

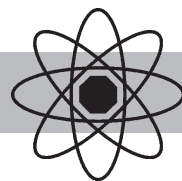
Eureka

Expanding Your Horizon of Science

Issue - 3

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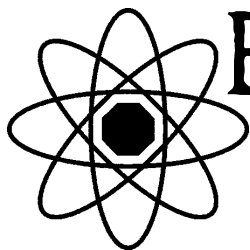




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Dear friends, Greetings to you all!

Jnana Prabodhini has long & enduring relationship with the seven sisters in north eastern part of India. Groups of volunteers regularly visit to interact with people. This science magazine is a part of an effort to keep you all in touch & keep this relationship flourishing forever . Editors of Eureka have taken support from free material available on different websites. We are quite eager to know your response. Even you can contribute your articles for this magazine. Send your feed back / articles on science.eureka@gmail.com.



Editorial Dialogue

*Few years back when I visited Tawang (Arunachal Pradesh), on the way to Chorten (stupa) at Jimithang I stopped at a stream side near a village. A small hut like structure was built near the stream of flowing water. In that small room I saw a fantastic example of traditional energy harvesting system that is the **Chuskar** (traditional water mill). The **Chuskar** is a flour mill system which runs by using hydro power, which is used by the villagers to grind the millets. The chakki is built and maintained using locally available natural resources like wood and stone. This traditional water mill is an excellent alternative source of energy, where neither electricity nor diesel or machinery is required. It is also an eco-friendly, pollution-free, energy-efficient and low-cost indigenous practice. It entirely depends on naturally available water.*

Indeed the system was an example of energy efficient and eco friendly resource harvesting. The water sources in hilly Northeastern India have prime resource for the hydro power. By providing technical support to such traditional practices a small percentage of energy sufficiency can be achieved in Northeast for providing energy for domestic purposes.

Humans living in close proximity to their environments are capable of observing, identifying, monitoring and reacting to variations in resource availability, ecological relationships, food access etc. You can share such traditional resource management systems about your tribe regarding water management, agricultural practices and food management through "Eureka"

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Teacher: What is the formula for water?

Student: H, I, J, K, L, M, N, O

Teacher: That's not what I taught you.

Student: But you said the formula for water was...H to O.



Interesting plants of our region



In this section, we will take brief account of some more interesting plant species of North- East India.



Tetrameles nudiflora
Family: Tetramelaceae

1. *Tetrameles nudiflora*

Family: Tetramelaceae

Common Names: Jungli Dungy, Bhelu, Dieng sharat

Flowering: February- April; **Fruiting:** April- May

Distribution: Darjeeling, Sikkim foothills to Arunachal Pradesh, Meghalaya, Myanmar.

Description: A very tall deciduous tree up to 50m tall, with huge wall like buttresses. Bark is gery in colour, smooth and shining with outer papery layer. Inner layer is creamy containing colourless sap. Leaves circular, pointed at apex, margin toothed, 5 nerved and heart shaped at base. Male and female flowers on different trees. Male flowers small yellowish borne in long inflorescence. Female flowers in hanging racemes.

Uses: Bees built their hives on the Jungli Dungy tree. A favoured nesting tree of Hornbills. It is an extremely fast growing tree and used in the plywood and match industries.



Aquilaria malaccensis
Family: Thymeliaceae

2. *Aquilaria malaccensis*

Family: Thymeliaceae

Common Names: Agarwood tree, Agar, Sasi, Akyaw

Flowering: April-August; **Fruiting:** Winter

Distribution: East Himalyan low hills, Assam, Bangladesh and Myanmar

Description: A tall evergreen tree with silky young shoots. Wood scented due to presence of a resinous substance. Leaves alternate, leathery, pointed. Flowers white in topped clusters. Fruit velvety, egg shaped.

Uses: The wood is scented and used as incense. The diseased wood is valuable, for hard dark coloured masses caused by fungus resulting in agarwood.

3. *Aesculus assamica*

Family: Sapindaceae

Vernacular Names: East Himalayan Horse Chestnut, Raman bih, Dieng dula, Dieng sangkenrop, Satpate,

Flowering: February-March, **Fruiting:** August-October



Aesculus assamica

Family: Sapindaceae

Distribution: Widespread species in the tropical and subtropical monsoon forest zone from NE India (Sikkim) eastward to S China and N Vietnam. Arunachal Pradesh and Khasi Hills, Bhutan and upper Myanmar.

Description: A handsome deciduous tree with a large spreading crown. 12-15 m tall with grayish bark. Leaves opposite, palmately compound, digitate with saw toothed margin. Flowers showy, borne on large terminal erect bunches. Flowers cream in colour with brown-red tinge. Fruits large, rusty brown in colour.

Uses: The nuts contain high concentrations of a saponin-class toxin called aesculin, which is toxic to many animals including humans. The wood is very pale whitish-brown, fairly soft and little-used. Uses include cheap furniture, boxes, and firewood.

4. *Shorea robusta*

Family: Dipterocarpaceae

Common Name: Sal, Dieng blei

Flowering: March; **Fruiting:** June

Distribution: Sub Himalayan tract from Kangra Valley to Arunachal Pradesh, Sikkim, and Bhutan. Assam, Meghalaya, Tripura and Andhra Pradesh.



Shorea robusta

Family: Dipterocarpaceae

Description: A large, semi deciduous tree of monsoon forests with shining foliage. Generally 13-32 m tall. Bark dark brown with longitudinal fissures. Leaves leathery, ovate in shape. Young leaves red or coppery coloured. Small, fragrant, yellow coloured flowers.

