly at M87*. This technique is called Very Long Baseline Interferometry, or VLBI.

This monumental task as each telescope had to be directly in line and the weather had to be clear.Each telescope had to have been perfectly synchronized and have their position relative to earth be known as accurately as possible in order to time the data collected in order to stitch the image.
Data was collected for a period of four days in April 2017. Due to the large amount of data it was transported physically from each telescope to a central location where the data was compiled to create an image. This collaboration resulted in an image that had a resolution 4000 times more than that of the Hubble space telescope. This was very important for the advancement of physics as this proved the existence of black holes and the data collected helps confirm general relativity. This is an astronomical undertaking as it helps answer many questions faced by physicists.

Laughing Gas Is Anaesthesia?!

By - Haimi Kothari, 8D IGCSE

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Until 1840 all the surgeries and operations were extremely painful for the patients as the discovery of Anaesthesia hadn't taken place and nobody knew about it.

Fortunately, half a century ago, people started becoming aware of a compound named Nitrous oxide. It was known to be famous among the youth in England as it made one feel stress free, relaxed and at peace. It gave the feeling similar to the one that one would get after taking drugs so people thought of it to be a recreational drug. It was famously called the Laughing gas. Movies and plays were made on this and the audience loved to watch this as it was entertaining to see how people got high after inhaling it and the epic drama they did. Dr. Horace W
ells, a well known dentist then too had gone to watch a movie based upon the Laughing Gas.

Watching that movie, he was suddenly struck by an idea. He thought that it could be used in the field of medicine. Patients could be asked to inhale the Laughing gas or Nitrous Oxide before the surgery and then the operation should be conducted. He asked one of his peers to pull a teeth once Mr. Wells has inhaled the gas and to his surprise it made wonders. The surgery was simply painless and at ease, the tooth was pulled out. This is how the first tooth was pulled with convenience. This was the story behind how Anaesthesia, the most commonly used ointment came to existence and became the most used in the minutest to the greatest surgeries conducted these days. Hence we can conclude that Nitrous Oxide, the so called Laughing Gas is no different than Anesthesia!

The Race For The Vaccine

By - Kush Agarwal, 10A IGCSE

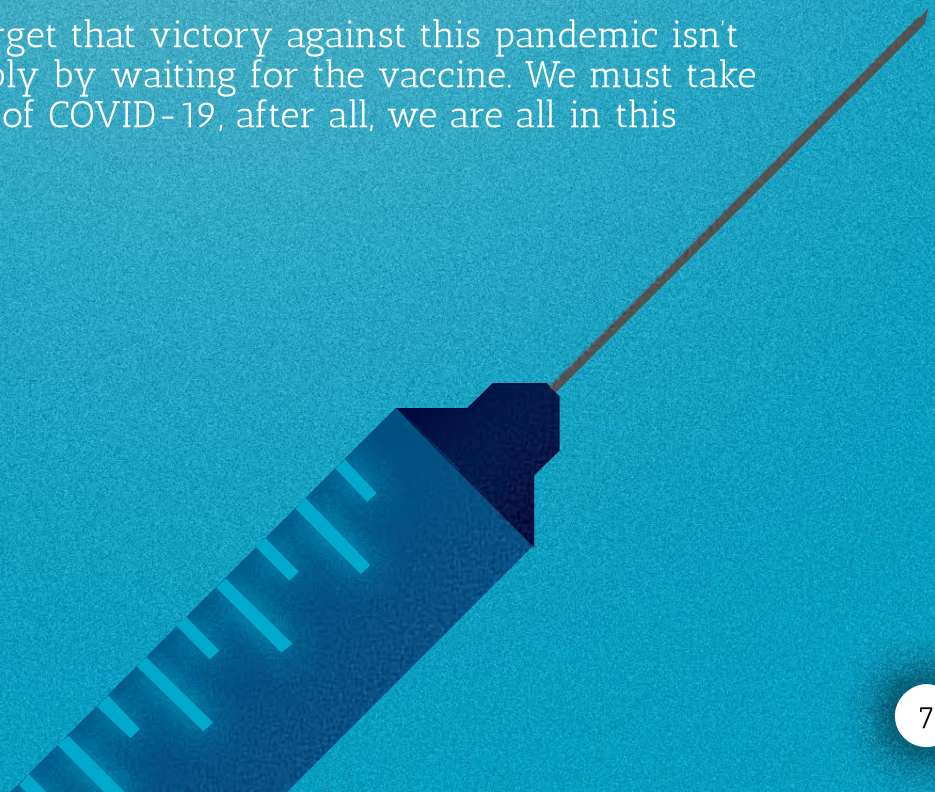
What we are going through needs no introduction. The pandemic has locked not only us, but also our lives and dreams. Many have perished, and many aspirants have been compelled to withhold their dreams. The only ray of hope shimmering through the dark clouds looming above is the prospect of a vaccine. But how close it actually is?

