

SANT HIRDARAM GIRLS COLLEGE, BHOPAL

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2021

3E'S

E

EXAMINE

E

EXPLORE

E

ENHANCE

Vol. 2

**BOOST YOUR BRAIN BY GOING
IN DEPTH WITH SCIENCE.**

**Under the Committee of
Energy Conservation,
Department of Physics
SANT HIRDARAM GIRLS
COLLEGE, Bhopal**



What's 3E's?

Magazines are something which offers a more long-form writing than a short clips of story in a newspaper and serve specific functions to society.

3 E's stands for EXAMINE, EXPLORE AND ENHANCE. This magazine provides you the in depth knowledge related to our environment and the upgradations in science, space and technology. So, examine the environment, explore and enhance your knowledge. Know the interesting facts and this will kindle a genuine interest in our readers mind for science. We aim to empower your minds with a scientific bent of mind.

Let's have fun with science.



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Glimpse of our
college, SHGC



BLESSINGS & INSPIRATION

- Paramhans Sant Hirdaram Sahibji
1906-2006

**“The Old, the Infirm and the children are all forms of God.
Serve them with heart and soul and win laurels of the Lord.”**

Symbol of simplicity, a legend human being, a noble soul and selfless charismatic person who dedicated whole of his life serving the mankind, especially those who need support the most. A true visionary, he directed his magnanimous social work especially in the field of health & education. Excellent health care units and adorable education institutions established in the remote sub urban area of Bhopal erstwhile known as Bairagarh and now renamed as Sant Hirdaram Nagar are epitomes of his great deeds.

We bow our heads in his lotus feet and our deep tributes to the great soul.

Message from President's Desk



Rev. Siddh Bhauji

President,

Shaheed Hemu Kalani Educational Society

As the President of the society, I would like to congratulate the Department of Physics for taking out this E magazine, 3E's (Vol. 2). I strongly believe that "The mind is not a vessel to be filled, but a fire to be kindled". Magazine kindles the imagination of our learners. I wholeheartedly acknowledge the endeavors of staff and students of this institution, who uses various mediums of expression to empower young girls, spiritually, culturally, and ethically. I am certain, with the amalgamation of committed and devoted efforts of staff members, our students would rise to higher intellectual level to contribute to national building and acquire inner bliss.

"With warm wishes and Santji's blessings".

Message from Director's Desk



Hero Gyanchandani

Director,

Sant Hirdaram Girls College, Bhopal

As the Director of the College, I would like to congratulate the department of Physics for taking out this E-magazine, 3E's (Vol. 2) covering wide variety of subjects of importance in today's scenario. The mission of the institution appears to be fulfilled as all the articles have been solely contributed by our passionate students. Magazine is the most effective platform of expression and as long it is thought provoking, we would be sure of learning, as everything begins in mind.

Thoughts are powerful to bring out desired change in the society. Think about little more than what is possible that little extra we do, would class you, of your own, 'Do more than belong – participate. Do more than care – help. Do more than believe – practice. Do more than be fair – be kind. Do more than forgive – forget. Do more than dream – work.' Just as our mother earth gives us more and more, this E magazine will enable our learners to give and get a little more of learning.

"With warm wishes and Inner Bliss".

Message from Principal's Desk



Dr. Dalima Parwani

M.Sc., MCA, M.Ed., Ph.D

Sant Hirdaram Girls College, Bhopal

It is a moment of great pleasure that Department of Physics, Sant Hirdaram Girls College, Bhopal is coming up with the second issue of their Magazine. I hope that this Magazine will make students and scholars aware of the current updates in the field of Physical Science, which is a pressing need of the hour.

We seek to bring together intellectuals to share their ideas, discoveries and inventions so that practical solutions may be invented which will benefit all sections of society. During the present era of globalization, scientific research has assumed much importance and the theme of this Magazine is very relevant for the current generation. We hope that this Magazine provides a platform for people to share their findings and help them to come up with innovative ideas for the service of humanity through Science.

The women and girls in our country represent a reservoir of talent. We hope that this platform provides them a great opportunity in the emerging Science of this world while helping in keeping alive our precious tradition and culture.

Message from Teacher's Desk



Ms. Jyoti Singh

HoD, Asst. Prof. of Dept. of Physics,

Sant Hirdaram Girls College, Bhopal

Very few have fully realized the wealth of sympathy, kindness and generosity hidden in the soul of a student. We believe in a joyful experiential learning system wherein each student is encouraged to participate wholeheartedly!

At our college, we leave no stone unturned to offer multitudes of opportunities to our students; it is for them to make the most of it. We at SHGC, Bhopal are aware of our responsibility of shaping our students in such a manner that they will not only excel in all walks of life and be successful change navigators but also will have the courage of conviction to challenge the conventional wisdom.

Our students made us proud and gave us a lot of reasons to celebrate all throughout the year. Every year our student come in the merit list and acquire first position. They are not only active in academic but also in other curricular activities. This magazine is all about science and environment and the articles are written by our students of B.Sc. 3rd Year (2020-21).

Happy Reading!



Disclaimer

The information contained in this magazine is compiled with utmost care. The views expressed in the articles contained in this magazine are author's own. All possible efforts have been made to keep the material free from errors. However, Department of Physics, Sant Hirdaram Girls College, Bhopal make no representation or warranty, expressed or implied, as to the originality, accuracy or completeness of any such information. The college shall not be liable for any action arising out of allegations of infringement of copyright of material used by any contributor.

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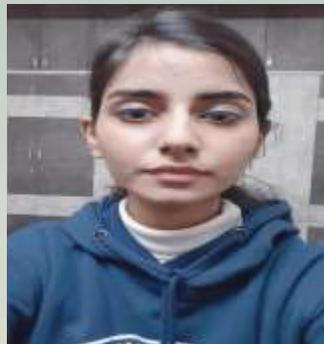
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RESEACHERS IDENTIFY POTENTIAL NEW CLASS OF DRUGS TO TREAT BLOOD AND BONE MARROW CANCERS

- Komal Sawlani

A rising growth of cancer cases in the last decade has, however, become a major public health concern for our country, India. Every year, almost 1.5 million cases are registered and the burden of diseases like cancer can have far-reaching consequences for individuals as well as have a larger impact on the social strata of the country.

India has third-highest number of haematological cancers in the world and blood cancer is one of the common cancers in our country. Though there was a time when cancer was incurable, the scene has changed now and there are treatments available that guarantee up to 90 per cent survival chances.

Over one lakh people are diagnosed with blood cancer in India, every year. While we have gained more knowledge and expertise in understanding and treating Blood Cancer, we now have challenges which are specific for our growing and developing country.

Scientists have found the new potential class of drugs that may treat and cure blood and bone marrow cancers.



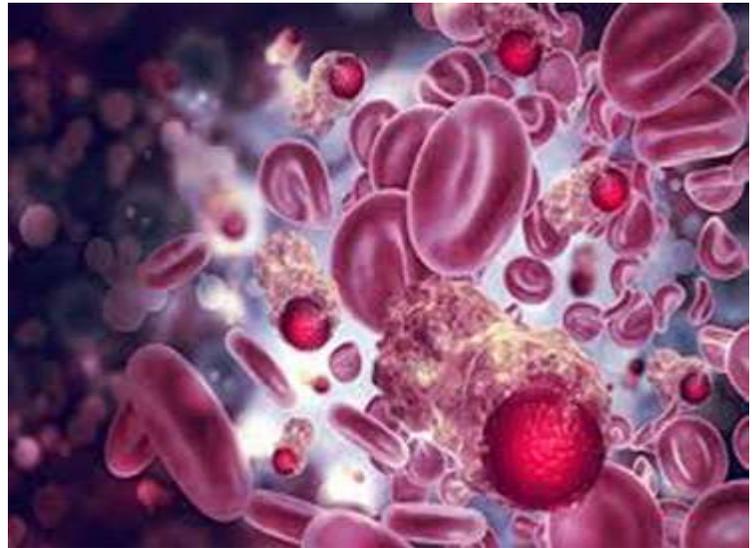
It may prove to be effective in treating certain common types of blood and bone marrow cancers has been identified by a group of scientists, including an Indian-American from the prestigious Cleveland Clinic.

Jaroslaw Maciejewski with his collaborator named Babal Kant Jha from the Cleveland Clinic Department of Translational Hematology & Oncology Research carried out a new pharmacological strategy to preferentially target and eliminate leukemia cells with TET2 mutations.

Myeloid leukemias are the cancers which are derived from stem and progenitor cells in the bone marrow that give rise to all normal blood cells. One of the most common mutations involved in driving myeloid leukemias are found in the TET2 gene, which has been investigated by the researchers.