Uses: Sal is one of the most important sources of hardwood timber in India, ranks second to teak in importance. It is resistant to termites and is in very great demand for railway sleepers. The stem exudes a gum called 'Sal dammar' used in marine yards and in shoe polish. Sal butter extracted from seeds is used in chocolate and as cooking agent. The wood is especially suitable for constructing frames for doors and windows. The dry leaves of Sal are a major source for the productions of leaf plates and leaf bowls in Northern and Eastern India.

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Hi friends! Hoping that you have worked on the last exercises and enjoyed them, now it's the time to have a look at some geometry. Pythagoras theorem! Everyone has heard of this but I'm sure that you must not have heard of the math from this article!

Here we go...

Pythagoras theorem

The Pythagorean Theorem states that: The area of the square on the hypotenuse of the right angled triangle is equal to the sum of the areas of the squares on the sides which form right angle. The converse of the Pythagorean Theorem is also true: For any three positive numbers a , b , and c such that $a^2 + b^2 = c^2$, there exists a triangle with sides a , b and c and every such triangle have a right angle between the sides of lengths a and b .

If (a, b, c) is a Pythagorean triple so is (da, db, dc) for any positive integer d ; the number d is then a common divisor of the three numbers da, db, dc in the triple. A primitive Pythagorean triple is one in which a, b and c are co-prime, that is they don't have any common factor. The triangles described by non-primitive Pythagorean triples are always similar to the triangle described by a primitive Pythagorean triple (the ratio of the sides of the two triangles will be d).

These primitive triples are given by some formula. If $m > n$ are positive integers, if m and n are co-prime and one of them is even, then $(a = m^2 - n^2, b = 2mn, c = m^2 + n^2)$ is a primitive Pythagorean triple. It can be seen that if both m and n are odd, then a, b , and c will be even, and so the Pythagorean triple will not be primitive. Every primitive triple arises in this fashion from a unique pair of co-prime numbers $m > n$. This shows that there are infinitely many primitive Pythagorean triples as we can select m and n with given requirements in infinitely many ways. It is interesting to note that there are more than one primitive Pythagorean triple with the same lowest integer, the

first example is for 20, which is the lowest integer of two primitive triples: $(20, 21, 29)$ and $(20, 99, 101)$.

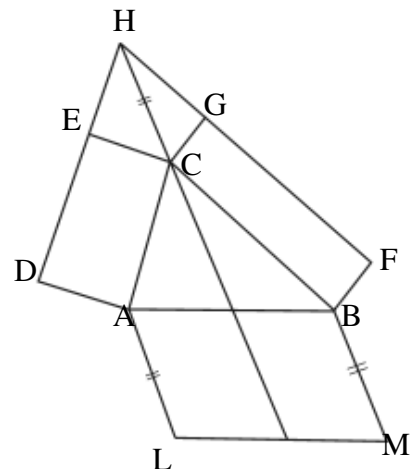
The Pythagorean Theorem was generalised by Euclid in his famous book '*Elements*':

1. For Right angled triangle: If we draw similar figures on the sides of a right triangle, then the sum of the areas of the figures drawn on two sides forming the right angle equals

the area of the figure drawn on the hypotenuse.

2. For any triangle: Take any triangle ABC and construct parallelograms $ACED$ and $BCGF$ that intersect with the triangle in the sides AC and BC , respectively. Extend DE and FG to meet in H and construct a parallelogram $ABML$ on the third side AB such that AL and BM are equal and parallel to HC . Then the area of $ABML$ is the sum of the areas of $ACED$ and $BCGF$.

Now try to find out as many proofs as you can!



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Revolutionaries



In this series we are going through the life of some of the prominent scientists who made a dent despite facing problems and challenges. Till now we have got to know about Charles Darwin and Sir Isaac Newton. Now we will know about an eminent Indian Scientist.....

C V Raman

Dr. C.V. Raman was one of the greatest scientists of India, who was awarded the 1930 **Nobel Prize** in physics for his work on the scattering of light and for the discovery of the '**Raman Effect**', which is named after him.



Chandrasekhar Venkata Raman, widely known as C.V. Raman was born on November 7, 1888 at Tiruchirapalli in Tamil Nadu. His mother tongue was Tamil. He was the second child of Chandrasekhar Iyer and Parvathi Ammal. His father was a lecturer in mathematics and physics. Raman's academic brilliance was established at a very young age. At the age of twelve, he finished his matriculation education and entered Mr. A V N College

Vishakhapatnam and two years later moved to the prestigious presidency college in Madras (Chennai). When he was the age of fifteen he received B. A. with honors in physics and English. He continued his studies at the same college. In 1907, barely seventeen, Raman received his Master degree with honors. He got first position in the University in M.A.

Professor C V Raman was first to investigate the harmonic nature of the sound of the Indian drums such as the tabla and the mridanga. In 1930, for the first time in its history, an Indian scholar, educated entirely in India has received highest honour in science, the '**Nobel Prize**' in physics. In 1943, he founded '**Raman Research Institute**', near Bangalore. His discovery of the '**Raman Effect**' made a very distinctive contribution to Physics. He was also conferred the highest title of '**Bharat Ratna**' in 1954. The '**Raman Effect**' was a demonstration of the '**Collision**' effect of light bullets (Photons) passing through a transparent medium, whether solid, liquid or gaseous. Raman was also awarded the '**Lenin Peace Prize**' in 1957. Sir Venkata Raman remained active until his death, at the age of eighty-two. He died on November 21, 1970 at Bangalore, India. India celebrates National Science day on 28th February every year to commemorate Raman's discovery. We should be proud of him.