CDC, Centers of Disease Control and Prevention states, "Clinical development is a three-phase process. During Phase I, small groups of people receive the trial vaccine. In Phase II, the clinical study is expanded and vaccine is given to people who have characteristics (such as age and physical health) similar to those for whom the new vaccine is intended. In Phase III, the vaccine is given to thousands of people and tested for efficacy and safety."

Recently, Moderna have completed phase I, indicating that the first milestone in this race has been reached. Phase II is said to be more critical since phase II involves gauging the effectiveness of the vaccine, as compared to phase I where safety is the main testing point.

Not lagging far behind is India's very own vaccine being developed by Bharat Biotech, which has also entered the penultimate phase. India also has 7 other vaccines in the pipeline, with the Serum Institute of India joining hands with Oxford University as one of the aforementioned "participants" in this race of sorts.

However, we must not forget that victory against this pandemic isn't going to be achieved simply by waiting for the vaccine. We must take steps to arrest the spread of COVID-19, after all, we are all in this together.



Science Is Not Everywhere!

By - Rajveer Kohli, 8B IGCSE

We all have seen cartoons in our childhood and if you are reading this while you still watch cartoons, then you can recall them better. Let's start with the most watched one which is "Tom and Jerry". Every time Tom the cat chases Jerry the mouse (many of these scenes are on cliffs), after running for a few seconds, Tom runs off the cliff. Here the science of gravity only works after you look down. This means that you won't fall unless you look down. This even happens in other cartoons like Ben 10. Here is an example:

In a very old cartoon called "Looney Tunes", there was this one episode where a bunny swings from the second floor of the building to the tenth floor directly and flies in circles defying the law of gravity and she is not even applying so much force of swinging to shoot eight floors high. Here is a demonstration of how to fly eight floors high:

There are many more examples where no science is used or only a little science is used. Like we have another famous cartoon that is "Doraemon".we all know that doraemon, a cat robot, is from the future like the 22nd century and they have many new gadgets that do marvelous and many funny things but they never told us that they can generate organs. Or did they? Some gadgets, if you remember, includes gloves. We all know that doraemon's hands are round but when he is demonstrating the glove gadget, like always, he wears them and BOOM! he has fingers in the gloves.

Taking Doraemon into consideration again, water is either very light or has very less gravity applied to it. You will see that whenever Nobita cries, which happens every time, the tears are just coming out as fountains as if a lot of force is applied to it from our cry. This could be known "Fountain Cry" in cartoons like this:

Discovering Science Through Stamps

By - Kush Agarwal, 10A IGCSE

Stamps have always been a very important part of communnication, as they enabled people to connect. Even today stamps provide a means of communnication vfor much of rural India. Stamps have also been released to commemorate milestones in science. Here are a few distinctive ones.

DIY Hand Sanitizer

By - Ms. Prachee Kothari - Department Of Physics

When you're on the go and can't find a place to wash your hands, hand sanitizer can be a lifesaver. Commercial hand sanitizer can get expensive, and with the shortage of hand sanitizer due to COVID-19, you may have to resort to making your own. Making your own hand sanitizer is a simple process that results in a formula you can customize to suit your personal tastes.

1. Gather your ingredients.
    - 2/3 cup 99% rubbing alcohol (isopropyl alcohol) or 190-proof grain alcohol
    - 1/3 cup pure aloe vera gel (preferably without additives)
    - 8 to 10 drops essential oil, such as lavender, clove, cinnamon, or peppermint
    - Mixing bowl
    - Spoon
    - Funnel
    - Plastic container
2. Mix the alcohol and aloe vera gel in the bowl. Pour the ingredients into the bowl and use the spoon to mix them together well. The mixture should be completely smooth.
    - If you want the solution to be thicker, add another spoonful of aloe vera.
    - Or thin it out by adding another spoonful of alcohol.
3. Add the essential oil. Add it one drop at a time, stirring as you go. After about 8 drops, smell the mixture to see whether you like the scent. If it seems strong enough, stop there. If you like a stronger scent, add a few more drops.
    - Lavender, clove, cinnamon and peppermint essential oils have the added benefit of providing additional antiseptic properties to the mixture.
    - If you don't like these scents, it's fine to use whatever scent you enjoy. Lemon, grapefruit and passion fruit all work well.
4. Funnel the mixture into the container. Place the funnel over the mouth of the container and pour the hand sanitizer in. Fill it up, then screw on the lid until you're ready to use it
    - A small squirt bottle works well if you want to carry the sanitizer with you throughout the day.
    - If you make too much for the bottle, save the leftover sanitizer in a jar with a tightly-fitted lid.

