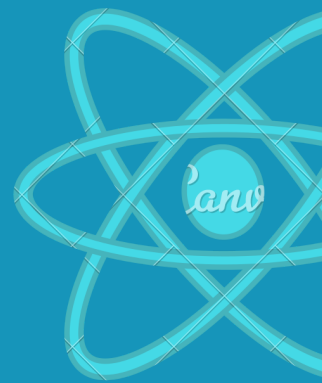


Ahmedabad International School



SENSE N' SCIENCE

(2018-19) Volume 1



Editorial

“The most beautiful experience we can have is the ‘Mysterious’. It is the fundamental emotion that stands as the cradle of true art and science.” — Albert Einstein.

It is this mystery of nature that has been capturing our attention since time immemorial. Our quest to unveil these mysteries of the unknown has paved the way for scientific initiative, investigation, and innovation.

It’s a joy to welcome you to the maiden edition of ‘Sense N Science’ - the Science Magazine of Ahmedabad International School. We are really proud to present the work of some of our students which showcases their curiosity and drive for discovery.

This magazine is designed to touch myriad branches of science, from the unseen microscopic creatures to the continuously expanding universe; from the chaotic quantum world to the orderly laws of physics.

Through this magazine, we have tried to answer some very basic questions which though seemingly mundane have at some point intrigued us. We have made Sense N Science to quench our constant thirst for knowledge and to highlight the relevance of ‘why’ in the scientific world.

We are sincerely thankful to all other teachers who extended their support and ideas to design this magazine in its present form and to sort out the best of the articles from our enthusiastic students. We also extend our sincere gratitude to Ms.Mehak Siddiqui for designing the final layout.

We are indebted to Dr. Anjali Sharma, Principal, Ahmedabad International school for entrusting us with the responsibility of this creative journey.

Rachpal Kaur Nirmale

Meenu Gupta

IN THIS ISSUE:

Scientist Of the Month.....	3
How Things Work.....	4
Architecture.....	10
Sharing The Planet.....	11
Harnessing Resources.....	22
Alarming Facts.....	25
Tell Me Why.....	28
Parting Shots.....	31

Scientist of the Month

Kush Agarwal, 9A, IGCSE

I am Kush Agarwal from grade 9A IGCSE, and I like to make all sorts of things, this time I made an automated garden, I have a hydroponic garden. Hydroponics involves growing plants in a mixture of water and essential nutrients, without soil. I grow around 15 plants in a PVC pipe about 10 feet in length. The roots grow in the solution and absorb nutrients. The pipes need to be "topped up" with fresh water and nutrients as



the water is used up by the plants and some is evaporated. The only drawback is that it is highly laborious if to be done without expensive equipment. I also had the same thought, but after combing my knowledge of electronics and science I came up with a very simple and ingenious solution, I could use open source hardware to automate the entire process. I

used an Arduino UNO (A mini computer) to control the water level by pumping and draining water continuously from pipes to keep the pipe at a predefined water level. I was able to more or less control the oxygen level by bubbling air in the water and in the future I would also control the temperature of the individual pipes by utilising mini cooling units. At a cost of only Rs. 1000 I could easily automate my garden which can house 120 plants. The system can be left unattended for any period of time, provided that there is an adequate amount of water in the refill reservoir (which replaces the water lost by evaporation and used by plants). Such commercial systems can cost upwards of Rs. 1 Lakh and can only grow small plants in limited quantities, whereas my system can handle many more plants and can also be expanded to house even more plants



How Things Work

Touch Screens, by Deven Gangwani, 10C, IGCSE



Today, nearly everybody has a smartphone in their pocket, a screen, a portal to a vast world of knowledge, entertainment and convenience. Its defining feature - the massive screen on it that allows us to use natural gestures such as tapping and swiping with technology - has made them so easy to use that even toddlers can handle them with ease, so much so that it's becoming a problem.

Indeed, smartphones have taken the world by storm ever since they were popularised by the first iPhone released by Apple, Inc. in 2007. Much of the reason is because of the use of touch screens in them. These make it childishly easy to carry out several tasks which, before, would have required much clicking and fiddling to do. They've turned the screen into both an input and an output, allowing it to get even bigger and to display even more. The smartphone's ease of use has even created massive industries, such as

mobile gaming. Touchscreens are taken for granted today, considering nearly every phone has them. However, have you ever wondered what goes on behind the screen of an iPhone? What dark magic and sorcery makes it so convenient and easy to use?

There are two main types of touch screens now-a-days, and several others which are used much less often. The 'Big Two' here are resistive touch screens, used in ATMs and electronic cashiers, and capacitive touch-screens, which are the ones included in every modern smartphone. Touch screens can also be made using infrared and ultrasonic technology.

The first main kind of touchscreen is the resistive touchscreen. Here, there are two transparent layers, usually of a conducting oxide compound, on top of the actual LCD display, both of which have small electric currents passing through, and are kept apart from each other by spacers. These touch screens work using the pressure from our finger. When we press the screen, the two layers touch, causing a current to flow in a certain way. This is then detected by sensors. The microprocessor calculates the position of the touch using the sensors, and then relays this information to any software running on it.

This method is quite simple, and the screen can be 'touched' using anything, from a stylus to your finger. It also works even if you wear gloves, as the screen simply relies on something pushing the two layers on top of the display together.

The second main type of touchscreen is the capacitive touchscreen. There are surface capacitive touch screens, which are simpler but do not allow multiple touches; and projected capacitive touch screens, which are more advanced, but allow multiple touches. They work using the principles of capacitance, or that electric charge can be stored in certain ways.

In surface capacitive screens, the screen is coated with a transparent conducting layer (usually indium tin oxide), and a small voltage is run across it. When a person touches their finger to the screen, there are small electrical changes, which are detected by sensors at the corners of the screen. Like this, the location of a tap on the display can be pin-pointed.

Projected capacitive screens are much more complex, and use grids instead of a simple sheet. The main differences between the two are that surface capacitive screens are slightly simpler, but can only detect single touches, while projected capacitive screens can detect multiple touches, and can allow a few more layers between the user's finger and the mechanism used to detect touches.

This type of touchscreen is the one used in smartphones and tablets as it allows multiple touches without much of a problem. It is also quite precise, and allows greater clarity than a resistive touchscreen.

The other two types of touchscreen are the surface acoustic touchscreen and the infrared touchscreen. The infrared touchscreen works by projecting a grid of infrared light beams very slightly in front of the screen, so that when the screen is touched, one or two beams are broken, allowing the computer to pinpoint where the screen was touched. This may seem like a much simpler and better solution to touch screens at first. However, infrared touch screens often have much trouble functioning and require often cleaning as dust or other particles can disrupt the infrared beams and cause false touches.