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Q: What happens when electrons lose their energy?

A: They get Bohr'ed.



In modern period human lives become more comfortable & faster due to various inventions. Let's understand origin of some of them.

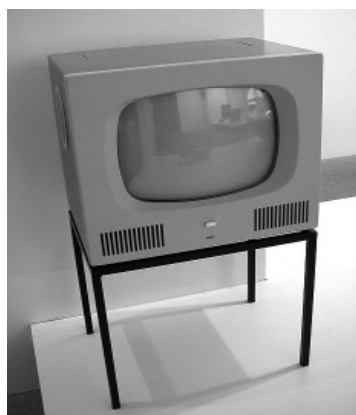
Television

Television (TV) is a widely used telecommunication medium for transmitting and receiving moving images, either monochromatic (“black and white”) or color, usually accompanied by sound. “Television” may also refer specifically to a television set, television programming or television transmission.

Commercially available since the late 1930s, the television set has become a common communication receiver in homes, businesses and institutions, particularly as a source of entertainment and news. Since the 1970s the availability of video cassettes, laserdiscs, DVDs and now Blue-ray Discs, have resulted in the television set frequently being used for viewing recorded as well as broadcast material.

History:

Television



Inventor	Philo T. Farnsworth Vladimir Zworykin John Logie Baird
Launch Year	1923
Available	Worldwide

In its early stages of development, television employed a combination of optical, mechanical and electronic technologies to capture, transmit and display a visual image. By the late 1920s, however, those employing only optical and electronic technologies were being explored. All modern television systems rely on the latter, although the knowledge gained from the work on mechanical-dependent systems was crucial in the development of fully electronic television. The first time images were transmitted electrically via early mechanical fax machines, including the pan-telegraph, developed in the late 1800s. The concept of electrically powered transmission of television images in motion was first sketched in 1878 as the telephonoscope, shortly after the invention of the telephone. At the time, it was imagined by early science fiction authors, that someday that light could be transmitted over wires, as sounds were.

In 1884 Paul Gottlieb Nipkow, a 23-year old university student in Germany, patented the first electromechanical television system which employed a scanning disk, a spinning disk with a series of holes spiraling toward the center, for rasterization. The holes were spaced at equal angular intervals such that in a single rotation the disk would allow light to pass through each hole and onto a light-sensitive selenium sensor which produced the electrical pulses. As an image was focused on the rotating disk, each hole captured a horizontal “slice” of the whole image.

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Astronomy

Friends, Astronomy is a natural science that deals with the study of objects such as stars, planets, comets, nebulae, star clusters and galaxies. In this article we are having glimpse of how our zodiac signs are placed in the sky. In astronomical terminology we call them constellations. We had observed Aries & Taurus. Now let's see how Gemini looks like.

Gemini

Gemini is a strong, masculine, positive or extrovert and an air sign. It lies between Taurus and Cancer. The brightest stars of Gemini are Castor and Pollux. Some of the facts are as follows:

1. Image: - twins

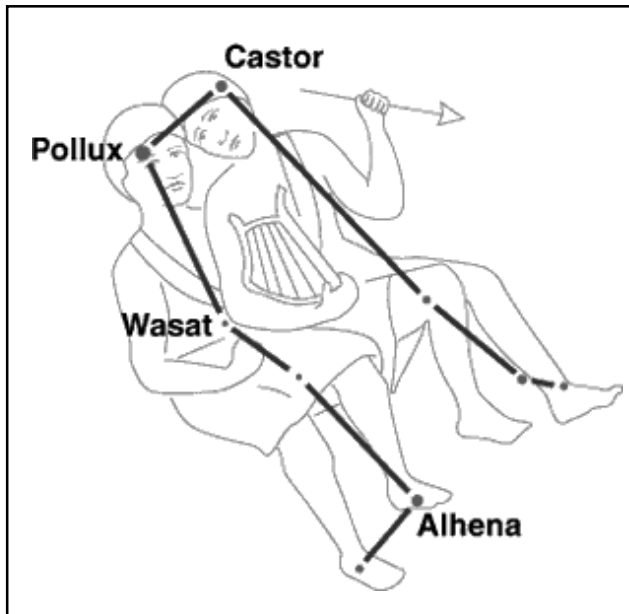
2. Time best visible: - In October and November Gemini will appear along the eastern horizon in the morning sky prior to sunrise. The best time to observe Gemini at night is overhead during the months of January and February. By April and May, the constellation will be visible soon after sunset in the west.

3. Area of sky covered:-514 square degrees

4. Stars: - It's located almost 50 light years away from Earth. Castor is a hot, blue/white twin star while Pollux is a cooler, singular star. It is not only more massive than our Sun, but probably younger, too. Its feet will always point towards **Orion**.

5. Mythology: These are twin brothers in Greek mythology and collectively known as the Dioskouroi, sons of Zeus. They were the sons of Leda by king Tyndareus and god Zeus respectively. Castor and Pollux were known to be well-educated, strong and daring, while remaining gentle individuals.

They were celebrated as healers, physicians and protectors of humankind. The oldest ideas that can be identified with Gemini appear to originate in India, where this constellation was known as "Aswins," or



"Twin Horsemen of the Dawn."

6. Symbolic significance: - The symbol projects the idea of duality, of more than one thing at a time. It shows two staves or scepters or two arms or both lungs.