Count Them While You Can

By - Adhya Brahmkshatriya, 9A GSEB

An endangered species is a species of wild animal or plant that is in danger of extinction throughout all or a significant portion of its range. A species is considered threatened if it is likely to become endangered within the foreseeable future.

The Olm or Proteus is an aquatic salamander in the family Proteidae, the only exclusively cave-dwelling chordate species found in Europe. In contrast to most amphibians, it is entirely aquatic; it eats, sleeps, and breeds underwater.

The Olm has adapted to living in total darkness and can survive for up to 10 years without food. The Croatian Herpetological Society - Hyla and the Croatian Institute for Biodiversity are working on Olm conservation within the PROTEUS project.

The data on the Olm distribution and the general knowledge on its ecology and biology are scarce, even though it is the most recognizable representative of the endemic underground fauna. The PROTEUS project strives to determine the exact species distribution and its population status in Croatia. This is a challenging task given that its natural habitat is not easily accessible, converting the species observation and study in situ into a complex endeavour. This type of data collection and analysis is of high importance for the determination and realization of species protection measures.
Olms hunt their prey in the absolute dark and have developed a powerful sensory system of smell, taste, hearing and electrosensitivity. Olms are pale and sightless, although their skin-covered eyes are still sensitive to light, despite spending their entire lives in caves. A small population of "black olms", which has darker pigmentation than other members of the species, has been recognised as a distinct subspecies.

The Olm was first protected in Slovenia in 1922 along with all cave fauna, but the protection was not effective and a substantial black market came into existence. The IUCN Red List of Threatened Species™ lists the Olm as Vulnerable (VU), because its Area of Occupancy is less than 2,000 km2, its distribution is severely fragmented, and there is continuing decline in the extent and quality of its habitat, and presumably also in the number of mature individuals.

Sir David Attenborough in Croatia, selected the Olm as one of the 10 species worldwide that he would like to protect from extinction. When interviewed for The Telegraph, he said: "In Croatia, it was once believed these Olms were baby dragons. It certainly is an odd looking creature. It has very tiny legs and an extremely elongated body, but perhaps the most interesting thing about it is that it lives for up to 100 years."

The project is supported by the MAVA Foundation, the Mohamed bin Zayed Species Conservation Fund and the Zoological Society of London (ZSL).

I would like to end this article with a quote by Jeffrey Moussaieff Masson,

"Animals are, like us, endangered species on an endangered planet, and we are the ones who are endangering them, it, and ourselves. They are innocent sufferers in a hell of our making."

Always remember, When they are gone, When every last life has been stolen. How will you remember them? I am signing off with this question for you to ponder upon.

Why do the hands of the clock move in a clockwise direction?

By - Rishikesh Mashruwala, 8D, IGCSE

First of all, the Earth and Moon only turn counterclockwise when viewed from a certain perspective: above the North Pole. If you looked at them from the South Pole, they would appear to turn clockwise.

The reason that clocks turn clockwise has to do with sundials, which were the first clocks. In the northern hemisphere, the earth rotates counterclockwise, which means that from our point of view the sun appears to move across the sky in a clockwise direction. Therefore, if you build a sundial to tell time, the shadows will move across it in a clockwise direction.

With mechanical clocks, you could of course make them go around either way, but the earliest ones were presumably designed to turn the same way the shadows on a sundial do, simply because that's what people were used to. What this means, by the way, is that if mechanical clocks had originated in the southern hemisphere, the ones we use today would probably go around in the other direction!

Eureka!

By - Aryan Singh, 10A IGCSE

Eureka. I'm sure we've all heard it. But raise your hand if you truly know the story behind it? For the precious few who do know, this article isn't for you but read on. Perhaps, you'll learn something new.

First, let me introduce you to Archimdes. A great inventor, astronomer, mechanic and a hundred other occupations. But perhaps, his greatest achievement was his principle of buoyancy. Maybe not greatest... but it's up there.