Members of the TET (short form ten-eleven translocation) family have been known to function as tumor suppressors for many years, but how they keep a lid on the uncontrolled cell proliferation of cancer cells had remained

uncertain. Researchers have demonstrated that the TET proteins collectively constitute a major class of tumor suppressors and are required to maintain genome instability.



What is Blood cancer? Blood cancer means malignancies of the blood, bone marrow or lymph nodes that result in uncontrolled blood cell production and altered function. **Blood cancer almost** accounts for 8% of all new cases of cancer diagnosed in India.

In the body, most of the blood cells develop from cells in the bone marrow – the spongy material in the center of the bones, called stem cells. Stem cells gets mature into different kinds of blood cells, each with its own special job. White blood cells help to fight infection, red blood cells carry oxygen to tissues throughout the body, and platelets help to form blood clots to control bleeding. These blood cells are created as the body requires. Normally, when cells grow old or get damaged, they die, and new cells take their place. However, sometimes this process can go wrong and the cells do not grow and divide normally, or the immune system goes haywire and attacks normal tissue.

Researchers have found that a synthetic molecule called TETi76, was able to target and kill the mutant cancer cells both in the early phases of disease i.e. CHIP (clonal hematopoiesis of indeterminate potential) and in fully developed TET2 mutant myeloid leukemia.



The research team have designed TETi76 to replicate and amplify the effects of a natural molecule called 2HG (2-hydroxyglutarate), which inhibits the enzymatic activity of TET genes.

Chemical groups from DNA molecules can be removed by the TET DNA dioxygenase gene family codes for enzymes, which ultimately changes what genes are expressed and can contribute to the development and spread of disease, while all the members of the TET family are dioxygenases, the most powerful enzymatic activity belongs to TET2 and even when TET2 is mutated then, the genes TET1 and TET3 provide residual enzymatic activity. But this activity is still enough to facilitate the spread of mutated cancer cells.



Researchers have studied the molecule and rationally designed a novel small molecule, synthesized by chemistry group headed by James Phillips, PhD. They have generated TETi76, a similar, but more potent version of TET2, which is capable of inhibiting not just TET2, but also the remaining disease-driving enzymatic activity of TET1 and TET3.

The researchers have studied TETi76's effects in both preclinical disease and xenograft models (where human cancer cells are implanted into preclinical models). Additional studies are going to be critical to investigate the small molecule's cancer-fighting capabilities in patients.

Researchers are optimistic about their results, which show not just that TETi76 preferentially restricts the growth and spread of cells with TET2 mutations, but also gives survival advantage to normal stem and progenitor cells.

NEW METHOD COULD TURN MARS WATER INTO OXYGEN

- Sneha Verma



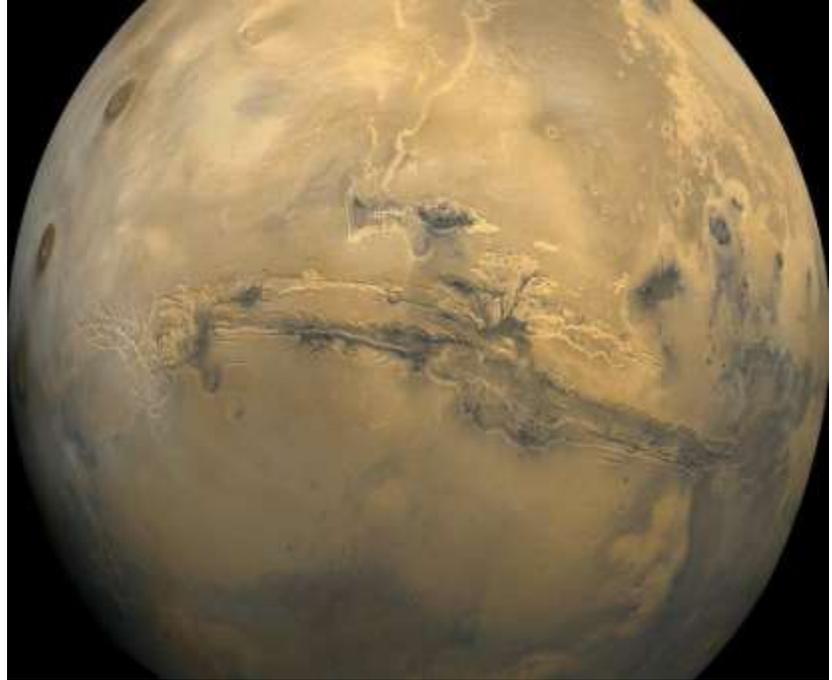
Is life possible on Mars? This question aroused ever since our eyes saw first close up picture of Mars in 1965. The scientists of all countries are trying their best and hard to find the possibility of lives on Mars. Every time we feel close or near to understand mars, it gives back some new, shocking revelation regarding the red planet. Ever since human are, we have thought of life only and only on earth because earth has everything that humans need for existence.

For many years we humans are wondering if there is water on mars or not, now we know that in 2012, NASA scientists announced the curiosity rover (a car sized mars rover) found evidence suggesting and hinting “vigorous flow” of water on mars. Now with years & years of research, we are finally at a conclusion that we may think of living on red planet. Our hardworking scientists and machines, satellites have found that all water on mars today exists as ice.

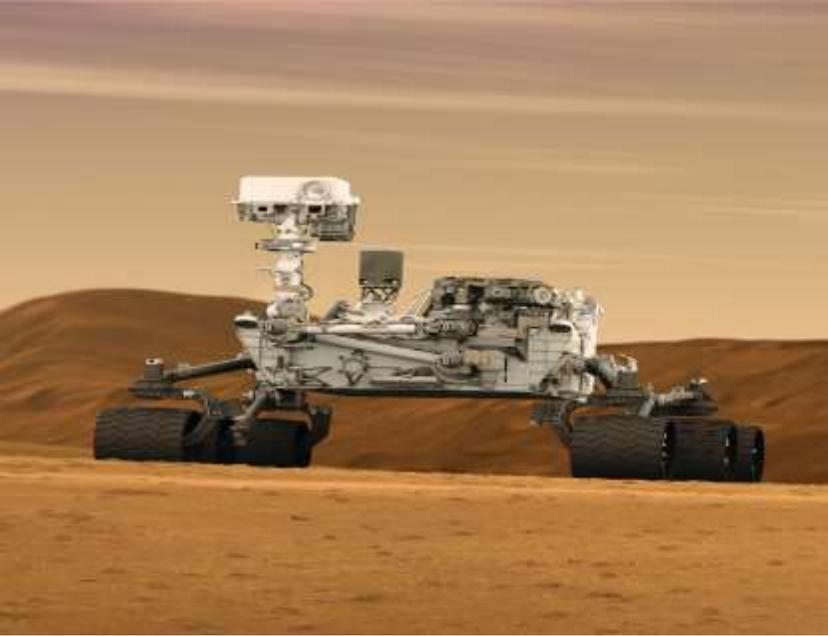
More than 21 million km^3 of ice has been detected. Another revelation is that the water present there is extremely salty which cannot be used for survival. Also, we need agriculture, fuel even air to breathe and we cannot store and carry these basic needs to mars.

Revolving around all factors, the scientists at Washington University in St. Louis have come up with a result or solution: to turn the salty/unpotable water on red planet (mars) into fuel and oxygen. Now the question arises is that how salty water can give breathe to astronauts. The red atmosphere is rich in carbon dioxide, but has just 0.14% oxygen. To give humans another planet to live on, NASA plans to generate oxygen by ripping from CO_2 . Now American scientists and researchers are saying that they have invented a method to utilize the salty water on mars into fuel and oxygen.