Surface acoustic touch screens work in a similar manner, but use ultrasonic waves of sound instead of beams of infrared light. When an object, such as a finger, touches the screen, the sound waves are absorbed. Receivers detect this change, allowing the microprocessor to calculate where the user has touched the screen.

Both of these methods actually allow for clearer pictures to be produced because there are no layers between the display and the user, unlike in resistive and capacitive touch screens.

There are also other types of touch-screens, each of which use different methods to detect where taps are. Some are better than others, but most have their uses in different industries. For example, since resistive touch-screens are usually cheaper and sturdier than capacitive touch-screens, they are more often used for public services. When tapping a small phone, however, quite a bit of accuracy is needed, and the display must also look good, which is why capacitive touch-screens are used.

Though they are ubiquitous at the moment, there are new technologies on the horizon which may obsolete touch-screens by providing an even more immersive experience. These include virtual reality and interfaces that allow the brain to directly communicate with a machine, which would remove the need for a screen at all. However, for now, the reign of the touchscreen shall continue, perhaps for quite a long time.

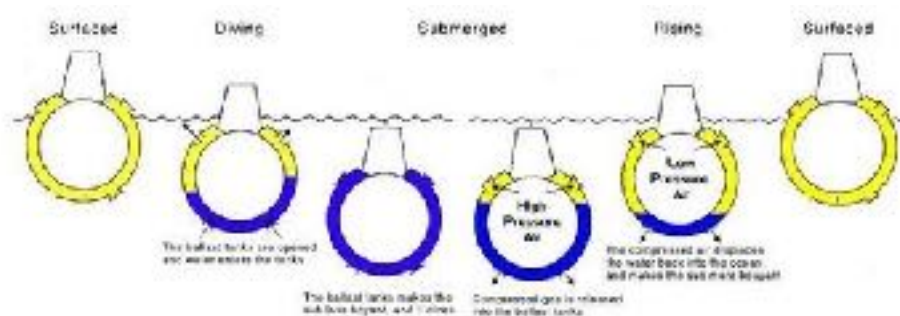
Submarines By Pulkit Gupta

A Submarine is a warship with a streamlined hull designed to operate completely submerged in the sea for long periods, equipped with a periscope and typically armed with torpedoes or missiles. The word submarine is composed of two morphemes, *sub* and *marine*. *Sub* is a prefix of latin origin that means 'below' or 'under,' while *marine* originates from the Latin 'marinus' meaning 'belonging or related to the sea'. It is a kind of naval vessel typically used for military purposes, widely used for the first time in World War 1.

A submarine can float because the weight of the water displaced by the vessel is in balance with the weight of the ship. This causes an upward force called the buoyant force, that acts opposite to gravity. A submarine can control its buoyancy, which gives it the capability to float and surface at its will unlike other ships.

This force can be controlled by ballast tanks and auxiliary, or trim tanks which can be filled with water or air. When the vessel is on

the surface, the ballast tanks are filled with air and the submarine's overall density is less than the water around it. As the submarine begins its dive, the tanks flood with water



and the air in the ballast tanks are vented out until the overall density of the submarine is more than its surroundings, allowing it to sink. This is known as negative buoyancy. A supply of compressed air is maintained aboard the marine in air flasks for life support and for the use of ballast tanks. The vessel also has short "wings" called hydroplanes on the stern that help in angling the dive. To maintain any depth, the trim tanks of the submarine balance the air and the water so that the surrounding and the vessel have the same density. The tail rudder is used to navigate the submarine towards starboard (right) or port (left). Some of the submarines are equipped with secondary propulsion motor that can spin 360 degrees.

The same way, during positive buoyancy, the process of the submarine surfacing, the ballast tanks force out the water to lower the submarine's density. In an emergency, the ballasts can be filled with high pressured air quickly that can rapidly surface the vessel .

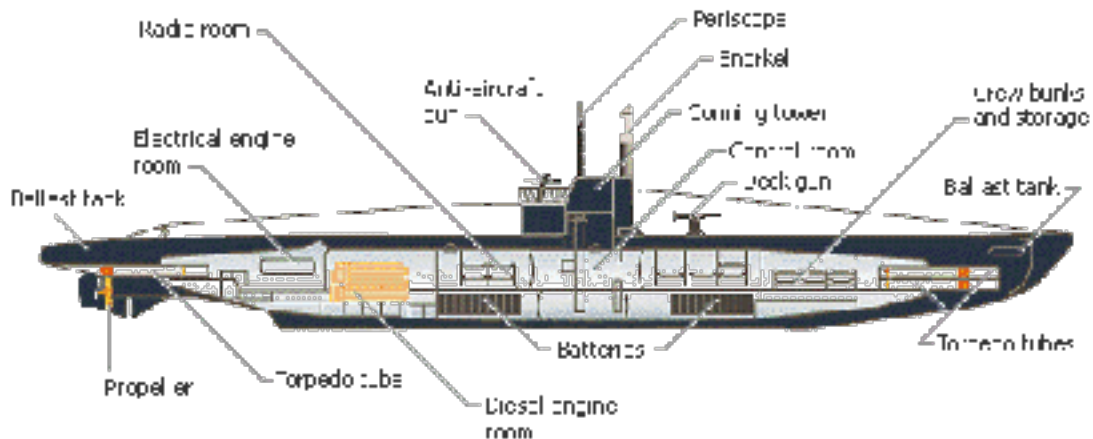
Three very important things regarding life support in the submarine are maintaining the air quality, a fresh water supply and the temperature.

The air we breathe is mainly consisted of nitrogen, oxygen, argon and carbon dioxide. The body only uses oxygen at the most and converts it into CO₂ which constituting of about 4.5% of the exhaled air. A submarine is like a sealed container, that is carrying people and limited supply of air. To keep the vessel air to be breathable, the oxygen has to be replenished as it is used. A person can suffocate if the oxygen level in the air falls too low. The carbon dioxide must be removed from the air, as this may become a toxin if the quantity rises. The moisture exhaled must be removed along with the carbon dioxide. The oxygen is supplied from either pressurised tanks, some sort of oxygen canister or by an oxygen generator by the use of electrolysis of water. This is releases using either a microprocessor that senses the oxygen levels or in batches throughout the day. The carbon dioxide can be chemically removed using soda lime, which is basically sodium hydroxide and calcium hydroxide, in devices called scrubbers. The moisture can be removed by dehumidifiers. Particles like dust and dirt can be filtered while gases like carbon monoxide can be removed by burners.

Most of the submarines have a distillation apparatus that takes in seawater and produces fresh water. On some submarines, these kind of plants can produce 38,000 to 150,000 litres of fresh water per day. This water's main purpose is for cooling electronic equipment and for supporting the crew.