The story begins with Hieron, the King of Syracuse, who had just led the Syracusans to victory. As a form of gratitude to the Gods, he ordered a goldsmith to make him a crown of pure gold which he would sacrifice to the gods. The goldsmith did as ordered and was paid a handsome amount. Soon, word began to spread that the goldsmith had tricked Helios by combining silver with gold. Now, Helios was frustrated but instead of killing the gold smith, he set out to see if the rumours were true. He ordered Archimedes to find out. Archimedes thought and thought but he couldn't figure out how to check if it was really gold. So naturally, he went to the public bath. He pondered about his dilemma whilst getting into his bathtub when he noticed the water flowing out of the tub. He then realized that the volume of water displaced was equal to his weight. Eureka! He had found the solution. In his ecstasy, he ran naked across the streets screaming Eureka! What he had indeed discovered was how to find the volume of an irregular object. The Archimedes principle states that the buoyant force on an object submerged in a fluid is equal to the weight of the fluid that is displaced by that object. Basically, by finding the volume of the water that was displaced, the volume of the object can then be measured and the density calculated. With this new discovery, Archimedes proved that the crown was indeed not made of pure gold. He was applauded for his discovery. Nowadays, this principle is applied everywhere. From submarines to hot air balloons. It all started with a naked man shouting Eureka. As for the gold smith, that's another story.

Teflon

By - Hargobind Khurana, 10A IGCSE

Teflon, found by Roy J. Plunkett at the DuPont Company's Jackson Laboratory in 1938, was a unintentional innovation—in contrast to the vast majority of the other polymer items. Be that as it may, as Plunkett regularly told understudy crowds, his psyche was set up by instruction and preparing to perceive curiosity.

Instruction and DuPont

As a poor Ohio ranch kid during the Depression, Plunkett (1910–1994) went to Manchester College in Indiana. His flat mate for a period at this little school was Paul Flory, who might win the 1974 Nobel Prize in Chemistry for his commitments to the hypothesis of polymers. Like Flory, Plunkett went on to Ohio State University for a doctorate, and furthermore like Flory he was employed by DuPont. In contrast to Flory, Plunkett made his whole profession at DuPont.

Revelation of Teflon

Plunkett's first task at DuPont was investigating new chlorofluorocarbon refrigerants—at that point seen as extraordinary advances over prior refrigerants like sulfur dioxide and smelling salts, which routinely harmed nourishment industry laborers and individuals in their homes. Plunkett had delivered a hundred pounds of tetrafluoroethylene gas (TFE) and put away it in little chambers at dry-ice temperatures before chlorinating it. At the point when he and his assistant arranged a chamber for use, none of the gas turned out—yet the chamber gauged equivalent to previously. They opened it and found a white powder, which Plunkett had the sound judgment to portray for properties other than refrigeration potential. He saw the substance as warmth safe and synthetically idle, and to have low surface grating with the goal that most different substances would not cling to it. Plunkett understood that against the forecasts of polymer study of the day, TFE had polymerized to deliver this substance—later named Teflon—with such conceivably valuable attributes. Scientific experts and designers in the Central Research Department with unique involvement with polymer innovative work explored the substance further. In the mean time, Plunkett was moved to the tetraethyl lead division of DuPont, which delivered the added substance that for a long time supported gas octane levels.

Teflon's Many Uses

From the start it appeared that Teflon was so costly to deliver that it could never discover a market. Its first use was satisfying the prerequisites of the vaporous dispersion procedure of the Manhattan Project for materials that could oppose erosion by fluorine or its mixes (see Ralph Landau). Teflon pots and dish were created years after the fact. The granting of Philadelphia's Scott Medal in 1951 to Plunkett—the first of numerous distinctions for his disclosure—gave the event to the acquaintance of Teflon bakeware with people in general: every visitor at the feast returned home with a Teflon-covered biscuit tin.

Why do we Dream?

By - Hetanshi Khajanchi,10 GSEB

Dreams are hallucinations that occur during certain stages of sleep. They are strongest during the rapid eye movement stage. Dreams are usually autobiographical thoughts based on one's recent activities.

Consistent with the psychoanalytic perspective, Sigmund Freud's theory of dreams suggested that dreams represent unconscious desires, thoughts, and motivations. According to Freud's psychoanalytic view of personality, people are driven by aggressive and sexual instincts that are repressed from conscious awareness.The occasional nightmare is considered a dream that's simply more frightening or upsetting. Nightmares tend to be caused by stress, anxiety, or sometimes as a reaction to certain medications.

The activation-synthesis model of dreaming was first proposed by J. Allan Hobson and Robert McClarley in 1977. According to this theory, circuits in the brain become activated during REM sleep, which causes areas of the limbic system involved in emotions, sensations, and memories, including the amygdala and hippocampus, to become active. The brain synthesizes and interprets this internal activity and attempts to find meaning in these signals, which results in dreaming.