As we all know oxygen and fuel are two major components to support human activities on mars. Engineers at Washington



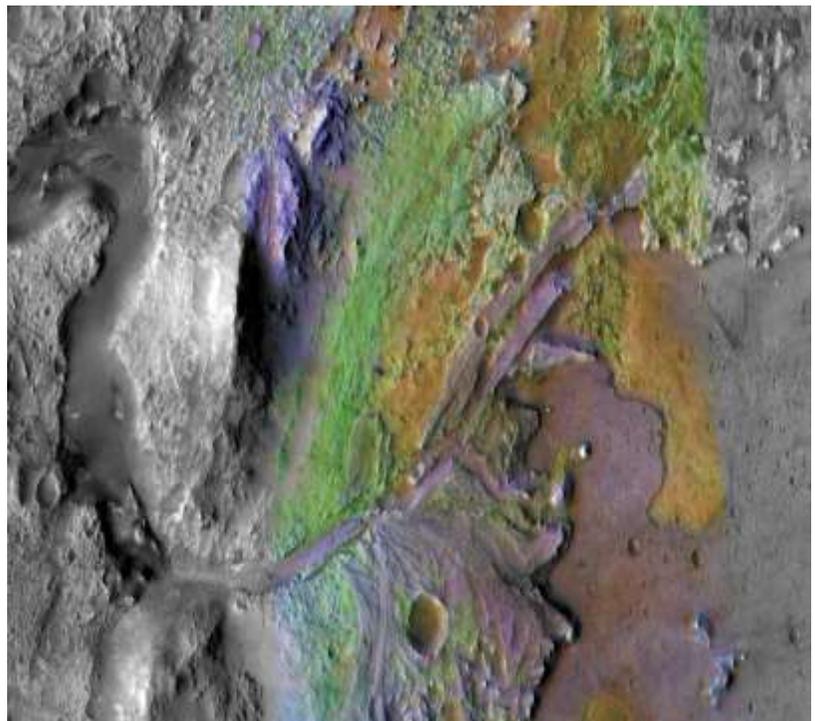
University in St. Louis, Missouri developed a method which works with electrolysis, a process that passes an electrical current through liquid such as water. This machine which is developed by researchers is known as electrolyzer. The researchers are sure that this device can separate salty water into oxygen and hydrogen gases. Also the research teams have solid evidences hinting towards once had huge amount of water and it holds today as well but since we know the red planet is extremely cold and henceforth the water is thought to be present in form of ice. So, the electrolyzer process can be costly, complex and harmful at the same time to the



mars it will be a long trip but fun. This will be a big step for mankind. We will be able to find out if there is life on this planet and if I imagine I find it to be a red desert. We all will be waiting and if we achieve it will be a great milestone for us.

environment and indeed it is a long time procedure. This electrolyzer device basically has two parts. One side of the device splits the water molecule to form hydroxyl ion and this technology is not new people have been using it from decades but it's expensive and cannot survive in the harsh environment of mars.

While the uncommendable work of our worlds scientists and technology which is going on and we will know if human can exist and survive on mars or not. Some day or other if people travel to



INDIAN SHARKS, RAYS & CHIMAERAS FACE HIGH RISK OF EXTINCTION

- Aashi Jain

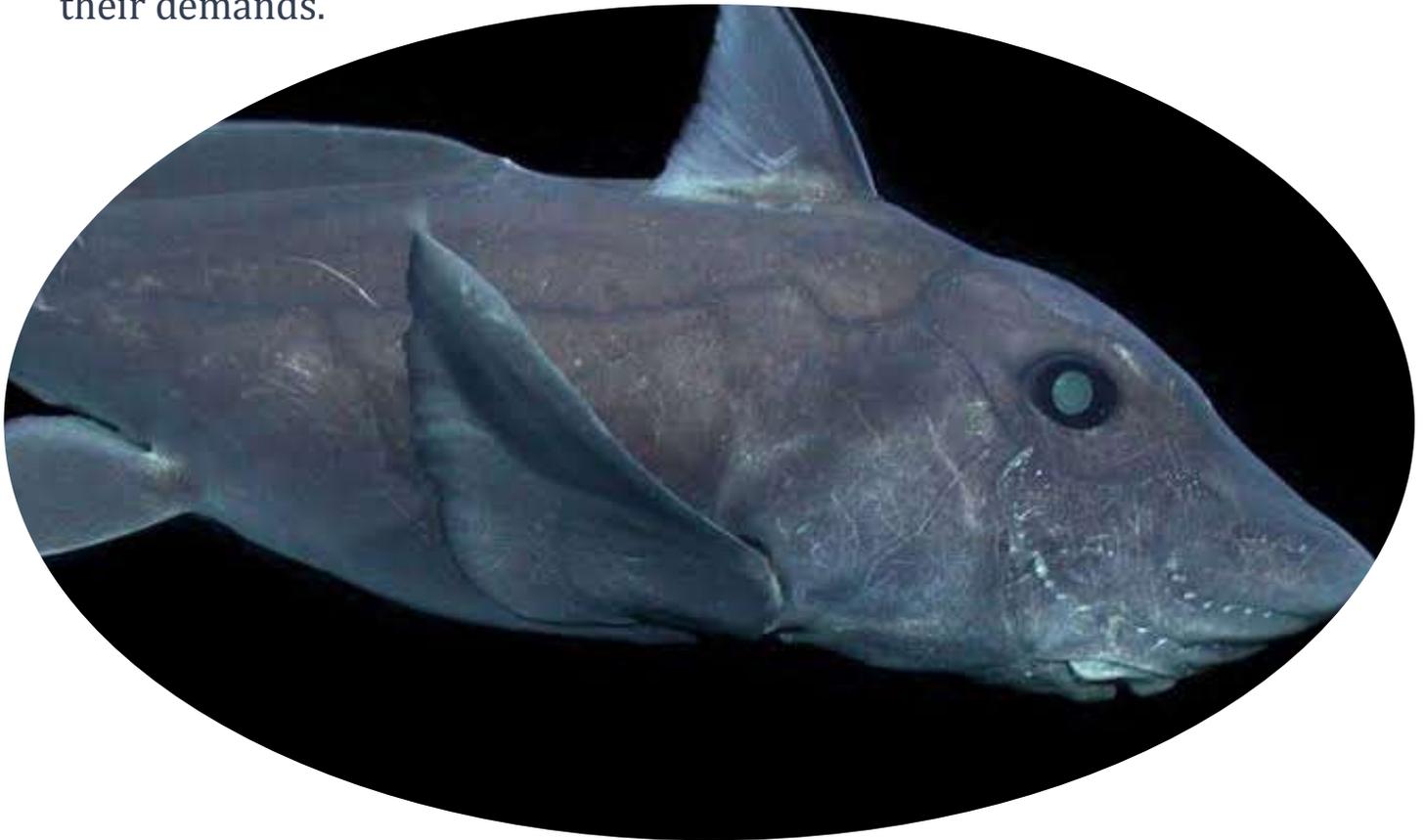
According to a recent assessment of Sharks, Rays and Chimaeras by the International Union for Conservation of Nature (IUCN)'s Shark Specialist Group in the Indian Exclusive Economic Zone (EEZ) has revealed that of the 170 species found across the Ocean of the Country, 19 (about 11%) are facing high risk of extinction. These species are classified as Critically Endangered (CE). In the latest IUCN Red list update marked the Indian Swell Shark as critically endangered because of limited Geographic range and population decline. The Indian Swell Shark is found in the coast of Kerala, Sri Lanka, Kollam. There are species like the Oceanic White Tip Shark that was classified as endangered as

endangered has now been listed critically endangered. The White Tip Shark has high amount of squalene in its liver. Squalene is a natural substance or compound found in Shark liver oil which is widely used in pharmaceutical Industry.



Overfishing, target fishing (when a particular type of fish is targeted) and illegal fishing of Sharks for their fins is depleting populations worldwide. Another problem is that the information on

deep-water species is very limited. Scientist said that Shark and rays number in Indian water has fallen drastically in recent years because of target fishing and by - catch (other fish that get caught alongside). We have target catch of more about 1,000 tonnes annually to export internationally to meet their demands.



The Chimaeras are also known as Ghost Sharks, Rat Fish, Spook Fish and Rabbit Fish. These species are of high economic value and are crucial to the blue economy of the Country. There is need for more accurate data for making conservation policy for economic benefit and also for our ecosystem. There is often a general lack of even basic management monitoring, control, and surveillance of many fisheries.

ISRO LAUNCHED COUNTRY'S 42nd COMMUNICATION SATELLITE

- Krishna Kaleshriya

ISRO (Indian Space Research Organization) successfully launched PSLV C50. PSLV stand for Polar satellite launched vehicle hope you remember in the month of November 2020 PSLV C49 was launched successfully. And it has been launched very successfully and a communication satellite has been launched India is concerned that we have a launching station that is Satish Dhawan Space Center that is located in Sriharikota is a place in Neluru, district of Andhra Pradesh State. So far this is the only one Space center for launching the vehicles. CMS 01 is India's 42 communication satellite. PSLV is the 52 and with respect to dome





PSLV excel variant. This is the 22nd flight in excel variant and all together in PSLV it is 52nd time and has been launched by ISRO. ISRO (Indian Space Research Organization) launched the country's 42nd communication satellite named CMS-01.

This is the second satellite launched by ISRO amid COVID -19 pandemic CMS-01 is envisaged to provide services in the extended- C band of frequency spectrum. Its coverage will include Indian main land Andaman -Nicobar and Lakshadweep Island. It will be the first in a new series of communication satellite by India after GSAT and INSAT series. This was the 77th launch vehicle mission from Satish Dhawan Space Center (SDSC) SHAR in Sriharikota. The new satellite would replace the GSAT-12 in orbit which was launched in 2011.