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Relativity:

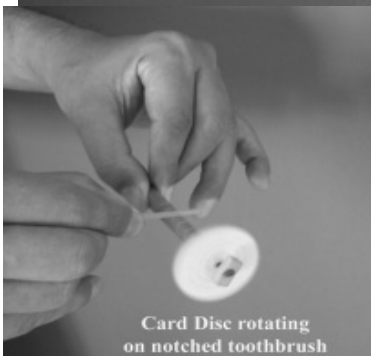
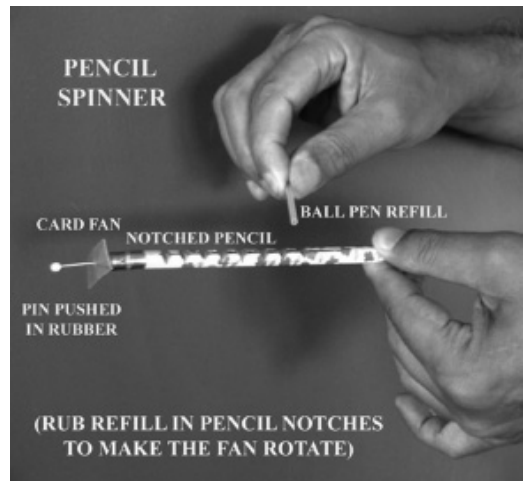
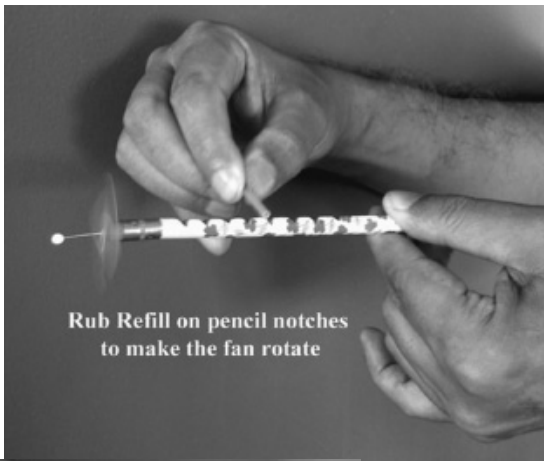
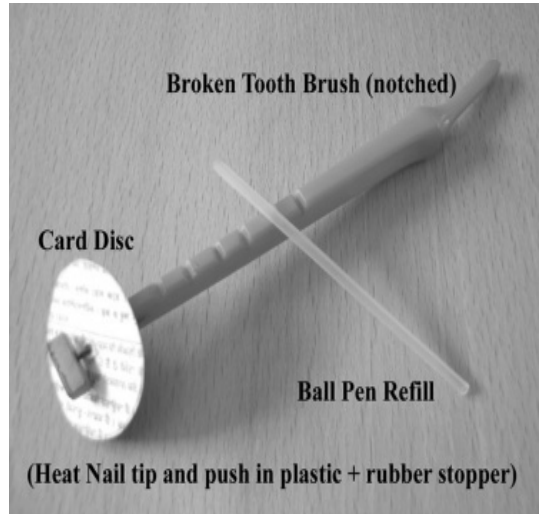
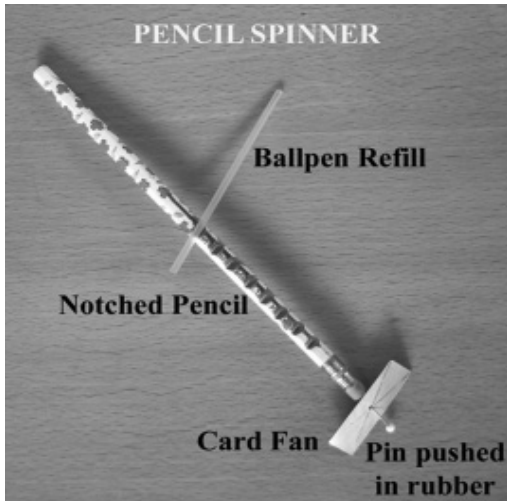
- *Two hairs in my cup of milk is too much.*
- *Two hairs on my head is too less.*

Fun with Science



In science, you don't have to go around making trouble for yourself -Nature does it for you!!! In science, you don't have to go around making trouble for yourself -Nature does it for you!!!! Let's use some basic theories of science and have more fun. Science toys are concept of Prof Arvind Gupta (renowned scientists from IUCAA). If you have designed any such toy let us know. Here is one such interesting toy –

Pencil spinner



For best results hold the refill near the edge and rub it hard. The fan will start rotating. (For making fan take a 5-cm x 1.5-cm rectangle from a greeting card. Mark its diagonals and make a hole in its center.)