Psychologists have associated dreaming as a form of consciousness that unites past, present and future in processing information from the past and present and fabricate different ways to deal with the future. Further believing that dreaming serves a primary purpose by which the mind works through difficult, complicated, thoughts and emotions, experiences and to further achieve psychological and emotional balance. On the contrary, many believe that dreams a component and form of memory processing, aiding and consolidation of learning.

There is not likely ever to be a simple answer, or a single theory that explains the full role of dreaming to human life. Biological, cognitive, psychological—it's very likely that dreaming may serve important functions in each of these realms.

Why is blue so rare in nature?

By - Hetanshi Khajanchi, 10 GSEB

Well, some people might think that blue is not so much rare in nature as the oceans , the skies all are blue but they do only appear blue. Animals could be green, red , orange and yellow they have evolved to form many pigments. But they are not blue. Animals make these pigments from the food they eat ie flamingos are born grey but turn pink due to the carotenoids present inside the crustaceans they eat. When it comes to red , orange, yellow and brown you are what you eat. But this is not the case with blue because it is different. It's not easy to suck blue easily. The best example of an animal who just appears blue is the blue morpho butterfly , because of the clever way that its wing scales interact with light. When we zoom inside its blue wing scale there are ridges shaped like tinyChristmas trees . The arrangement of branches iswhat gives Morpho wings their blue colour, whenlight comes in, some of it bounces off the top surfacebut some light passes into the layer and reflects off the bottom surface. For most colours of light, wavesreflecting from the top and bottom will be out of phase they'll be cancelled out and that light isremoved. But blue light has just the right wavelength the reflected light waves are in sync,and that colour makes it to our eye. The hall of mirrors only let's blue light escape. There's even a pigment at the base that absorbs stray red and green light to make the blue even more pure, that's how such an awesome blue is formed. All of this happens because of the way light bends when it moves from air into another material. So if we fill all those tiny gaps with something other than air like alcohol the blue disappears and comes back after drying . But as these butterflies live in rainforests these wing scales are made of a material that's naturally water resistant. But why is almost all of nature's blue made from structures and not pigments like everything else? The best theory by scientists till now is that at some point way back in time , birds and butterflies evolved their ability to see blue light. But they hadn't evolved a way to paint their bodies that colour. But it would be ie going from an early Beatles to a pepper Sargent Beatles(beatle's a bird), it meant new opportunities for communicating and survival. Creating the blue pigment out of the blue would have required inventing new chemistry and there was no way to just add that recipe to their Gene's. It was muc easier for evolution to change the shape of their bodies, ever so slightly at the microscopic level, and create blue using the amazing physics of light instead. They solved a biology problem with engineering and that's interesting. Many other animals use physics to deceive us. For example there are no blue feathers on birds as their feathers have structures which only reflect blue light. And also do all fish use light scattering to create their vibrant blues. Less than 1% of the animals that we perceive as blue actually have any blue pigment in them. That 1% with blue are very rare . Such as the olive wing butterfly, it's one of the very few insect species on Earth known to have a true blue pigment. Also the blue poison dart frog: one of the only vertebrates to contain blue pigment. No matter how you look at them they are blue. Blue is not limited to animals it's equally rare in nature everywhere: Less than 10% of the flowers contain blue pigment, there are no blue foods and the 2 things again we think are blue that are the sky and the sea also appear blue due to the physics of light scattering. The animals have evolved the ways to control what our eyes see. But why? Maybe it's so the predators know they are poisonous, maybe to impress a mate, maybe it's because blue pigment is so rare. Scientists yet don't know why blue is so rare. So we need to start wondering that if we can't trust our eyes ; what can we trust .

How much can a piece of LEGO actually hold?

By - Soumyaa Desai, 8A, IGCSE

A Lego brick can support 770 pounds of force!

There's no pain quite like the pain of walking through the house, probably in the dark, always unprepared, and your foot finding that stray Lego lodged under the carpet.

The weight you'd have to apply to this Duplo block to squish it, is nearly 700 pounds. What weighs 700 pounds? A smallish manatee, a largish zebra, or a modern vending machine! LEGOs can support four to five times the weight of a human without collapsing. They are strong enough to support a tower 375,000 bricks tall, or around 2.2 miles high.Now you perfectly know what it takes to squish a lego block,so go on and jump on it without your mom scolding you about it!