ALIENS CALLING? FIRST POTENTIAL RADIO SIGNAL FROM EXOPLANET DETECTED

- Sristhi Sharma

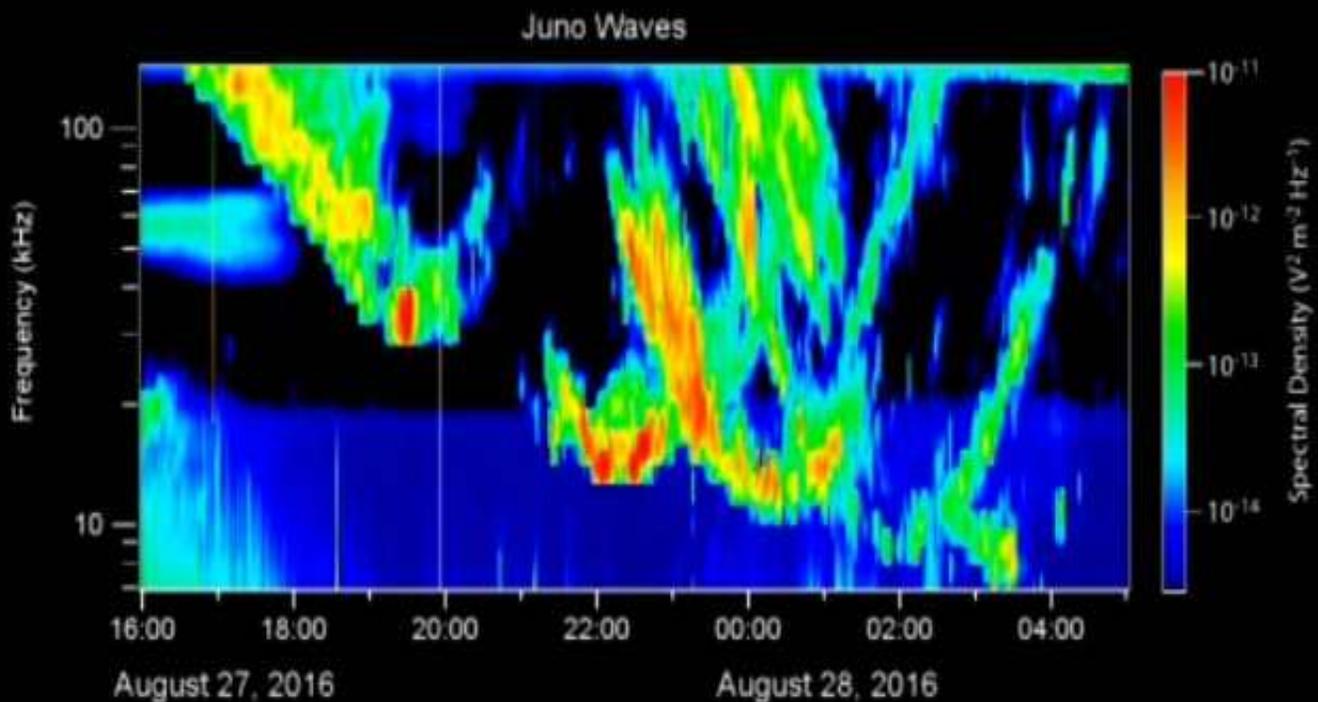
Scientists may have detected and collected radio emissions from a planet orbiting a star beyond our sun for the first time meaning our solar system. This obviously opens up chances for all the extra-terrestrial or alien believers to speculate and come up with new conspiracy theories.

The astronomers behind the new research used a radio telescope in the Netherlands to study three different stars known to host exoplanets. Researchers used the Low Frequency Array (LOFAR). The researchers compared what they observed here to the observations of Jupiter, faint as if being seen from a star system few light-years away. But one of the star system had a different behaviour: Tau Boötes, which contains at least one exoplanet. If the detection aligns up, it leads us

to better understanding of the magnetic fields of exoplanets and in whole the exoplanets themselves, this is what the researchers are hoping for.

"We present one of the first hints of detecting an exoplanet in the radio realm," Jake Turner, an astronomer at Cornell University and lead author and head of research, said in a statement. "We make the case for an emission by the planet itself. From the strength and polarization of the radio signal and the planet's magnetic field, it is compatible with theoretical predictions."

However, Turner and others in this research are doubtful that the signal they detected is actually coming from the planet, which is dubbed Tau Boötes b.



The team is planning to keep this star system under observation for further discoveries and research on exo-planets in general.

This all began at Jupiter, the researchers had studied the planet's radio emissions and then changed those measurements to mimic the effect they expected closeness to the host star and distance from Earth would have had on their observations of an exoplanet.

The scientists also then used the observations made in 2016 and 2017 by the Low Frequency Array (LOFAR) in the Netherlands. In addition to the potential signal from Tau Boötes b, the researchers also speculated that they may have detected a signal from the star Upsilon Andromeda (or its planet system), but that detection was fainter than compared to Tau Boötes b.

The researchers are curious in detecting radio emission from planets because such detections may help scientists decode as to what's happening in the same worlds magnetic fields. Those magnetic fields give the information of the planet's and its surface.

As a testament: Earth's magnetic field holds down the atmosphere that makes the planet Earth habitable for organisms. But till this point of time in research, studying magnetic fields directly i.e. without other methods has been difficult for scientists to manage, even though every planet in our solar system and possibly beyond have magnetic field at least to some extent and at least at one point of time.

"We learned from our own Jupiter what this kind of detection looks like," Turner said. "We went searching for it and we found it."

The researchers were open minded enough to accept the fact that it might be from other planets or even other sources, they emphasized: "There remains some uncertainty that the detected radio signal is from the planet. The need for follow-up observations is critical."

OneWeb ANNOUNCES LAUNCH OF 36 SATELLITES; TO OFFER HI-SPEED INTERNET IN INDIA BY MID-2022

- Shivani

Bharti Global and UK government led OneWeb on Friday announced the launch of 36 communication satellites and said it aims to offer high speed internet from its constellation of satellites in India by mid-2022.

The OneWeb satellite constellation

The OneWeb satellite constellation (formerly WorldVu) was a planned initial 65 satellite constellation that was in the process of being completed in 2019–2020, with a goal to provide global satellite Internet broadband services to people everywhere, initially aiming to start global services in 2021. The constellation was being deployed by OneWeb, formerly known as WorldVu Satellites and headquartered in London, with offices in California, Florida, Virginia, Dubai and Singapore.

OneWeb's partnership to provide high-speed internet in India

The recommencement of satellite launches by OneWeb comes within weeks of billionaire Sunil Bharti Mittal-run Bharti Group along with the British government taking over as the new owners of the broadband satellite communications company, which emerged from bankruptcy.

The Low Earth Orbit (LEO) broadband satellite communications company on Friday launched the 36 satellites from a Soyuz launch vehicle, which began from the Vostochny Cosmodrome, in Russia.

This takes the total in-orbit constellation to 110 satellites, part of OneWeb's 648 LEO satellite fleet that will deliver high-speed, low-latency



global connectivity, a company release said. The launch puts OneWeb on track to offer global services to customers from late 2021, starting with the United Kingdom, Alaska, Northern Europe, Greenland, Iceland, the Arctic Seas, and Canada, with global service in 2022.

OneWeb has secured global priority spectrum rights and now successfully completed four launches and aims to offer high-speed internet from OneWeb satellites in India by mid-2022, it added.

Sunil Bharti Mittal, Founder and Chairman of Bharti Enterprises, said: “Today’s launch is one of many steps we have taken to operationalize one of the world’s first LEO constellations which clearly demonstrates we are on our way to achieving our mission.”

Noting that there is an overwhelming demand for broadband, Mittal said the pandemic has taxed infrastructure everywhere, and many people worldwide are left with little to no options to access the internet. “OneWeb’s system will help meet existing and future demand by delivering broadband connectivity to the communities, towns, regions left unconnected or under-connected,” Mittal said.



Less than a month since its acquisition by Bharti Global and the U.K. Government, OneWeb is speedily returning to full operations — hiring at a fast pace, restarting launches, continuing to build its ground station network, and pushing forward on user terminal development, the release said.

The U.K. government and Bharti Global have taken over the reins of OneWeb, which recently announced new management with telecom czar Sunil Mittal at the helm as Executive Chairman.

Bharti Global — an overseas arm of Bharti — operates out of London and has investments in telecom, technology, hospitality, transportation and energy.

OVEREXPLOITATION, LONG LIFE CYCLE HAVE ENDANGERED A COMMON HIMALAYAN HERB

- Divya Rathore

The Himalaya Center of Plant Diversity is a narrow band of biodiversity lying on the southern margin of the Himalayas, the world's highest mountain range with elevations exceeding 8000 m. The plant diversity of this region is defined by the monsoonal rains, up to 10,000 mm rainfall, concentrated in the summer, altitudinal zone, consisting of tropical low land rainforests, 100–1200 m, up to alpine meadows, 4800–5500 m. There co-workers have estimated there to be around 6000 species of higher plants in Nepal, including 303 species endemic to Nepal and 1957 species restricted to the Himalayan range. The Indian Himalaya is home to more than 8000 species of vascular plants of which 1748 are known for their medicinal properties.