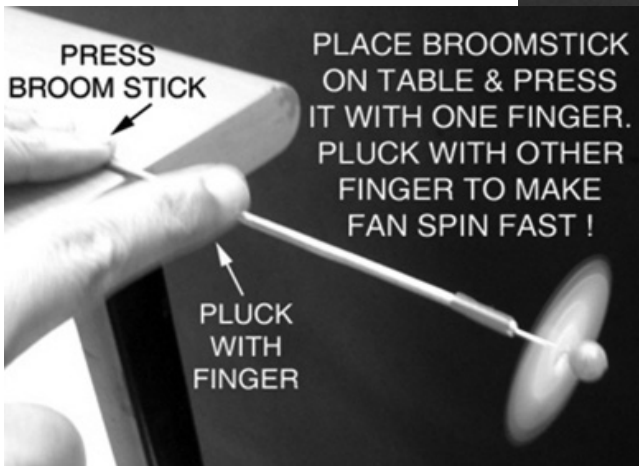
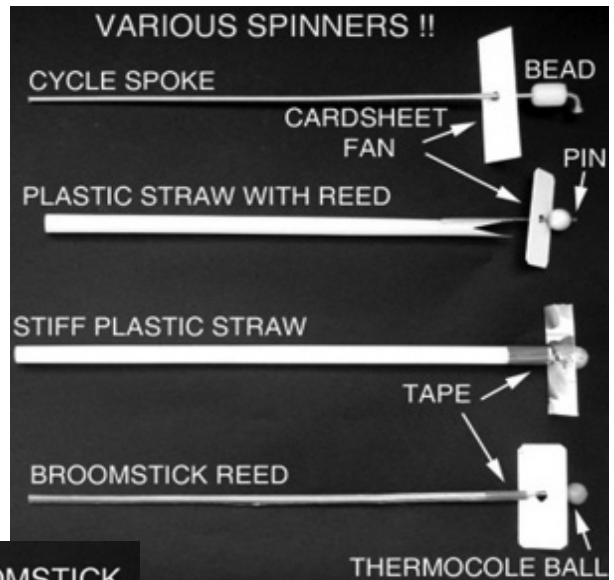
You can also do this by pressing the index finger of the hand holding the pencil next to the rubber on the pencil.

Can you make the fan rotate in the opposite direction?

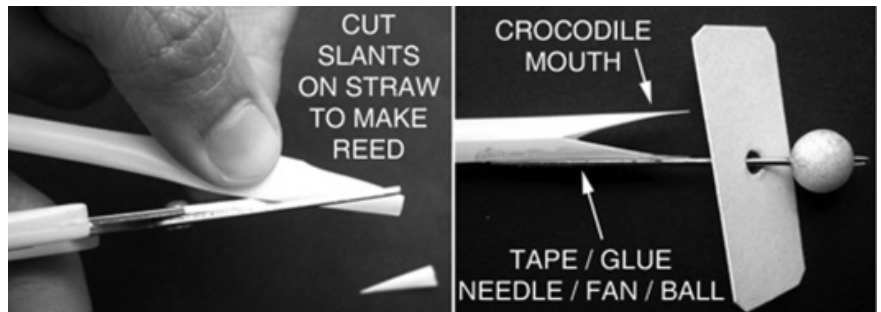
Will the fan rotate if you rub it with your finger?

What can be biggest size of fan?

The fan rotates because of the vibrations in the pencil produced by the refill.

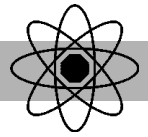


The physics behind the toy is a bit complex and several learned research papers have been written on it! Try to find information more on it and send us



You must have enjoyed doing this. For more fun and experiments you may visit www.arvindguptatoys.com

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Experiencing fungal growth



Fungus growing on wood

You must have enjoyed and thrilled after experiencing changes in butterfly life. It is hard to believe how crawling caterpillar eating loads of leaves turns into winged butterfly. If you observe more, you will notice that leaf eating caterpillar suddenly starts feeding on the nectar of flower when becomes butterfly!

We all can easily '**know**' the fact that the type of mouth required to 'chew' leaves will be different than the mouth required to 'suck' the flower nectar. But now, after observing butterfly life closely we can '**appreciate**' this fact. After appreciating this gigantic shift in life forms, this time we will observe how entirely new life can arise from nothing! Got confused? So let

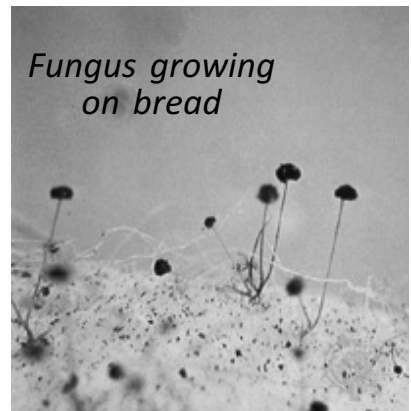
us do this activity!

Objective: Observing emerging fungal life growing on the food and creating 'fungal garden' under the supervision of science teachers.

Activity:

1. Take a little amount of cooked rice (you can take any food item for that matter)
2. Keep this rice open for 2-3 days (you can keep this anywhere in your house or in any open area nearby your house)
3. After 2 days observe this rice. You will notice colour change in the rice and will observe some growth on this rice.
4. Observe the same rice every day (at least for next one week) and note down the observations, changes in the fungal structure as days progresses.

Now you will wonder, when we keep food we make sure that this food item is not having anything on it initially. After keeping the same food item in open area there is certain observable change on the surface of food. So what is grown on this food? Is it just an accumulated dust? Observe it carefully. This growth is nothing but the 'Fungus'. Where from this fungus suddenly appeared on the food? Or is it the case that it was already present there? If you observe this fungus using simple lens you will notice the structure as shown in the figure. If you observe daily, fungal network eventually will occupy entire food surface. In some fungi (e.g. bread fungus) vertical stalks arise



Fungus growing on bread

from this horizontal network of branching and having thousands of spores packed inside packets. These packets get burst and spores migrate and attaches to the food surface. These packets are called as 'Sporangium'. So we all live in the environment where such millions of invisible spores are freely moving around us!

Keep different vegetables, fruits, decayed leaves, rotten food together in a small tray and let the fungus grow on these materials same way as we done for rice.....after some days this will form a small, colourful '**Fungal Garden**' in your tray!