Poison Dart Frog

By - Jayni Patel, IBDP I A

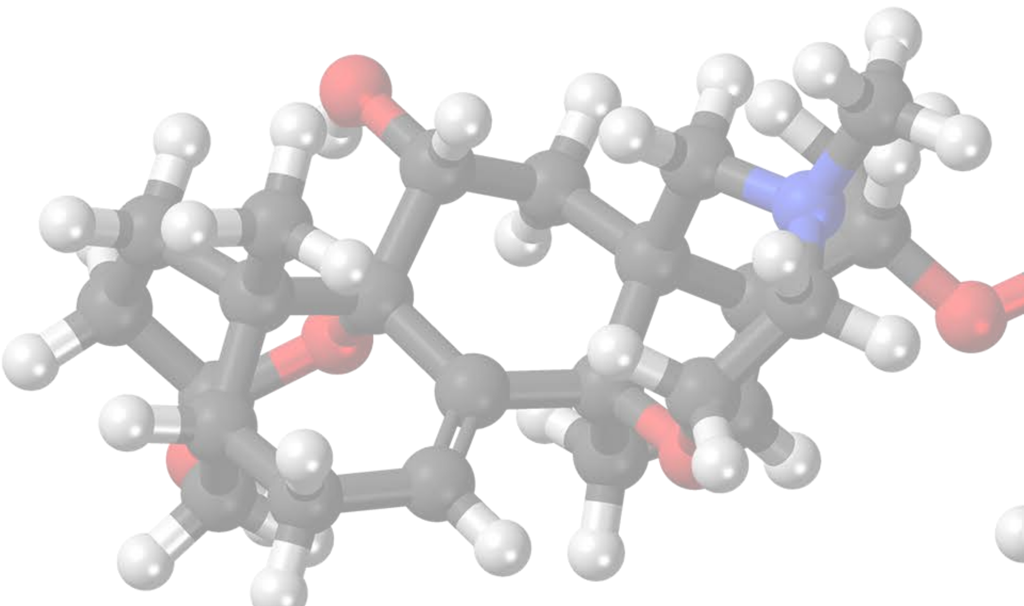
Poison dart frogs are one of the planet's most brightly coloured animals. Depending on the species, they can be yellow, copper, gold, red, blue, green, black or a combination of those colours. Their showy colours and startling designs help warn predators of the danger they impose. Within their skin, they store natural venom that can paralyze, or even kill, a predator. Poison dart frogs comprise two families of frog species, Dendrobatidae and Aromobatidae, native to rainforests of South and Central America. About a quarter of the more than 200 species are listed as threatened or critically endangered. Ranging from barely 1 inch to 2.5 inches in length, these day-active frogs display bright colours that help predators remember they are inedible. Human activities are being the only major cause of us loosing these colourful species – and someday just out of the blue, these blue frogs of the Amazon rainforest are going to be missed by our eyes.

Poison Dart Frog

Humans!!! It's our pair of hands and legs that is removing these creatures out of existence! Various chemicals commonly used in local farming retard the growth of poison dart frogs, and disrupt their reproductive cycles. Pesticides kill insects, leaving the frogs without a food supply, while fertilizers contaminate bodies of water. European and American collectors prize the brightly coloured poison dart frogs, resulting in a high demand in the international pet trade for new and increasingly rare specimens. Wild poison dart frogs are protected by treaty, but that increases their value to smugglers, who export them illegally to capitalize on the demand. Smugglers hide these little frogs in luggage, or concealed in legal shipments of exported tropical fish. Customs officials estimate close to 90 percent of illegally exported poison dart frogs die in transport because of the poor shipping conditions. A fungal disease has plagued poison dart frogs, like other amphibian species around the world. The Centres for Disease Control and Prevention reports that researchers believe spread of this fungus was caused by the international transport of amphibians, and that it originated in southern Africa around 1938. Globally, the fungus has caused the decline or extinction of at least 200 frog species alone.

These wonderful species, though poisonous are on the verge of extinction but there are chances that humans can alter their activities to retain the beauty of this biome. The rainforests support a huge diversity of organisms, the poison dart frog being one of them. Controlling certain actions can give them a new life and save the planet's most attractive species from moving completely out of sight.

Recent researches have brought out the discovery of a New Poison Dart Frog in the Amazon Rainforest! It shouldn't be a surprise for us to know that humans are equally capable of recovering these beautifully coloured species and this research gives us hope and depicts the human potential of withdrawing the poison from these poisonous creatures.



Icy Winds From Pluto's Heart

By - Krisha Nanavati 8D IGCSE

Pluto in the 1930 was officially labeled the ninth planet by the International Astronomical Union and was named after the Roman god of the underworld, also known as Hades in Greek. Though it has been reclassified as a Dwarf Planet along with Eris and Ceres. A part of Pluto, the Tombaugh Regio is nicknamed the Heart because of its shape. It is the largest and brightest surface of the Dwarf Planet and is located just North of the Equator.