Himalayan plants have played indispensable role in the lives of tribal peoples living in the Himalaya by providing forest products for both food and medicine. Tribal communities in the Himalayas feel necessity for these plants for nutrition and medicinal need and for livelihood. The historical usage of Himalayan medicinal plants dates very long back indeed, and written records of Himalayan plants being used as medicine occur in the Rigveda texts from around 6,500 years ago, which was followed by the Atharvaveda and the Ayurveda. Ever increasing demand of herbal medicines in the world market has put alarming ultimatum to the existence of Himalayan medicinal plants,

reported to be the richest source of active bio-molecules. Due to overexploitation, majority of these Himalayan herbs bear threatened status while some have become extinct. Some of the overexploited Himalayan herbs are found in the Himalayas region. There are some endangered species of Himalayan herbs which is fall off up to 50% of population between 2010 to 2079. The Himalayan trillium (*Trillium govonianum*), a common herb of the Himalayas was declared 'endangered' by the International Union for Conservation of Nature (IUCN).

Some important threatened medicinal plant species of Indian Himalayas are:

Aconitum chasmanthum is a Himalayan herb, its geographical distribution is up to 2100-3500m in Jammu and Kashmir. It is used for medical purpose to cure **analgesic, diaphoretic, diuretic, sedative**. According to IUNC it a critically endangered species.



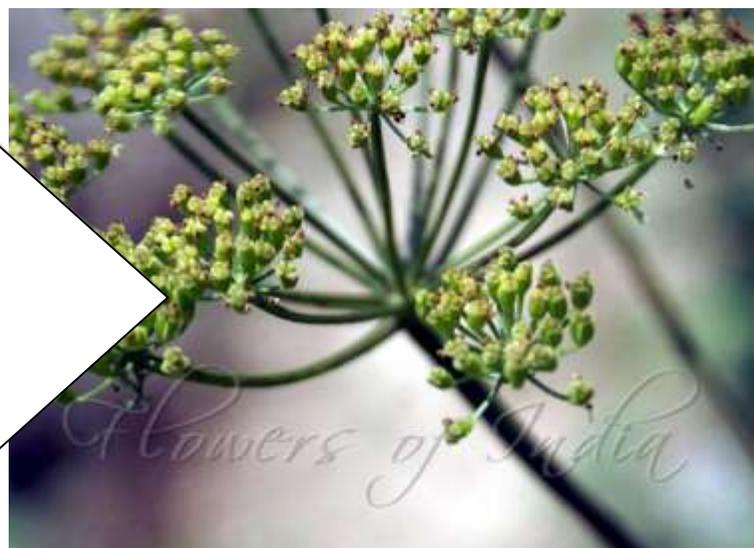
Betula utilis is a Himalayan herb, its geographical distribution is up to 2800-4200m North–West Himalayas. It is used for medical purpose to cure **Antispasmodic, ant dysenteric haemostatic**. It is an endangered species of herb.

Cinnamomum tamala is a Himalayan herb, its geographical distribution is up to 900 – 2400m, throughout Himalayas. It is used for medical purpose to cure as **Antispasmodic, antifungal, antibacterial, treating leucorrhoea.** It is also an endangered species.



Datisca cannabin is a Himalayan herb, its geographical distribution is up to 1800-200m in Western Himalayas. It is used for medical purpose to cure as **diuretic, febrifuge and purgative, root is sedative.** It is also an endangered species.

Angelica glauca is a Himalayan herb, its geographical distribution is up to 2600 - 3700m, Western Himalayas. It is used for medical purpose to cure **Cordial stimulant in the treatment of dyspepsia and constipation.** It is also an endangered species.



medical requirement and it is export on large scale. The value of the trade in medicinal plants of the Himalaya has never been quantified but runs to tens of millions of dollars annually. Processed exports would definitely help the Himalayan region retain more of this wealth, which is presently diverted to business firms in Indian cities and pharmaceutical companies in the West, which result in increase in the economy of India.

Export status of medicates and medicaments of various Indian system of medicine from India* (value in US \$ million)

		2007- 2008	2008- 2009	2009- 2010	2010- 2011	2011- 2012	2012-2013 (April to December)
Medi- cants	Ayurveda	31.19	51.07	25	38.09	33.03	17.13
	unnani	0.05	0.1	0.02	0.05	0.09	0.01
	Siddha	0	0	0.01	0.04	0	0.10
	Homeopathy	0.32	0.56	1.17	0.2	0.65	0.24
Medicaments	Ayurveda	48.74	70.23	117.15	115.52	137.2	90.26
	unnani	0.23	1.02	0.07	0.21	10.21	0.99
	Siddha	0.1	0.02	0.08	0.24	0.15	0.18
	Homeopathy	0.44	0.47	0.42	0.78	0.59	0.7

The world conservation strategy (IUCN, UNEP and WWF, 1980) defines conservation as "the management of human use of the biodiversity so that it may yield the greatest sustainable benefit to present generation while. Government took some different step to protect the Himalayas ancient herb for future generation, some schemes are announced by government to cultivate and protect these herbs for upcoming generation for different medical purpose.

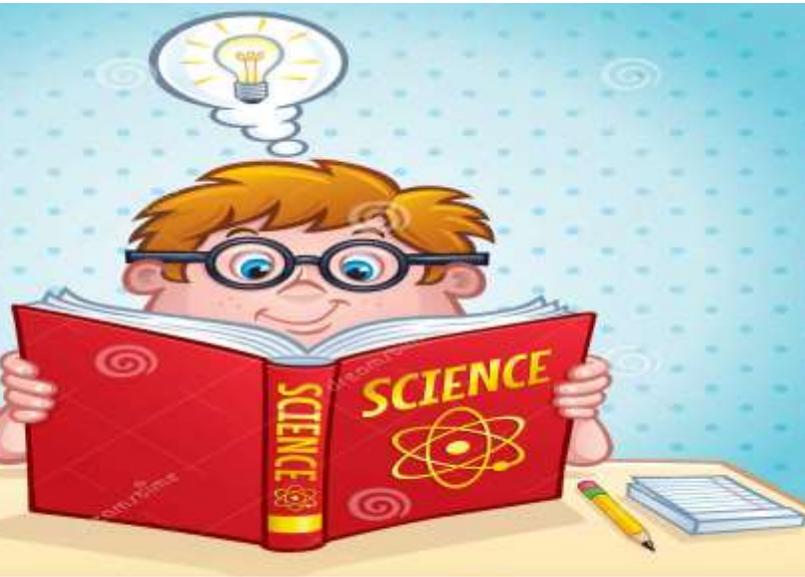
Implementation of **Fair Wild standard**, a set of **ecological and fair trade guidelines** can assist traders and concerned agencies in **sustainable harvest and trade of species** without harming its survival. A valuable herb which cure the most dangerous disease is overexploiting because of some climatic reasons and for overutilization of these herbs.

List of various bodies involved in medicinal plants biodiversity conservation programs in India.

Working bodies

Work related to medicinal plant biodiversity conservation

1 Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy (AYUSH), Established by Ministry of Health and Family Welfare (MOHFW), Govt. of India (GOI)	Included the medicinal plants biodiversity conservation in its national policy
2 National Medicinal Plants Board (NMPB), Set up by AYUSH	To co-ordinate all matters relating to medicinal plants including conservation and cultivation. Has established 35 State Medicinal plants Board for taking concerned issues in respective states.
3 Ministry of Environment and Forests (MoEF), GOI	Has well defined 'National biodiversity Action Plan' for biodiversity conservation of Indian fauna and Flora.
4 Jawaharlal Nehru Tropical Botanic Garden and Research Institute (TBGRI), Thiruvananthapuram, Kerala Identified as 'Center of Excellence for Biodiversity conservation of Medicinal Plants' by MOEF	It is an autonomous Institute established by the Government of Kerala in 1979. It functions under the umbrella of the Science, Technology and Environment Department, Government of Kerala. Has very large Botanic Garden and carries out various ex-situ conservation programs
5 Institute of Ayurveda and Integrative Medicine (I-AIM), initiated by Foundation for revitalization of Local Health Traditions (FRLTH), Bangalore (a registered trust)	Identified as 'Center of Excellence on Medicinal Plants and Traditional knowledge' by MOEF, Designated as 'ENVIS Centre on Medicinal Plants' by MOEF as carries out extensive activities for medicinal plants conservation.
6 The Botanical Survey of India (BSI), Supported by MoEF	Has established experimental botanical gardens at different geo-graphical locations of India, namely: Dehradun (Northern circle), Allahabad (Central Circle), Shillong (Eastern Circle), Pune (Western Circle), Coimbatore (Southern Circle), Port Blaire (Andaman and Nicobar), Jodhpur (Arid Zone), Gangtok (Sikkim-Himalayan Circle) Itanagar (Arunachal field station).
7 The Indian Council of Forest Reserve (ICFRE), supported by MoEF	To develop reserve forests and support cultivation of medicinal plants



EXPLAINER:

Why did Mount Everest's height change?