You can keep your record by observing and measuring-

1. The material on which fungus is (wood, decayed leaves, rice, vegetables, fruits etc)
2. Colour, Shape and structure of fungi,
3. Growth measure: Area occupied every day by fungus

Example: If fungus grows circularly as shown in photos you can measure the maximum distance travelled by fungus as a radius and simply put in the formula of area of circle. So if you measure radius as 2cm on day one and 4 cm on day two then put these values in the formula for area of circle and find the area occupied by fungus for two days and take the difference. This difference (Area of day two- Area of day one) will tell you that how much fungus has grown (Same applies if fungus grows in rectangular manner, just use area of rectangle)!

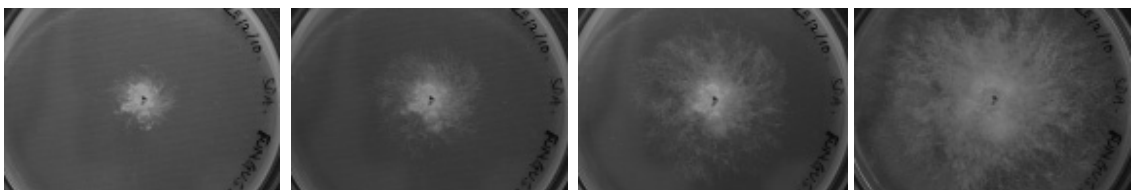


Growing white fungus photographed every 15 hrs (this growing fungus was provided with artificial food and after every 4 hrs distance from centre to the external tips was measured).

So, you can observe different types of fungi around your house. Can draw pictures, observe closely, and monitor their growth. You can involve your friends in creating your fungal garden. Fungal spores may

be harmful to us so do this activity under the supervision of your school science teachers. Do you know, Science still do not know all fungi present in the world so it will be fun watching growing fungus.....and who knows you will come up with entirely new unknown fungus! So do this 'Fungal garden' and have a fun....

Images in the article are showing few types of fungi growing around us.....



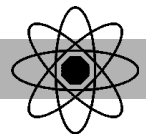
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Friends, in this article we will be going through various species which are facing vanishing threat.

Great Pied Hornbill

The **Great Hornbill** (*Buceros bicornis*) also known as **Great Indian Hornbill**, is one of the larger members of the hornbill family. Their impressive size and colour have made them important in many tribal cultures and rituals. The Great Hornbill is long-lived, living for nearly 50 years in captivity.

The most prominent feature of the hornbill is the bright yellow and black casque on top of its massive bill. The casque is hollow and serves no known purpose. Females are smaller than males and have bluish-white instead of red eyes. The wing beats are heavy and the sound produced by birds in flight can be heard from a distance.

Conservation status : Due to habitat loss & hunting in some areas, the Great Hornbill is evaluated as Near Threatened on the IUCN Red List. Hunting is prohibited & protected under Wildlife Protection Act 1972.

Distribution and habitat : The distribution of the species is fragmented over its range in South and Southeast Asia. In South Asia they are found in a few forest areas in the Western Ghats and in the forests along the Himalayas. Their habitat is dense old growth (unlogged) forests in hilly regions. The home ranges of males is found to be about 3.7 km² during the breeding season.

Feeding & Reproduction : Great Hornbills are usually seen in small parties with larger groups sometimes aggregating at fruit trees. The diet consists mainly of fig fruits & even small reptiles, birds, insects. (Hornbill can eat upto 150 figs in one meal). They prefer Large, tall and old trees, particularly that rise above the canopy. At the time of nesting, the female hornbill starts living in a tree hollow sealed with dung and pellets of mud. She remains imprisoned in her nest until the chicks are semi-developed relying on the male to bring her food. The process of incubation continues for 6-8 weeks. The female hornbill comes out only after she has molted and fresh feathers have grown on her and her young ones. During the breeding season they become very vocal. The female voids faeces through the nest slit and young follow the same nest sanitation behaviour after they are two weeks old. Once the female emerges out of the nest, it is sealed again by the chicks. The young birds have no trace of a casque. The full development of casque takes five years.



Type: Bird

Diet: Frugivorous + Carnivore

Size: Body, 95-120 cm (38-47 in),
152 cm (60 in) wingspan

Weight: 2.15–4 kg (4.7-8.8 lbs)

Activity : Find out traditional values / reasons & write back to us - Why people in North East Indian states were Large casque of Hornbills on their traditional caps ?

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In our great journey of the technical world, let's know about a magic! How can a simple plate preserve a huge amount of data? Let's understand the magic of a small Compact Disc!!!

The Magic of a small Circle...

CDs and DVDs are everywhere these days. Whether they are used to hold music, data or computer software, they have become the standard medium for distributing large quantities of information in a reliable package. If you have a computer and CD-R drive, you can create your own CDs.

CD Material: A CD can store up to 74 minutes of music that means almost 700 MB! A CD is a fairly simple piece of plastic, about four one-hundredths (4/100) of an inch (1.2 mm) thick. Most of a CD consists of an injection-molded piece of clear polycarbonate plastic. During manufacturing, this plastic is impressed with microscopic bumps arranged as a single, continuous, extremely long spiral track of data. A thin, reflective aluminum layer is sprayed onto the disc, covering the bumps. Then a thin acrylic layer is sprayed over the aluminum to protect it. The label is then printed on the acrylic. A cross section of a complete CD (not to scale) looks like this:



The Spiral: A CD has a single spiral track of data, circling from the inside of the disc to the outside. The fact that the spiral track starts at the center means that the CD can be smaller than 4.8 inches (12 cm) if desired, and in fact there are now plastic baseball cards and business cards that you can put in a CD player.