The temperature of the ocean, that envelopes the submarine is around 4 degrees Celsius. The metal of the vessel conducts heat to its surroundings. So, to maintain a comfortable temperature for the crew, there should be electrical heating. This power comes from nuclear reactors, diesel engines or in cases of emergency even battery.

Nuclear submarines use nuclear reactors, steam turbines and reduction gearing to drive the main propeller shaft, that moves the vessel forwards or in reverse by providing thrust. The equipment on board also function with the help of electric power. Submarines are equipped with diesel engines that burn fuel or nuclear reactors that use nuclear fission, for the same reason. Electrical equipment is often run on batteries, while these in turn may be charged by the other two methods. The diesel subs cannot head underwater unless the batteries are fully charged. This limits the amount of time a diesel sub can actually stay underwater. Nuclear power was recognised as an advantage to submarines. These do not require oxygen, so they can stay underwater for weeks in a single run. They can even stay at sea for a longer time, since they have a longer ability for fuel to last. These reactors are very similar to those of commercial power plants, except that the reactors in a sub are smaller and they use highly enriched fuel to allow the small reactor to give off huge amounts of energy.



As light doesn't permit penetration in the ocean for a longer range, subs must wade through the water virtually blind. A GPS(global positioning system) allows the latitudes and longitudes to be determined only when the sub is surfaced. Underwater, the subs use inertial guidance systems that keep a track of the ship's motion using gyroscopes.

To locate a target, the subs must use SONAR (sound navigation and ranging). Active SONAR emits pulses of sound waves that travel through the water and bounce off the target, returning to the ship. Using the speed of sound and time taken for the sound waves to travel , it can be determined using computers, the distance between the target and your sub. The same technology is used by whales, bats and dolphins. Passive sonar includes listening to sounds generated by the target.

Torpedo

A torpedo is a guided missile that functions underwater. A torpedo has a propulsion system, a guidance system and some sort of explosive device. These can function at very long distances and so they require propulsion systems that can run for 10 to 20 minutes. Most of these use rocket or jet engines, even though they do not work very well underwater.

High strength alloyed steel is the main component for submarines today. A few subs were made out of titanium hulls.

In the US navy, there are three types of submarines: ballistic missile submarines, attack submarines and cruise missile submarines. All these are nuclear powered.

There are basically six types of navy vessels: carriers, cruisers and destroyers, amphibious craft, submarines, littoral combat ships, and hospital ships. Out of all these, the submarine is the most hi-tech vessel. It can be used for rescue missions. It is the only type of vessel that can go underwater.



“Science is a way of thinking, much more than it is a body of knowledge.”

-Carl Sagan

Amazing Architecture

“The Da Vinci Tower - Dubai” by Kashish Gandhi, 9B, IGCSE

Dubai’s skyline gets changed with every new tower getting erected year-by-year setting new records. Last time it set record in year 2010 with Burj-Khalifa the tallest building of the world and now The Da Vinci Tower an architectural marvel getting shaped by architecture firm “Dynamic Architecture” founded by Israeli Italian Architect David Fisher at the cost of 372 M \$ with 80 Floors.

This amazing architecture is going to set open in Dubai - EXPO 2020 which is going create the buzz worldwide whose each floor will rotate so that the occupant can see the desert, sea and city in full round of it. It will be having the hotels, restaurants, residences of varied sizes which are expected to priced between 4 M \$ to 40 M \$.

Da Vinci Tower is named after the Italian Renaissance genius Leonardo Da Vinci and it has got many amazing facts like:



Independent Rotating Floor

It will have 80 floors each floor, each rotating on it’s own as per the sun direction or wind direction or as per the tenant’s life or mood. Floor’s rotation will be so smooth that it won’t create the motion sickness to tenants and complete round in 90 minutes.

Luxury

Top 5 floors of the 80 will be single floor of 1500 square metre. occupied by one tenant and will be able to get their car right on their floor with the special elevators.

The way it is built:

Whole tower is will be having the pre built structures apart from the central concrete

core. Each prebuilt structure will have ready flooring, water piping, air conditioning made from aluminium, carbon fibre and high quality materials. Being the prefabricated will need less people at construction site, will get mechanically connected very faster and mainly will be seismic resisted giving safety and cost saving.

Sustainability:

There will be horizontal wind turbines between each floor and solar inks on each roof, which will make first full self-power building.

This is going to be the best fit for DUBAI EXPO 2020.

The Amazing World Around Us

86 Percent of Earth's Species Still Unknown? by Jevil Mansata, 9B

Even after centuries of effort, some 86 percent of Earth's species have yet to be fully described, according to new study that predicts our planet is home to 8.7 million species. We learn all about the common animals when we're young: dogs, cats, cows, horses, elephants, and on and on. But there are dozens of animals and plants out there that you don't know about. Not only do you not know about them, but they're incredibly unique and some are even incredibly adorable. So here are some of them which you haven't heard or seen before.



The Baseball Plant

It is generally known as *euphorbia obesa* native to South Africa. The plant has exactly the same shape of a baseball. It is an unbranched plant with an average height of 20 cm. The special species of baseball plant is protected by national nature conservation as it is very rare in the world. Male and female flowers of *euphorbia obesa* grow on different plants. Baseball plants are quite toxic, makes severe skin problems.

Hydnellum Peckii

Hydnellum peckii is a special type of fungi that produce blood or juice like fluid on its surface. This plant is also known as 'bleeding tooth fungus'. It is the Scarlet pigment causes blood like colour fluid of this plant. This strange plant mainly found across North America and Europe. It is edible, but the blood like fluid is extremely bitter in taste. *Hydnellum peckii* has an unpleasant odour. The colour of fluids on *Hydnellum peckii* can be varied as orange or pink.



The Gerenuk



The gerenuk, also known as the Waller's gazelle, is a long-necked species of antelope found in dry thorn bush scrub and desert in Eastern Africa. The word gerenuk comes from the Somali language, meaning "giraffe-necked". Gerenuks have a relatively small head for their body, but their eyes and ears are proportionately large. Gerenuks seldom graze but browse on prickly bushes and trees, such as acacias. They can reach higher branches and twigs than other gazelles and antelope by standing erect on their rear legs and stretching their elongated necks.

Amazonian Royal Flycatcher

The Amazonian Royal Flycatcher is found in forests and woodlands throughout most of the Amazon basin. They are about 6 1/2 inches in length and like to dart out from branches to catch flying insects or pluck them from leaves. They build very large nests (sometimes up to 6 feet long) on a branches near water. The nest hangs over the water which makes it hard for predators to reach.