- Priyanshi Sharma

Everest hasn't stopped growing because it's growing year by year.

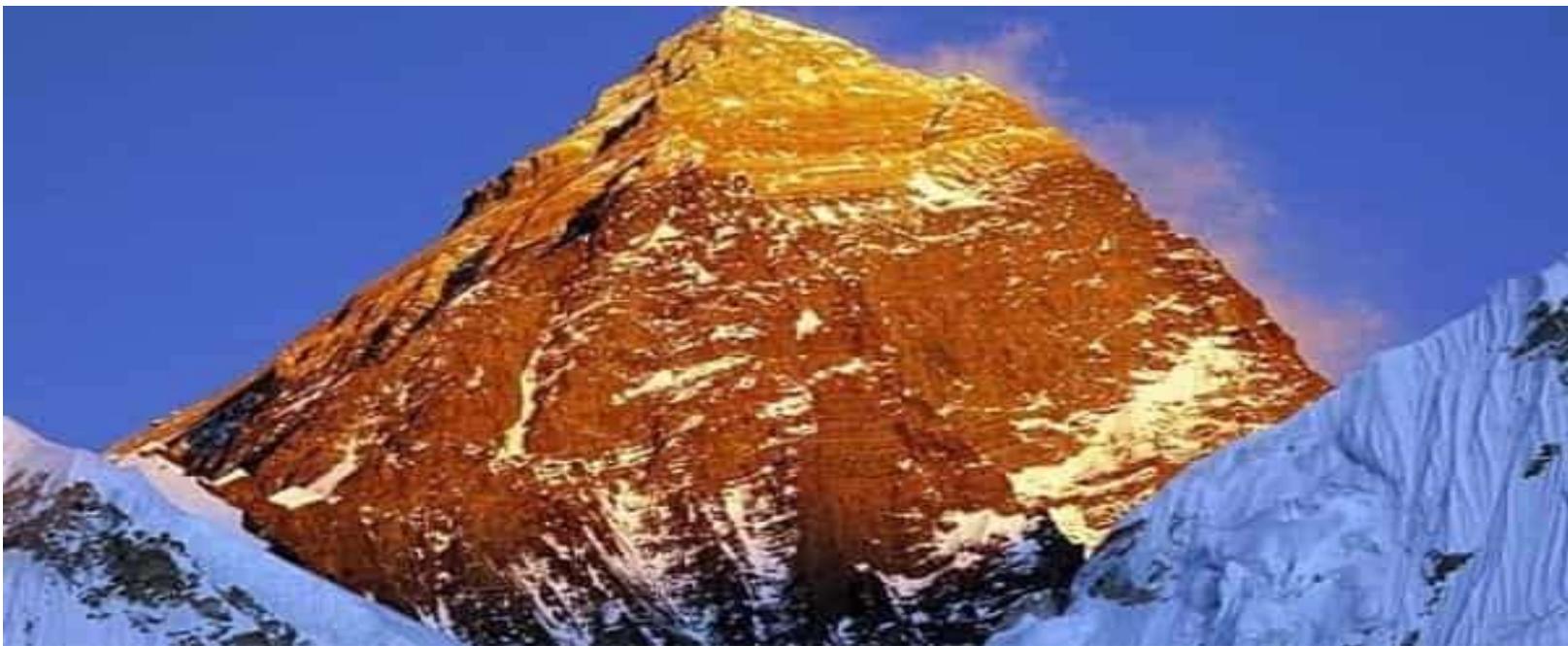
Earth scientist estimate that Everest is 50-60 million-year-old, the mountain was formed movement of tectonic plates when upward force generated in Indian and Eurasian tectonic plates they collide and that formed the high mountain on Earth. That force is still at work today, pushing Everest's summit about a more than one inches higher each year.

The Earth surface is like an armadillo's armor; Pieces of crust constantly move around each other. For such huge continental plates, the motion is relatively fast and quick. So they move more than 1 cm per year.

When two plates collide one pushes into other and causing what's known as uplift. 50-60 million year ago, the Earth's Indian plate drifted North, bumped into the bigger Eurasian plate and they create huge uplift but mountains are shaped by force other than uplift.

3 factors why Everest's height is increasing: -

- 1. Weathering.*
- 2. Valley*
- 3. Climate*



- **Weathering:** Rising air cools, causing any water vapor within it to condense and form rain or snow. As that falls, it wears down the landscape, dissolving rocks or breaking them down in a process known as weathering.
- **Valley:** Water moving downhill carries the weathered material and erodes the landscapes carving out deep valley and jagged peaks. This balance between uplift and erosion gives a mountain its shape.
- **Climate:** In sub-zero, temperature, some snowfall doesn't completely melt away, instead slowly until it become ice, that forms snowline, which occurs at different heights around the planet depending on climate.

So then, how did the icy Mount Everest come to be so tall. The mountains lie near the tropics, so snowline is so high and the glaciers relatively small, barely big enough to twiddle it down. And mountain maintain its impressive shape and structure. Everest height increase every year scientists revealed that Mount Everest is still increasing more than 1 inches a year Everest is now officially a little higher and that might be the end of the story.

The new height is 86 cm more than the previous measurement. According to the measurement done in 1954 by our country India. The new recorded height of Mount Everest is 8848 meters, or 29035 feet.

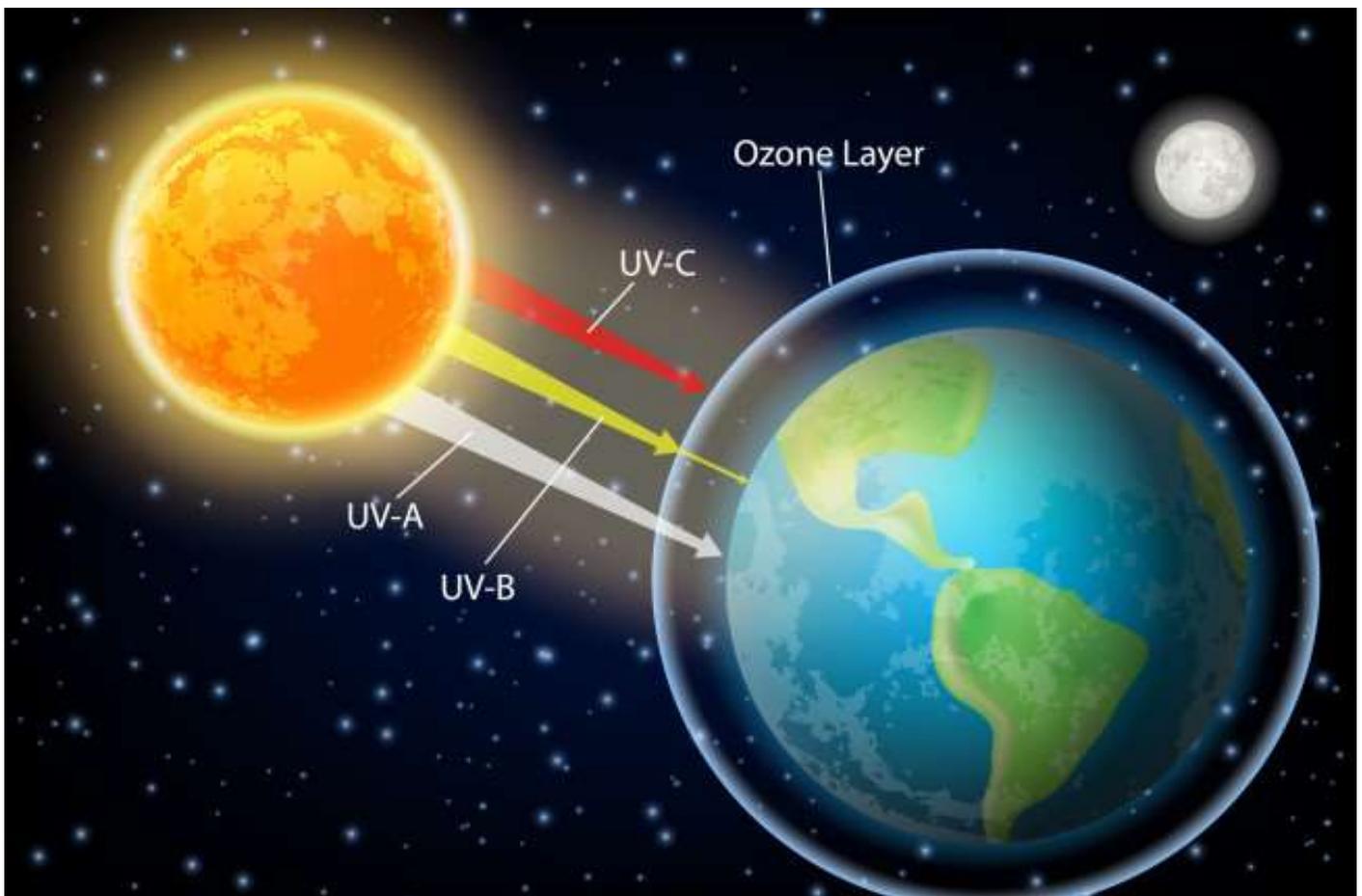
So the answer is Everest height still increasing and that story might be never end.