Bumps on the CD:

Looking through the polycarbonate layer at the bumps, they look something like this: The incredibly small dimensions of the

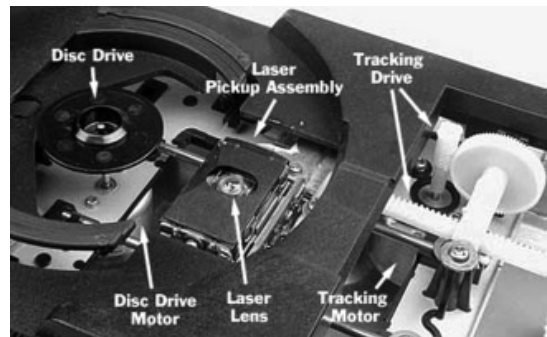


bumps make the spiral track on a CD extremely long. If you

could lift the data track off a CD and stretch it out into a straight line, it would be 0.5 microns wide and almost 3.5 miles (5 km) long!

CD Player Components: The CD player has the job of finding and reading the data stored as bumps on the CD. The player consists of three fundamental components:

- A **drive motor** spins the disc.



- A **laser and a lens system** focus in on and read the bumps.
- A **tracking mechanism** moves the laser assembly so that the laser's beam can follow the spiral track.

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Internet: The Virtual world



In the series, we have gone through articles on Internet Routing and Internet Infrastructure. Let's know about URL and Domain Name System.

URL and Domain Name System (DNS)

You must have read that, each computer connected to the Internet has a unique address known as IP address. A name that identifies one or more IP addresses is known as Domain Name. In 1983, the University of Wisconsin created the **Domain Name System (DNS)**, which maps domain names to IP addresses automatically. This way, for example, you only need to remember `www.google.com`, instead of `google.com`'s IP address. Domain names are used in URLs to identify pages on Internet.

URL: Uniform Resource Locator



A Uniform Resource Locator (URL) is a Uniform Resource Identifier (URI) that specifies where an identified resource is available and the mechanism for retrieving it. The best-known example of a URL is the "address" of a web page on the World Wide Web, e.g. `http://www.example.com`

Because the Internet is based on IP addresses, not domain names, every Web server require a Domain Name System (DNS) server to translate domain names into IP addresses.

For example, the **Uniform Resource Locator (URL)** "`http://www.google.com`" contains the domain name `google.com`. So

does this e-mail address: `example@google.com`. Every time you use a domain name, you use the Internet's DNS servers to translate the human-readable domain name into the machine-readable IP address.

Domain Names and Address Resolution

What if you don't know the IP address of the computer you want to connect to?

What if you need to access a web server referred to as `www.anothercomputer.com`?

How does your web browser know where on the Internet this computer lives?

The answer to all these questions is the Domain Name Service or DNS.

The DNS is a distributed database which keeps track of computer's names and their corresponding IP addresses on the Internet.

Many computers connected to the Internet host part of the DNS database and the software that allows others to access it.

These computers are known as DNS servers. No DNS server contains the entire database; they only contain a subset of it.

If a DNS server does not contain the domain name requested by another computer, the DNS server re-directs the requesting computer to another DNS server.

Every domain name has a suffix that indicates which top level domain (TLD) it belongs to. There are only a limited number of such domains. For example:

gov - Government agencies
edu - Educational institutions
org - Organizations (nonprofit)
mil - Military

com - commercial business

net - Network organizations

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Energy Resources

Do you know, from where does the energy come that we use? Well, we will let you know about all the sources of energy being tapped today. In last issue we have discussed about the Nuclear fuels. This time let us know about 'Solar Power'

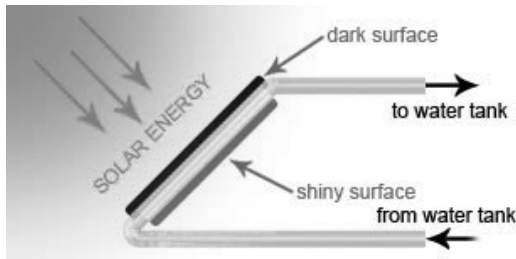
Solar power - energy from the Sun

Introduction : We've used the Sun for drying clothes and food for thousands of years, but only recently have we been able to use it for generating power. The Sun is 150 million kilometers away, and amazingly powerful.

How it works: There are three main ways that we use the Sun's energy:-

1. Solar Photovoltaic Cells:

That converts light directly into electricity.



2. Solar water heating: where heat from the Sun is used to heat water in glass panels on your roof.

3. Solar Furnaces use a huge array of mirrors to concentrate the Sun's energy into a small space and produce very high temperatures. Solar furnaces are basically huge "solar cookers".



More: Solar cells provide the energy to run

satellites at orbit the Earth. These give us satellite TV, telephones, navigation, weather forecasting, the internet and all manner of other facilities.

Advantages :

- ✧ Solar energy is free - it needs no fuel and produces no waste or pollution.
- ✧ Handy for low-power uses such as solar powered garden lights and battery chargers, or for helping your home energy bills.

Disadvantages :

- ✧ It doesn't work at night.
- ✧ Very expensive to build solar power stations, though the cost is coming down as technology improves.
- ✧ It can be unreliable unless you're in a very sunny climate.

Is it renewable?