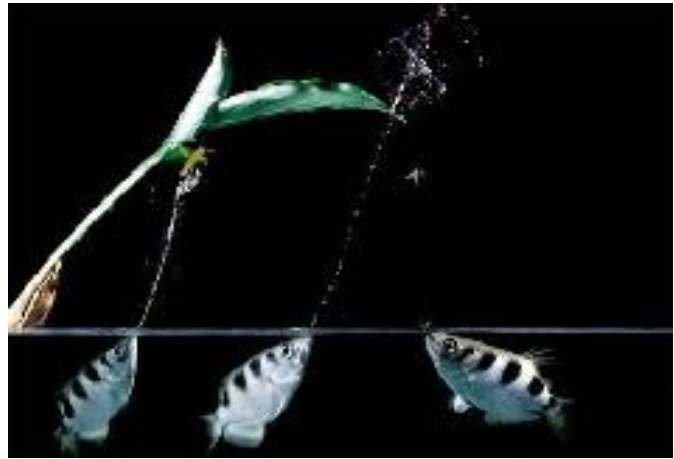
The Star-Nosed Mole



The star-nosed mole is a small mole found in wet low areas of eastern Canada and the northeastern United States. It is easily identified by the 11 pairs of pink fleshy appendages ringing its snout, which is used as a touch organ with more than 25,000 minute sensory receptors, known as Eimer's organs, with which this hamster-sized mole feels its way around.

Archer Fish

They shoot a jet of water from their mouth to hit insects and other prey above the water surface. Archer fish create a gun barrel in their mouth by pressing their tongue in a special groove in the roof of their mouth and then close their gills to shoot the water pistol. They shoot the water jet with the finesse of a marksman and are highly accurate up to the height of 2 meters and sometimes up to 3 meters.



The Southern Right Whale Dolphin

The southern right whale dolphin is a small and slender species of mammal found in cool waters of the southern hemisphere. They are fast active swimmers and have no visible teeth and no dorsal fin. They are very graceful and often move by leaping out of the water continuously

The Irrawaddy Dolphin

The Irrawaddy dolphin is a species of oceanic dolphin found near sea coasts and in estuaries and rivers in parts of the Bay of Bengal and Southeast Asia. Genetically, the Irrawaddy dolphin is closely related to the killer whale.





The Zebra Duiker

The zebra duiker is a small antelope found in Ivory Coast and other parts of Africa. They have gold or red-brown coats with distinctive zebra-like stripes (hence the name) Their prong-like horns are about 4.5 cm long in males, and half that in females. They live in lowland rainforests and mostly eat leaves and fruit.

Anteater

Together with the sloths, they are within the order pilosa. The name "anteater" is also colloquially applied to the unrelated aardvark, numbat, echidnas, pangolins and some members of the Oecobiidae. Extant species are the giant anteater *Myrmecophaga tridactyla*, about 1.8 m (5 ft 11 in) long including the tail; the silky anteater *Cyclopes didactylus*, about 35 cm (14 in) long; the southern tamandua or collared anteater *Tamandua tetradactyla*, about 1.2 m (3 ft 11 in) long; and the northern tamandua *Tamandua mexicana* of similar dimensions.

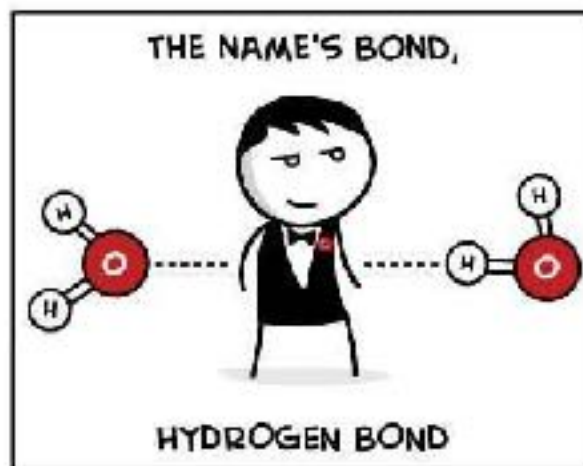


The Axolotl, by Krishang Shah

The axolotl also known as a Mexican salamander (*Ambystoma mexicanum*) or a Mexican walking fish, is a neotenic salamander which is critically endangered in the current world. Though it is known as a walking fish it belongs to the class of amphibians. Axolotls are unusual among amphibians in that they reach adulthood without undergoing metamorphosis. Instead of developing lungs and taking to the land, adults remain aquatic and gilled. Their average life span in wild is 10-15 years. Axolotls are probably one of the most scientifically studied salamanders in the world. It's not unusual for amphibians to be able to regenerate, but axolotls take it to the next level. On



top of being able to regenerate limbs, the animal can also rebuild their jaws, spines, and even brains without any scarring. They can regenerate the same limb 50, 60, 100 times. The Salk Institute for Biological Studies is studying how regeneration works in animals like axolotls, and released two studies in 2012 with their findings. The hope is that if we can fully understand regeneration, we can recreate the phenomenon in human beings.



Bizarre and newfound species by Lavanya Shah

Scientists estimated there are millions more species on Earth, left to discover, and new species are constantly discovered and described. The newest list includes a tree that can stretch more than 130 feet into the sky and a single-celled creature that was discovered in an aquarium and doesn't fit neatly into any known group of similar organisms. A beetle that disguises itself as part of an ant and an extinct marsupial lion that used to roam Australia are also featured. Some animals are found to be new species only when scientists peer at their genetic code, because they look outwardly similar to another species – these are called cryptic species. Two of such newfound species are described below:



Gryffindor's Hat (*Eriovixia gryffindori*)

They may be little, but they're also just a bit magical. At only 2 millimeters in length, these tiny spiders are the smallest creatures to make the list this year, and do so because of their striking resemblance to the infamous hat once owned by the famed wizard Godric Gryffindor. 10 points to Gryffindor!

A deadly fruit (*Solanum ossicruentum*)

Combining the Latin for bony (*ossi*) and bloody (*cruentum*), this strange relative of the tomato has a gruesome secret. When cut in half, the fruit not only appears to "bleed", but it then dries in a bony state. Discovered in Australia, this species has actually been known to botanists for at least 50 years, but has only just been described officially.



There's an astonishing amount of life out there that we still know almost nothing about. But if we're not careful, most of those creatures could be lost before we get a chance to get to learn how they're uniquely adapted for life on Earth. Every year, approximately 18,000 new species are named and classified. But we believe about 20,000 species go extinct annually. So many of these species - if we don't find them, name them and describe them now - will be lost forever. And yet they can teach us so much about the

intricacies of ecosystems and the details of evolutionary history," ESF president Quentin Wheeler said in a news release! "Each of them has found a way to survive against the odds of changing competition, climate and environmental conditions. So each can teach us something really worth knowing as we face an uncertain environmental future ourselves.