Our Atmosphere – Layer by Layer

- Anshu Vishwakarma

The atmosphere of earth is a layer of gases surrounding the planet earth, that is retained by earth's gravity.

The atmosphere becomes thinner and thinner with increasing altitude with no definite boundary between the atmosphere and outer space. The atmosphere layer closest to the earth is referred to as the troposphere beyond the troposphere are the stratosphere the Ozone Layer, the mesosphere, the thermosphere and the exosphere, the atmosphere is made up of 78% Nitrogen 21% Oxygen and smaller amounts of organ carbon dioxide Helium and neon.



The composition of atmosphere:

The earth is surrounded by a blanket of air which we called the atmosphere and it reaches over 550 km from the earth's surface.

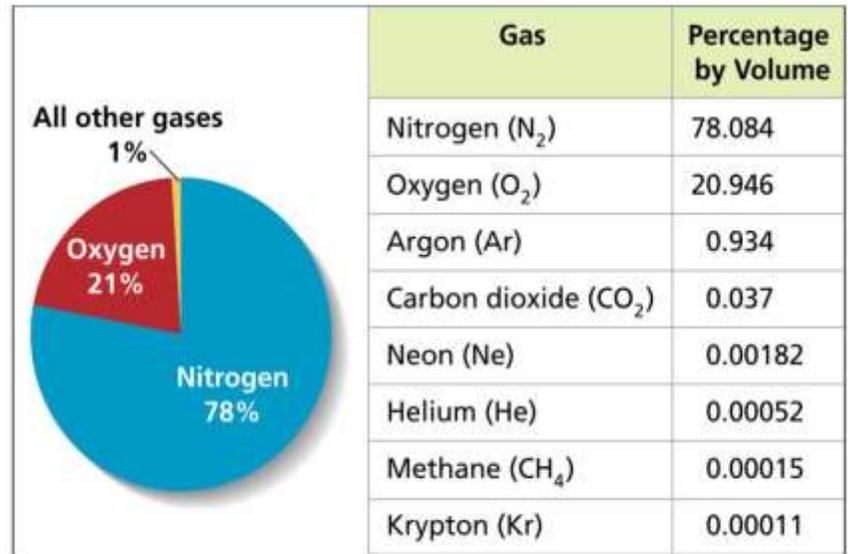
Nitrogen: - 78%

Oxygen: - 21%

Other gases: - 1%

(greenhouse gases Carbon dioxide water vapor methane etc.)

Composition of the Atmosphere



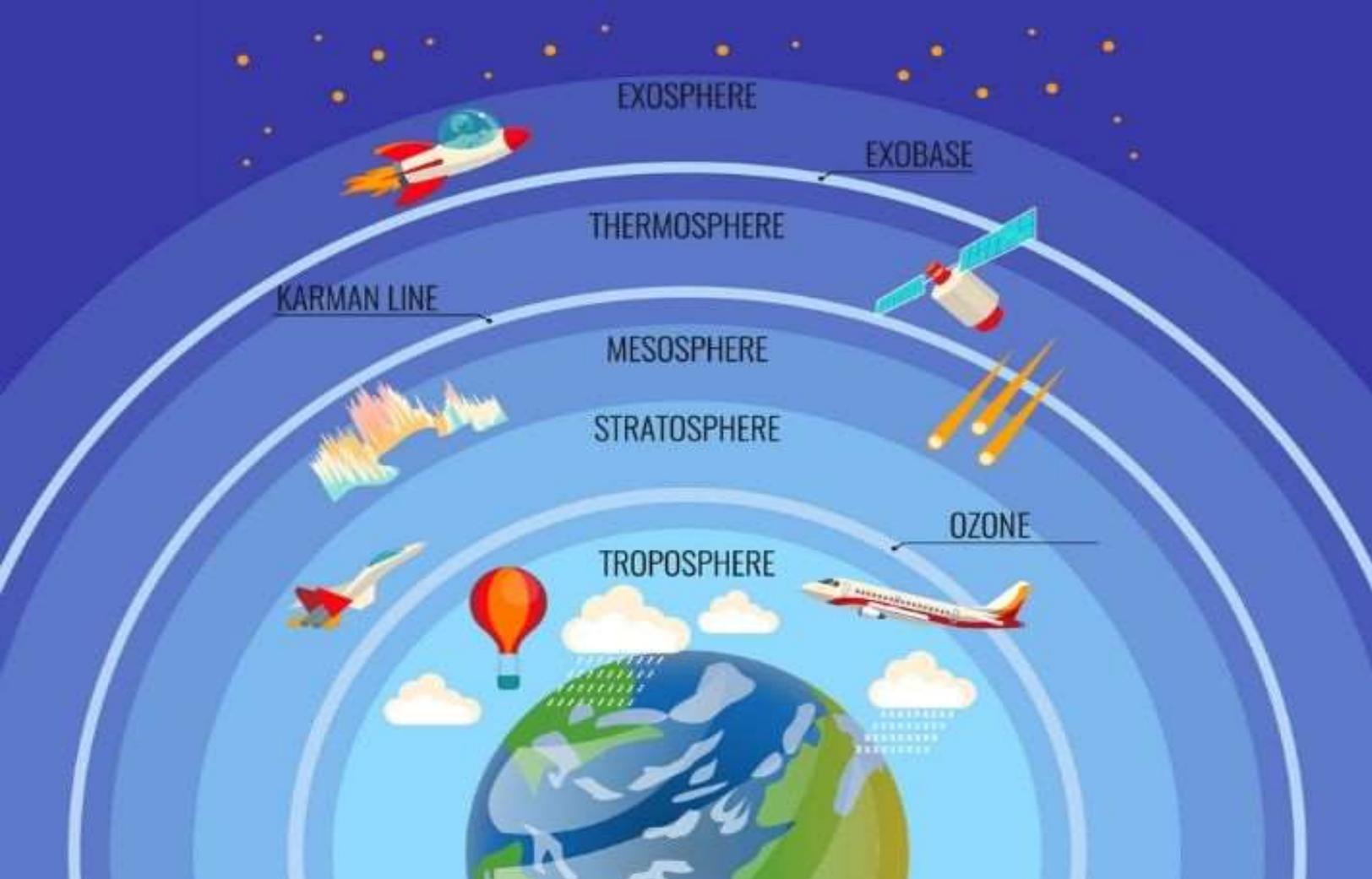
The atmosphere can be classified in four ways: -

1. on the basis of composition
2. on the basis of temperature
3. on the basis of chemical reactivity
4. on the basis of ionization

Classification of atmosphere on the basis of temperature

The atmosphere can be classified in layers on the basis of temperature:

1. **Troposphere:** - It is the lowermost layer of the atmosphere the height of this layer is about 18 kilometers on the equator and 8 kilometers on the poles the thickness of the troposphere is greatest at the equator because heat is transported to great heights by strong convectional currents.



2. Stratosphere: - The stratosphere extends from the top of the troposphere to about 50 kilometers above the ground the infamous ozone layer is found within the stratosphere. 3. Mesosphere: - The mesosphere is the layer of Earth's atmosphere the Mesosphere is directly above the stratosphere and below the thermosphere it extends from about 50 to 85 kilometers above our planet.

4. Thermosphere: - Thermosphere is the layer in the earth's atmosphere directly over the mesosphere and below the exosphere sphere.

5. Exosphere: - The Exosphere is the outermost is the outermost layer of the Earth's atmosphere it starts at an altitude of about 500 kilometers and goes out to about 10,000 kilometers.