Solar power is renewable. The Sun will keep on shining anyway, so it makes sense to use it.

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S(c)quiz Your Brains....!!!



Solve this science quiz. Send your answers to Janana Prabodhini's address.

.....The interesting prize is waiting for you.....!!

Environmental Science

1. What is meant by ecosystem?
 - a. Study of interactions between two organisms
 - b. Group of organisms interacting among themselves and with the environment
 - c. Association between living and non living factors
2. What are the major components of an ecosystem?
 - a. Biotic and abiotic
 - b. Natural and artificial
 - c. Organic and inorganic
3. What are autotrophs?
 - a. Organisms who fed on others
 - b. Self nourishing organisms
 - c. None
4. The path through which a nutrient travels as it moves from air, water or soil into the bodies of living organisms and back to the air, water or soil is called?
 - a. Bioaccumulation
 - b. Biomagnifications
 - c. Biogeochemical cycle
5. The accumulation of substances in the living tissues of organism is called?
 - a. Eutrophication
 - b. Bioaccumulation
 - c. Biodegradation
6. The aquatic ecosystem is divided into 2 different eco systems? Name both the ecosystems?
 - a. Grassland & forest
 - b. Ground water & surface water
 - c. Marine & fresh water
7. Natural causes of ecosystem destruction are?
 - a. Floods, earthquakes & wars
 - b. Earthquakes, migration and forest fires
 - c. Floods, earthquakes and forest fires
8. Which is the nitrogen fixing bacteria?
 - a. *E. coli*
 - b. *Azotobacter*
 - c. *Penicillium*
9. The Bishnoi tribes who are famous as indigenous protector of forests and animals are found in which state of India?
 - a. Gujarat
 - b. Maharashtra
 - c. Rajasthan
10. The world Environment day is celebrated worldwide on which date?
 - a. 5th June
 - b. 10th October
 - c. 7th May

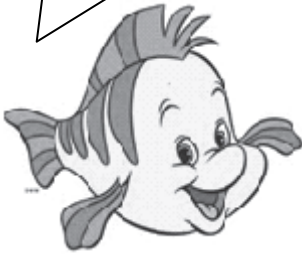
Nivedita Kulkarni

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Answers of contest in August Issue....

- | | | | | | |
|--------------------|------------|-------------------------|---------|-------------|-------------|
| 1. Refraction | 2. Convex | 3. Isaac | 4. Watt | 5. Big Bang | 6. Filament |
| 7. A solar eclipse | 8. The Sun | 9. The milky way galaxy | 10. low | | |

Hello friends... I m sweet little Flounder and will tell u the fantastic stories in the world of chemistry.....today I will tell u Van's mass conservation's amazing experiment.....

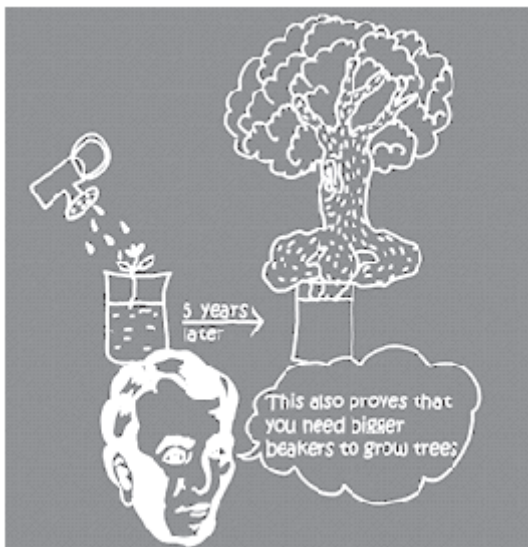


Van Helmont (1577 – 1644) a wealthy

physician living near Brussels, spent most of his life in retirement, carrying out chemical experiments. He felt that water could be converted into other substances and to prove this he did the following experiment.

He planted a tree in a weighed amount of earth, watered it for five years, and then showed that, while the tree had gained 164 pounds, the weight of the earth remained the same.

To him, this proved that all parts of the tree had formed from water and thus that water was the basis of all chemical substances. Though the fallacy of this would be shown later, the idea of quantitative experiments was established and so was the implicit assumption that matter is not created or destroyed in the changes that it undergoes.



He is remembered for the introduction of the word "**Gas**" from the Greek word **Chaos** into the vocabulary of scientists.....



*If you can keep your head when all about you
Are losing theirs and blaming it on you,
If you can trust yourself when all men doubt you,
But make allowance for their doubting too;*

*If you can wait and not be tired by waiting,
Or being lied about, don't deal in lies,
Or being hated, don't give way to hating,
And yet don't look too good, nor talk too wise:*

*If you can dream - and not make dreams your master;
If you can think - and not make thoughts your aim;
If you can meet with Triumph and Disaster
And treat those two impostors just the same;*

*If you can make one heap of all your winnings
And risk it on one turn of pitch-and-toss,
And lose, and start again at your beginnings
And never breathe a word about your loss;*

*If you can force your heart and nerve and sinew
To serve your turn long after they are gone,
And so hold on when there is nothing in you
Except the Will which says to them: 'Hold on!'*

*If you can talk with crowds and keep your virtue,
Or walk with kings - nor lose the common touch,
If neither foes nor loving friends can hurt you,
If all men count with you, but none too much;*

*If you can fill the unforgiving minute
With sixty seconds' worth of distance run -
Yours is the Earth and everything that's in it,
And - which is more - you'll be a Man my son!*

— Rudyard Kipling

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