Peacock mantis shrimp by Aarya Desai, 9C



The peacock mantis shrimp is one of the most beautiful creatures found on Earth. The shrimp is also known as the clown shrimp and by many more names. This creature is native to Indo-Pacific from Guam to East Africa. Their ability to see circularly polarised light which makes them a target by scientists, who want to understand and replicate to improve disk scanners. The mantis shrimp is a powerful predator due to its fast and

strong limbs known as raptorial appendages, with the help of them it can deliver a punch which is faster than 80km/h with the force of 1500N per strike. The mantis's punch helps it to defend itself and also to hunt. One punch from the mantis is equivalent to a .22 caliber handgun. Peacock mantises live near corals and make U-shaped holes to live in, when threatened it tries to look big. The peacock mantis shrimp is very beautiful yet deadly.



Glass Frog - Withes Butter - Star Nosed Mole



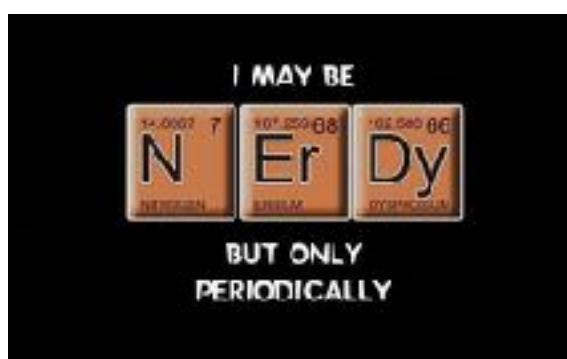
There are a wide range of species of flora and fauna on Earth, most of which aren't even known to us, either due to their habitat or their way of living. Here are some of them:

The glass frogs are frogs of the amphibian family Centrolenidae. While the general background coloration of most glass frogs is primarily lime green, the abdominal skin of some members of this family is transparent. They are mainly found in South and Central America.

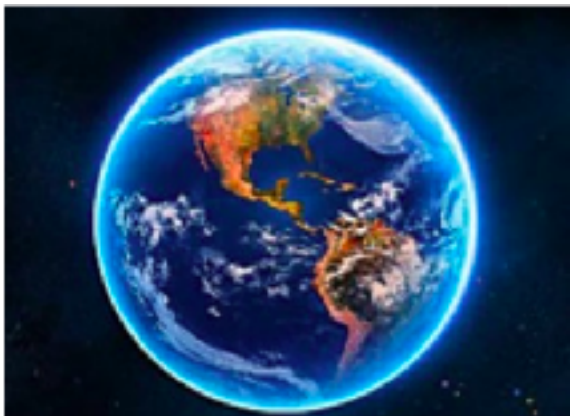
2>Witches Butter is a common jelly fungus in the Tremellaceae family of the Agaricomycotina. It is most frequently found on dead but attached and on recently fallen branches, especially of angiosperms, as a parasite of wood decay fungi in the genus *Peniophora*. The gelatinous, orange-yellow fruit body of the fungus, which can grow up to 7.5 cm (3.0 in) diameter, has a convoluted or lobed surface that is greasy or slimy when damp.

The star nosed mole is a small mole found in wet low areas in the northern parts of North America. It is the only member of the tribe Condylurini and the genus *Condylura*.

The star-nosed mole is easily identifiable by the twenty-two pink fleshy appendages ringing its snout which is used as a touch organ with more than 25,000-minute sensory receptors, known as Eimer's organs, with which this hamster-sized mole feels its way around. With the help of its Eimer's organs, it may be perfectly poised to detect seismic wave vibrations.



What do we know about marine life? by Dhvimidh Bagadia, 9B



Till date, we have explored approximately only five percent of the ocean. Much remains to be learned from the mysteries of the deep oceans. The ocean is the life of Earth, covering more than 70 percent of the planet's surface driving weather, regulating temperature, and eventually supporting all living organisms.



So, here are three very unusual sea creatures:

Frilled Shark

Humans rarely encounter frilled sharks, which prefer remaining in the oceans' depths, up to 5,000 feet below the surface. Considered living fossils, frilled sharks have many physical characteristics of ancestors who swam the seas in the time of the dinosaurs. It has 300 sharp, trident shaped teeth arranged in 25 rows. It is spread out in the Atlantic and Pacific ocean which is very rare in fish.





Fangtooth Fish.

The nightmare-like fangtooth is among the deepest-living fish ever discovered. The fish's normal habitat ranges as high as about 6,500 feet , but it has been found swimming at icy, crushing depths near 16,500 feet. It reaches only about six inches long, but their teeth are the largest, proportionate to body size, of any fish.

Blue Glaucus.

This is a species of sea slug that goes by many names. It isn't seen by predators easily from above as its blue colour camouflages with the ocean and silver underneath so it matches with the bright sun . They steal poison from their prey and absorb it. When touched it gives out toxic cells..and even lays those cells on their eggs! These beautiful creatures are seen all over the world .. from temperate to tropical waters.



More Amazing Creatures by Dhvimidh Bagadia, 9B, IGCSE



The common basilisk is also known as The Jesus Christ lizard as it has a special feature that it can walk on water! It is a reptile and its scientific name is *Basiliscus basiliscus*. The species is endemic to South America and Central America, where it is found near rivers and streams in rainforests. It is a carnivore.

These cute little bears are from the eastern Himalayas and southwestern China. Red pandas are endangered and their scientific name is *Ailurus fulgens*. In significantly cold temperatures, red pandas can become dormant, lowering their metabolic rate and raising it every few hours as they wake up to look for food.



Strongylodon macrobotrys, commonly known as jade vine, emerald vine or turquoise jade vine, is a species of leguminous perennial liana, a native of the tropical forests of the Philippines, with stems that can reach up to 18 m in length. Jade vines are not frost tolerant; it needs a minimum temperature of 15 °C (59 °F).



Harnessing Resources

Plastic Pyrolysis

Compiled by Aarya Parikh. Credits to Tanmay Patel www.treehugger.com

Plastic is the man-made substance that can be used with great versatility, although it is the most environment unfriendly substance. Plastic has been charged guilty for pollution on several accounts but it is almost impossible to get rid of it altogether. However, it cannot be recycled easily.

Manufactured out of petroleum, it is said that 7% of the world's oil is used every year only to make plastic. That is higher than that needed for all of Africa.

The world now has a splendid discovery to convert plastic back into oil. There is a safe and user friendly process that has been developed to carry out this conversion.