During the day, a thin layer of nitrogen in the Tombaugh Regio warms and turns into vapor. At night, the vapor condenses and once again forms ice. Each sequence is like a heartbeat, pumping nitrogen winds around the dwarf planet. Each sequence is like a heartbeat, pumping nitrogen winds around the dwarf planet. New research in AGU's Journal of Geophysical Research: Planets Suggests this cycle pushes Pluto's atmosphere to circulate in the opposite direction of its spin -- a unique phenomenon called retro-rotation. As air whips close to the surface, it transports heat, grains of ice and haze particles to create dark wind streaks and plains across the north and northwestern regions.

Pluto's Heart

Palladium Clusters

By - Ms. Meenu Gupta - Department Of Chemistry

Chemists have constructed the first hexagonal palladium cluster that not only looks like benzene but is also as aromatic.

There are other non-carbon and metal clusters, some with regular and others with rarer types of aromaticity. But this is the first example of an all-metal system with benzene-like symmetry and π aromaticity.

At the molecule's core there are seven palladium atoms, six arranged in a hexagon and another one sitting in the middle. All are connected by single bonds. Stabilising ketimide ligands ($R_2C=N-$) bridge each pair of adjacent outer atoms. According to calculations, the molecule's aromatic ring current is almost the same as benzene's.

These are rare but potentially useful compounds given how catalytically active palladium is. It turns out that surrounding the $[Pd_7]^{6+}$ cluster with six ketimide anions produces a deep green solid that's stable when kept cold and under inert gas.

The mixed-valence palladium compound – oxidation states +1 and 0 – reacts with triphenyl phosphine to form a palladium(0) phosphine complex. This, the researchers suggest, could make it useful for cross coupling reactions, many of which use similar compounds as catalysts.

Fun Facts!

By - Ms. Meena Singh - Department Of Biology

Rats laugh when tickled.

Squirrels plant thousands of new trees each year by merely forgetting where they put their acorns.

When playing with female puppies, male puppies will often let them win, even if they have a physical advantage.

Sea otters hold hands when they sleep to keep from drifting apart.

Macaques in Japan use coins to buy vending machine snacks.

In China, killing a Panda is punishable by death.

Sweden has a rabbit show jumping competition called Kaninhoppning.

The closest relatives to the elephant shrew are actually elephants, not shrews.

Oysters can change gender depending on which is best for mating.

Einstein's Forgotten Son

By - Ms. Saritha S - Department Of Biology

Albert Einstein is one of the most famous scientists in history and his name has become a household term synonymous with genius. But although almost everyone has heard of the physicist and his remarkable work, few know about the tragic fate of his son, Eduard Einstein.

Eduard Einstein's Early Life

Eduard Einstein's mother, Milea Maric, was Albert's first wife. Maric was the only female student who studied physics at the Zurich Polytechnic Institute where Einstein also attended in 1896.
The two married in 1903 and their union produced three children, Lieserl (who vanished from history and may have been given up for adoption), Hans Albert, and Eduard, the youngest, who was born in Zurich, Switzerland on July 28, 1910. Einstein separated from Maric in 1914 but kept up a lively correspondence with his sons.
Little Eduard Einstein was a sickly child from the start and his early years were marked by bouts of illness that rendered him too feeble to take family trips with the rest of the Einsteins.
Einstein despaired over his son even after he had abandoned the household, writing fearfully in one 1917 letter to a colleague, "My little boy's condition depresses me greatly. It is impossible that he would become a fully developed person."

Eduard's Mental Illness Worsens

As he grew older, Eduard (whom his father affectionately dubbed "tete," from the French "petit") developed an interest in poetry, piano-playing, and, eventually, psychiatry.

He worshiped Sigmund Freud and followed in his father's footsteps by enrolling in Zurich University, although he intended to become a psychiatrist. By this time, Albert's fame had been solidly established. In one telling bit of self-analysis, Eduard Einstein wrote, "it's at times difficult to have such an important father because one feels so unimportant."

The aspiring psychiatrist followed his father's path once again when he fell in love with an older woman at the university, a relationship that also ended disastrously.

Einstein's Forgotten Son

It appears to be around this time that Eduard's mental health took a severe turn for the worse. He was sent into a downward spiral that culminated in a suicide attempt in 1930. Diagnosed with schizophrenia, it has been speculated that the harsh treatments of the era worsened rather than eased his condition, eventually to the point where it impacted his speech and cognitive abilities.