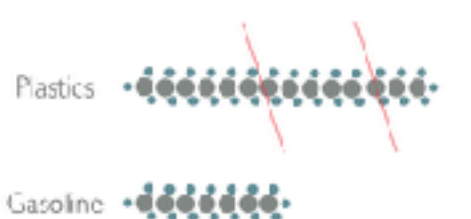
According to the data released by Plastic Waste Management Institute - Effective Utilization doesn't just take into account the 20 percent of recycled plastic. But it also considers the incinerated 52 percent used for energy recovery like generating electric power or heat. If we burn plastic, we create a lot of toxic waste as well as release a lot of CO₂, but in this way we minimize the carbon footprint as well as create awareness in people of the value of plastic waste.

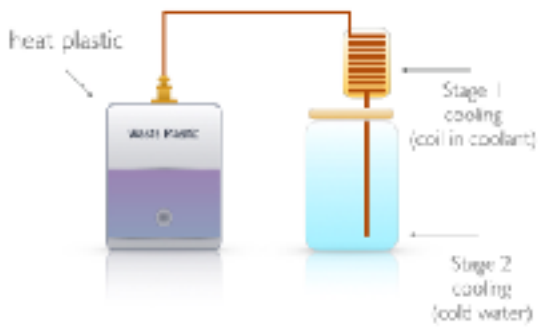
Hydrocarbons are the building blocks for plastics & oil product

. But, plastics have a longer hydrocarbon chain than oils. .

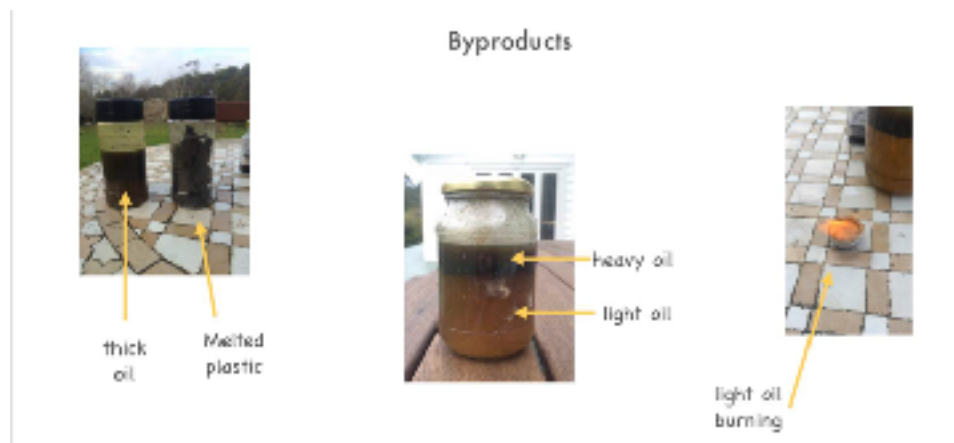
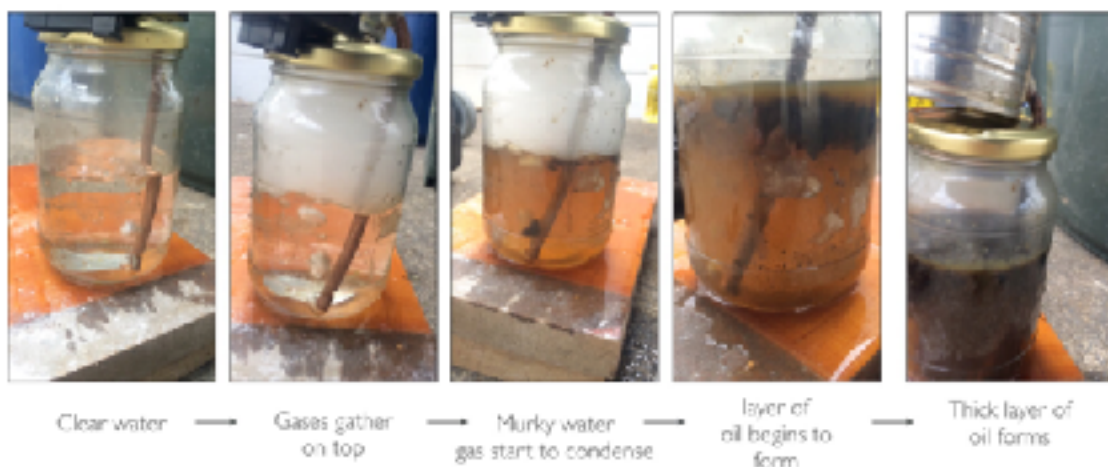


So in theory by 'separating' the plastic hydrocarbon chain apart, we are able to create an oil based fuel.



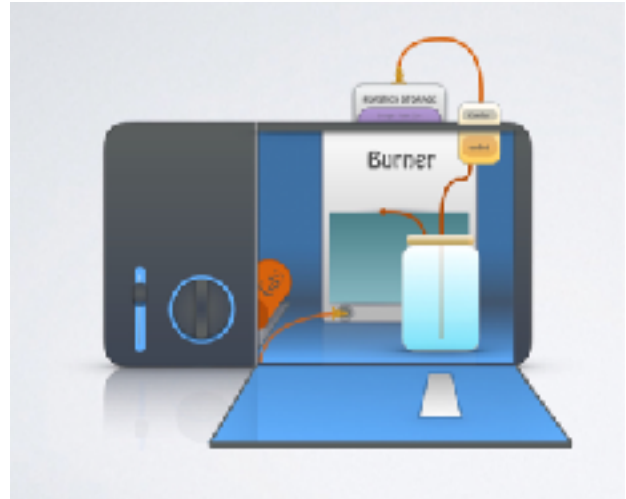


The heat is on given through an electric heater without the interference of a flame, so the conversion is a safe process. When the plastic is heated it will release 'vapours' (these vapours are made up of different gases) as the gas travels through the pipe it needs to be cooled down, once it reaches the 2nd stage condenser (cooler) it will form into a liquid, (which will be a mixture of oils) the oils then need to be separated from the water.

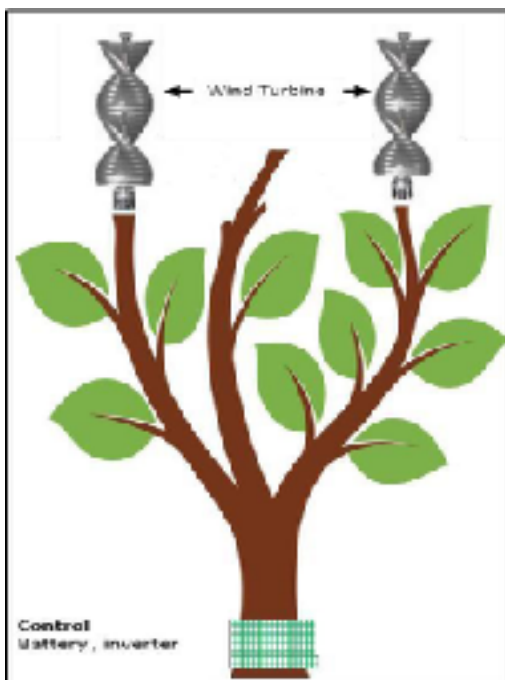


Akinori Ito claimed to be the mastermind behind this, although this process has many practitioners all over the world. It can be carried out even using very simple apparatus. Though the oil extracted from the plastic will be used to generate energy, the converter machine (which will be needed at some point) will use a lot of energy as well

as it uses an electric heater. Besides the oil, there must be some waste product to this conversion as well which might as well be toxic. There are still a few interrogators to this discovery but we'll see how the implementation of this process turns out!