Eduard's Family Emigrates To The United States Without Him

Albert, for his part, believed his son's condition was hereditary, passed down from his mother's side, although this scientific observation did little to assuage his grief and guilt. His second wife, Elsa, remarked that "this sorrow is eating up Albert." The physicist soon faced more than issues surrounding Eduard. By the early 1930s, the Nazi Party had risen in Europe and after Hitler took power in 1933, Einstein could not return to the Prussian Academy of Sciences in Berlin, where he had been working since 1914. Einstein may have been one of the world's most famous scientists, but he was also Jewish, a fact that his countrymen could not accept and forced him to flee to the United States in 1933. Although Albert had hoped his younger son would be able to join him in America along with his older brother, Eduard Einstein's continually deteriorating mental condition prevented him from also being able to seek refuge in the United States. Before he emigrated, Albert went to visit his son at the asylum where he was being cared for one last time. Although Albert would keep up correspondence and would continue to send money for his son's care, the two would not meet again.

Final Days of Eduard

As Eduard spent the remainder of his life in an asylum in Switzerland, he was buried in Hönggerberg cemetery in Zurich when he died of a stroke at age 55 in October 1965. He had spent over three decades of his life in the psychiatric clinic of Burghölzli at the University of Zurich.

Ideonella sakaiensis - A plastic eating bacteria

By - Vedant Agarwal, 10 GSEB

The natural world is rapidly becoming a giant pile of plastic waste. Even areas as far removed from us as the Arctic are not safe. We're slowly suffocating a lot of natural ecologies with our trash. Fish, birds, and other animals all unwittingly consume the five trillion tons of plastic (and counting) strewn about the ocean, and doing so can kill them.

Scientist are trying to come up with novel solutions to remedy the plastic pollution crisis, and they're thinking small—in a good way. In a new study to be published in the Proceedings of the National Academy of Sciences this week, a team of international scientists illustrate how they created—by accident—a new enzyme capable of breaking down plastic bottles. This providential development could finally allow us to fully recycle plastic drink bottles for the first time ever, putting a much-needed dent in plastic pollution increases.

The new study's origins are tied to the 2016 discovery of a bacterium in a Japanese waste dump that had evolved to use PET (polyethylene terephthalate), commonly used in the 1 million soft drink bottles sold every minute around the world, as an energy source. The team of scientists originally began running tests to see how the bacterium, Ideonella sakaiensis, managed to produce an enzyme capable of degrading PET. Those tests, it turned out, in advertantly made the enzyme, PETase, even better at degrading PET. The resulting mutant PETase now takes just a few days to break down PET, compared to the 450 years it takes for the stuff to degrade naturally.

The salient takeaway is to use PETase to break down bottles before they end up in the environment. However, the enzyme could also augment plastics recycling approaches themselves. "Current recycling strategies for PET bottles mostly focus on mechanical recycling, so they chop the bottles up and use them for applications that typically do not need the same materials requirements as bottles," says study co-author Gregg Beckham, a researcher at the U.S. Department of Energy's National Renewable Energy Laboratory. "Engineered enzymes that break PET down to its building blocks would enable the ability to do full bottle-to-bottle recycling," which would hopefully help decrease oil drilling demands for new plastic production.

Ideonella sakaiensis - A plastic eating bacteria

After characterizing the structure of the enzyme by bludgeoning it with x-rays from the UK's Diamond Light Source, which can hit objects with beams 10 billion times brighter than the Sun and help scientists distinguish individual atoms from one another, the team changed the structure of PETase slightly in order to compare it to another enzyme which breaks down cutin (a polymer found in the protective coating in plants). That process unexpectedly conferred PETase with a 20-percent improvement in degrading PET.

This is not exactly a radical shift from the original, but it does augur the potential to go further and turn the enzyme into something with real, significant applications. Beckham and his team have already filed a patent with the hopes of making the enzyme stable and active at temperatures above 158 degrees Fahrenheit, where PET becomes rubbery and breaks down 10 to 100 times faster.

"Akin to laundry detergent, which contains many enzymes that are produced at the industrial scale to clean our clothes, one could envision a PET-degrading enzyme system that is able to take PET bottles in a large industrial reactor with hot water and break the bottles down rapidly to their building block constituents," says Beckham. "Many groups around the world are working towards this goal now, and I anticipate that this will be a reality in the next decade or, hopefully, much sooner."

The original Ideonella sakaiensis bacteria is far from the first living species to possess plastic-eating proclivities. Waxworm caterpillars have been found to break down plastic in a matter of hours, and mealworms possess gut microbes that eat through polystyrene. It is likely that microbes are evolving faster and better strategies to break down man-made plastics. It seems that nature is evolving solutions.

Surely humans could stand to evolve some solutions as well.

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