Wind Tree Turbines by Kashika Bagga



The use of wind turbines has been a great revolution in generating electricity. However they are not very practical to use in neighborhoods, workplaces etc. This is because of the tremendous amount of noise pollution they cause and their inability to generate electricity at low wind speeds.

However the monstrous, noisy, conventional wind turbines may now be a thing of the past thanks to the wind tree turbines being installed in Paris. A French company 'New Wind' is installing the first tree turbines at Place de la Concorde in Paris.

Each tree is about 26ft tall and has 63 aero leaves. All the leaves have tiny blades in them, which can generate electricity at wind speeds as low 4mph regardless of the winds direction.

The company's founder Jerome Michaud-Lariviere hopes that the trees could be used to exploit small currents and could be eventually installed in people's backyards and urban centres.

The power output of the wind trees is about 3.1 kilowatts per year depending on the wind. Also the machines are very silent and cause almost no sound pollution. These wind trees currently retail at \$33,670. 'New Wind' has taken a revolutionary step towards encouraging renewable sources of energy, which in future could be used worldwide.

Alarming Facts

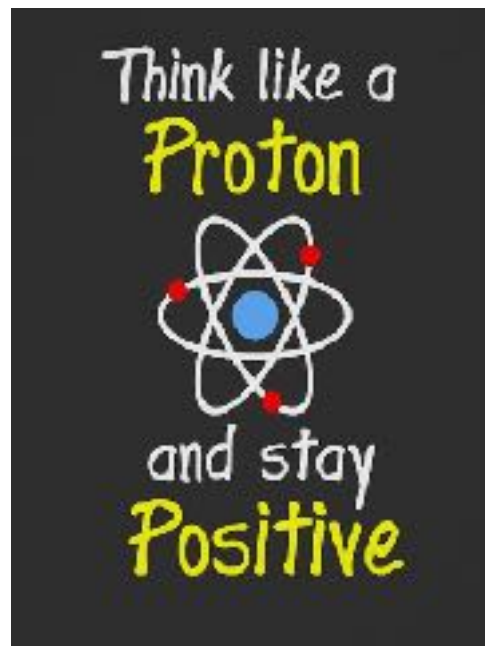
- Every year, more than 14 billion pounds (6 billion kilograms) of garbage is dumped into the world's ocean. Most of it, is plastic that is toxic to marine life.
- Known as the Great Pacific Garbage Patch, there even is a "continent" made from the plastic trash, floating in the Pacific Ocean. According to some estimates, the patch can be as large as twice the size of the US.
- Landfills are among the biggest contributors to soil pollution. About 80% of the items buried in landfills could be recycled.
- There are more than 500 million cars in the world now and the number is expected to rise to over a billion by 2030, which means the pollution caused by cars could potentially double by that year.
- Americans make up about 5% of the world's population but produce as much as 30% of the world's waste and use about a quarter of the world's natural resources.
- The only relatively clean place on Earth is Antarctica. The continent is protected by the Antarctic Treaty that prohibits military activities, mineral mining, nuclear explosions and nuclear waste disposal
- China is among the countries with highest air pollution in the world. Breathing air in Beijing, the country's capital, increases the risk of lung cancer in the same way as smoking 21 cigarettes a day.
- Moreover, almost 700 million Chinese (about a half of the country's population) have to drink contaminated water.
- Water pollution is even worse in India, where almost 80% of all urban waste is dumped into the river Ganges - the most sacred river to Hindus. The river is now also the place where poor Indians bury their deceased family members.
- Noise pollution is one of the most ignored types of pollution but it can cause serious problems including stress, hearing loss, sleep disorders, high blood pressure etc. In the US alone, millions of people suffer from noise pollution.

- A radioactive waste dumping site for the former Soviet Union, Lake Karachay, western Russia, is the most polluted spot on Earth. Spending just an hour in the lake would be fatal for a human.
- With computers, TVs, cell phones and other electronic devices becoming more and more available in the world, electronic waste has been an increasing problem in recent years. In 2012 alone, people produced almost 50 million tons of electronic waste.
- The US has also been struggling with serious water pollution. About 40% of American rivers and 46% of American lakes are too contaminated for fishing, aquatic life and swimming.
- Thousands of marine animals including fish, turtles, dolphins etc. die after swallowing plastic bags that resemble jellyfish.
- In India, about a thousand children die every single day due to a disease caused by extreme water pollution.
- In America alone 3 million plastic bottles are thrown away every hour. However, it takes up to 500 years for the plastic bottle to decompose.
- These days, there are up to 500 chemicals in an average human body that were not found in humans before 1920. In total, there are almost 80,000 synthetic chemicals on today's market.
- Pollution in China can change weather in the US. Almost a third of air pollution in San Francisco actually comes from China.



Facts about deforestation

- Fact 1: Forests cover 30% of the earth's land.
- Fact 2: It is estimated that within 100 years there will be no rainforests.
- Fact 3: Agriculture is the leading cause of deforestation
- Fact 4: One and a half acres of forest is cut down every second.
- Fact 5: Loss of forests contributes between 12 percent and 17 percent of annual global green house gas emission .
- Fact 6: If the current rate of deforestation continues, it will take less than 100 years to destroy all the rainforests on the earth.
- Fact 7: The rate of deforestation equals to loss of 20 football fields every minute.
- Fact 8: There are more than 121 natural remedies in the rain forest which can be used as medicines,
- Fact 9: According to Rainforest Action Network, the United States has less than 5% of the world's population yet consumes more than 30% of the world's paper.
- Fact 10: The over exploitation of forests is making it extremely difficult to replant a new ecology.
- Fact 11: 20% of the world's oxygen is produced in the Amazon forest.
- Fact 12: Up to 28,000 species are expected to become extinct by the next quarter of the century due to deforestation.
- Fact 13: 25% of cancers fighting organisms are found in the amazon.
- Fact 14: 13 million hectare per year in South America and Africa and south East Asia is converted from a forest to an agriculture land.
- Fact 15: Deforestation has considerably stopped in places like Europe, Pacific, North America and some parts of Asia due to lack of agricultural land.



Tell Me Why?

Why Are Rain Clouds Dark? by Piya Sheth, 9A, GSEB

The air around you is full of water in its gaseous form, called water vapor. When the air near the ground warms, it starts to rise, taking the water vapor along with it. The air starts to cool as it rises higher into the sky, causing the water vapor to condense onto atmospheric dust from volcanoes, car exhaust and other sources. The resulting water droplets and ice crystals coalesce, or join together, to form clouds.

Unlike atmospheric particles that scatter more blue light than other colors (making the sky blue), the tiny cloud particles equally scatter all colors of light, which together make up white light.

However, rain clouds are gray instead of white because of their thickness, or height. The main reason why rain clouds are dark is due to their particulate density. As clouds are formed from minuscule water droplets and/or ice crystals, the denser they are packed, the more light radiating from the Sun is scattered and dispersed by them, lending a darker appearance to their lower sections.

This is best visualised by a trip on an aeroplane, with clouds on an overcast day seeming grey/black in colour when viewed on the runway, yet a bright white when viewed from above during flight. Essentially, the deeper and denser a cloud formation is, the less light will pass through it.

That is, a cloud gets thicker and denser as it gathers more water droplets and ice crystals – the thicker it gets, the more light it scatters, resulting in less light penetrating all the way through it.

The particles on the underside of the rain cloud don't have a lot of light to scatter to your eyes, so the base appears gray as you look on from the ground below.

This effect becomes more pronounced the larger the water droplets get – such as right before they're large enough to fall from the sky as rain or snow – because they become more efficient at absorbing light, rather than scattering it.

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Why do we have lines on our palms?

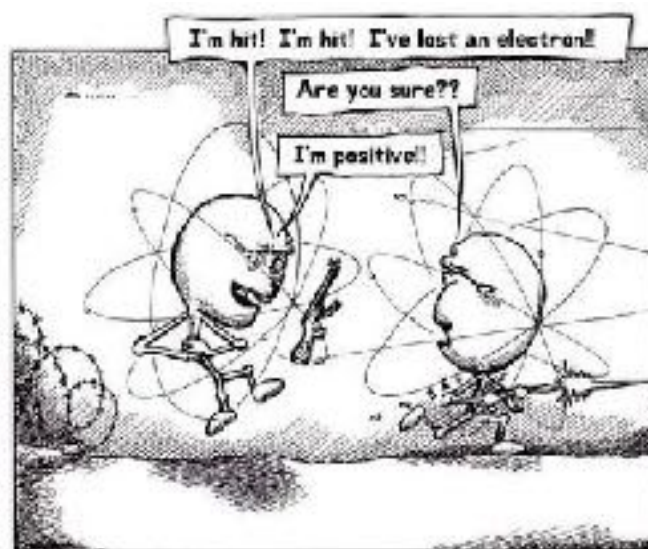
Your hands are the most hardworking part of your body and they are capable of several actions- including holding, stretching, lifting, typing and writing. To be able to do these different tasks and change their shape constantly, the skin covering them should be able to adjust itself to the complex positions. That is where the lines on your palms come into play. These lines are technically called creases, or palmar flexion creases to be more specific, and they are required to divide your palm into sections for flexion.

These creases help in folding the skin on your hand when you change its shape, say when you make a fist or bend your hands. If you did not have these creases, you would have loose skin hanging out from your palms under your fingers.

Take a look at the lines carefully and you will see that each one of them is at a place where your hand bends. The same goes for the lines on your elbow, knees, wrist etc. They prevent the skin from bunching up into clumps and provide an avenue for the skin to tuck into when your joints contract and then enable the skin to unfold when your joints extend. This is the reason why you have strong and prominent creases where the bones of your finger meet your thumb.

Babies develop these flexion creases on their hands when they are in the womb itself, at around the 12th week of gestation. The thickness and number of creases on the palms depends upon factors such as race and genetic history.

A study conducted in Korea found that the union of creases is related to hand grip, whereas another report in France presented that hand strength can be predicted from the circumference of the hand. A third study combined the results of both the researches and concluded that people with a large hand circumference and fused hand lines such as the simian crease have greater hand strength.

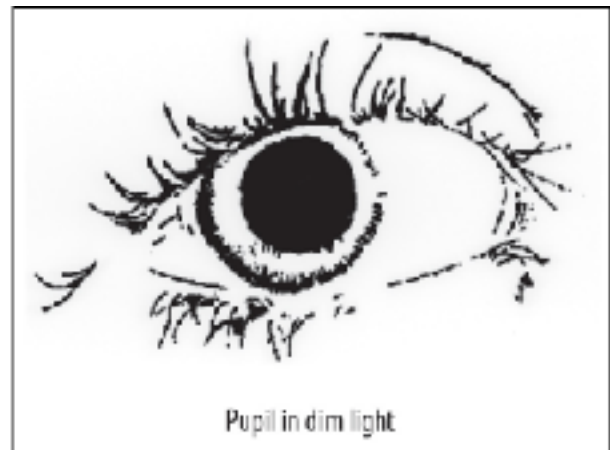
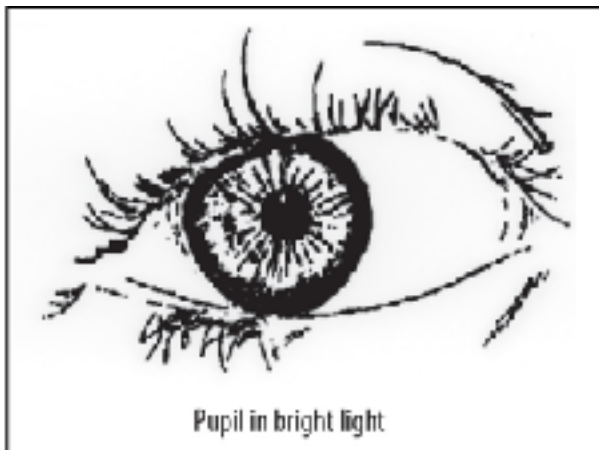


Another casualty in the War of the Atoms

Why Does The Pupil Change Its Size?

The pupil is an opening that lets light into your eye. Since most of the light entering your eye does not escape, your pupil appears black. In dim light, your pupil expands to allow more light to enter your eye. In bright light, it contracts. Your pupil can range in diameter from 1/16 inch (1.5 mm) to more than 1/3 inch (8 mm).

Light detected by the retina of your eye is converted to nerve impulses that travel down the optic nerve. Some of these nerve impulses go from the optic nerve to the muscles that control the size of the pupil. More light creates more impulses, causing the muscles to close the pupil. Part of the optic nerve from one eye crosses over and couples to the muscles that control the pupil size of the other eye. That's why the pupil of one eye can change when you shine the light into your other eye.



Since light travels faster than sound, people may appear bright until you hear them speak.



Parting Shots