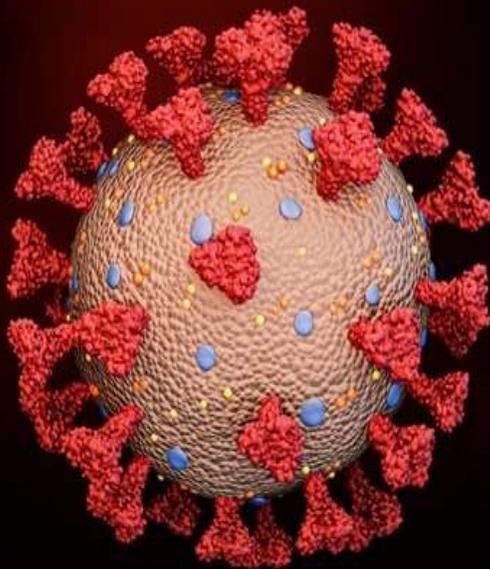
What is a Spike Protein?

- Rakhi Kumari

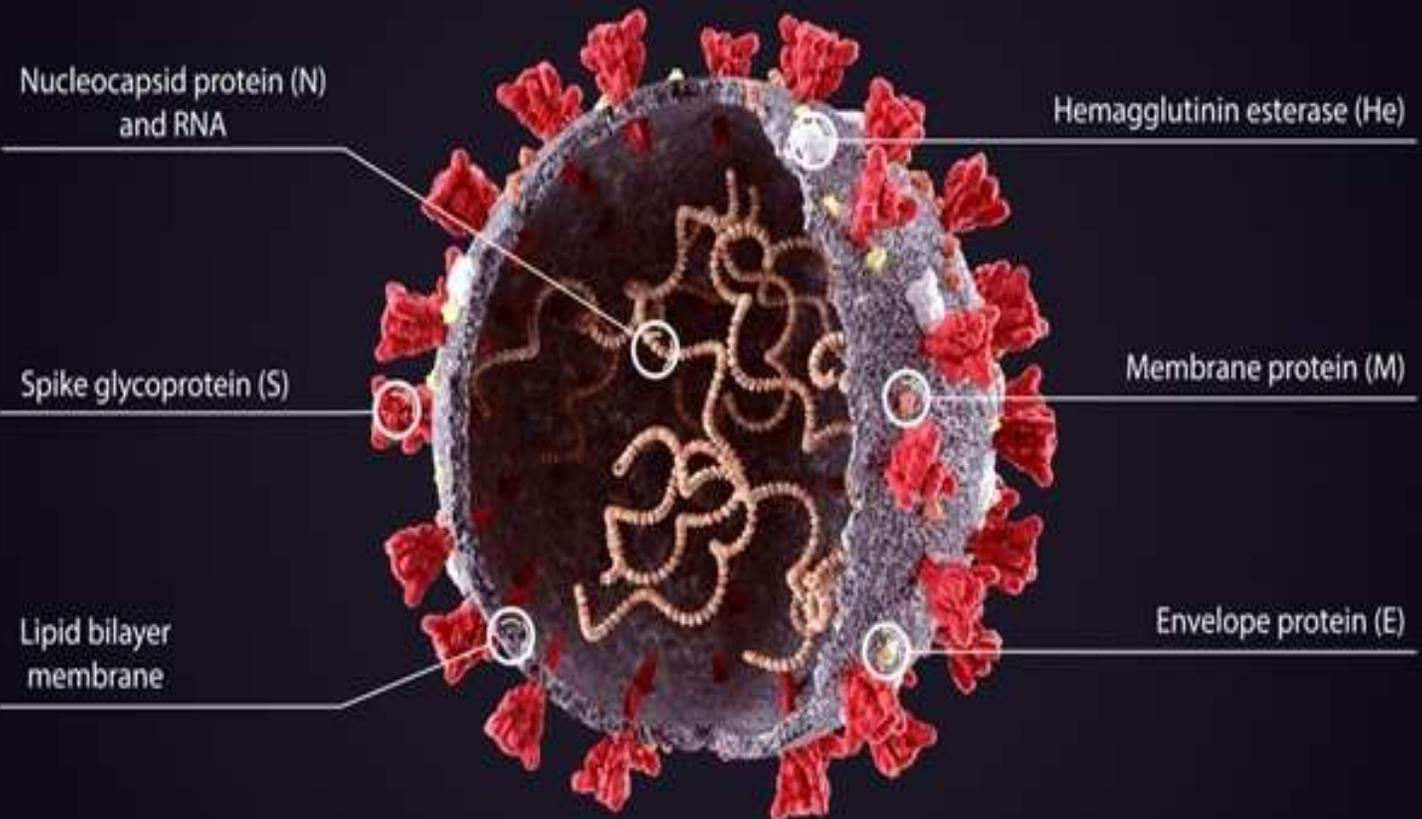
Members of the coronavirus family have sharp bumps that protrude from the surface of their outer envelopes. Those bumps are known as spike proteins. They are actually glycoproteins. That means they contain a carbohydrate (such as a sugar molecule). Spiked proteins are what give the viruses their name. Under the microscope, those spikes can appear like a fringe or crown.

Spike protein plays an important role in how these viruses infect their hosts.

Spike proteins like to stick together and three separate spike molecules bind to each other to form a functional “trimeric” unit. The spike protein is composed of a linear chain of 1,273 amino acids, neatly folded into a structure, which is studded with up to 23 sugar molecules. The spikes are coated with polysaccharide molecules to hide them, avoiding observation of the host immune system during entry.



The RNA genome of coronaviruses, which, at a median length of 29 kb is the longest among all RNA viruses, is comprised of six to ten open reading frames (ORFs) that are responsible for encoding both the replicate and structural proteins for the virus. One of the most important features of the spike protein of SARS-CoV-2 is how it moves or changes over time during the evolution of the virus. In the induction of neutralizing-antibody and T-cell responses, the spike protein plays an important role. The spike protein also protect immunity, during infection with SARS-CoV.



The presence of Spike proteins on the coronavirus gives rise to the spike-shaped bumps found on their surface. Without the spike protein, viruses like the novel SARS-CoV-2 would never be able to interact with the cells of potential hosts like animals and humans to cause infection. As a result, the Spike protein represents an ideal target for vaccine and antiviral research attempts.

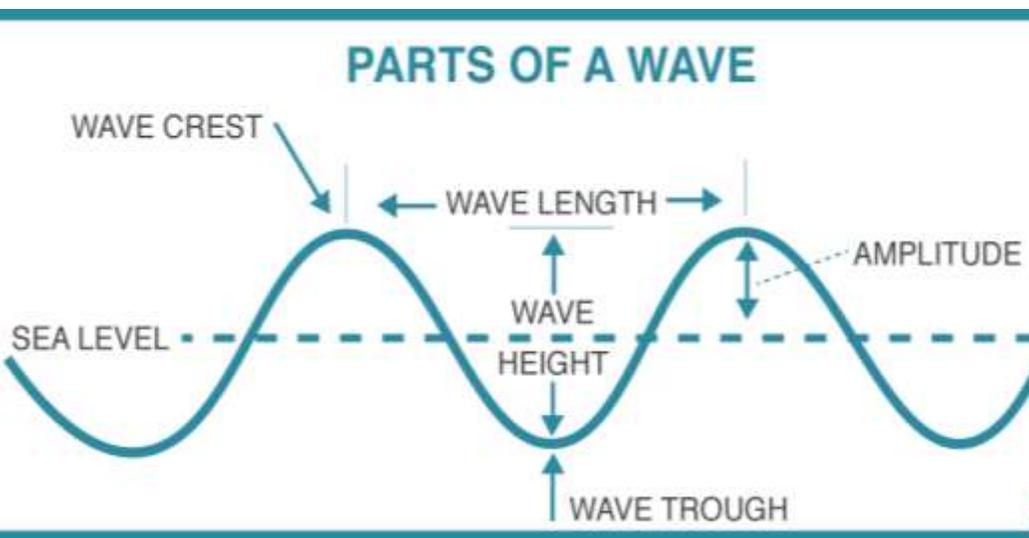
The spike protein on the novel coronavirus behind the 2020 global pandemic. This confirmed that the new virus spike protein also is a shape-changer. What's more, it clings to its target on human cells 10 to 20 times as tightly as the SARS spike protein does to the same target. Such a tight grip may help the COVID-19 virus spread more easily from person to person.

Understanding Waves & Wavelengths

- Jyoti Kumari

Wave: A wave is a kind of oscillation (disturbance) that travels through space and matter. Wave motions transfer energy from one place to another. Waves require some oscillating or vibrating source.

Waves appear in many different forms. Shake the ground during earthquakes. Light waves travel across the universe, allowing us to see distant stars. And every sound we hear is a wave.



A wave is a disturbance that moves energy from one place to another. Only energy not matter is transferred as a wave moves. The substance that a wave moves through is called the *medium*. That medium moves back and returning to its original position.

But the wave travels along the medium. It does not stay in one place. Light, or electromagnetic radiation, can also be described as a wave. The energy of light travels through a medium called an electromagnetic field. This field exists everywhere in the universe. It oscillates when energy disturbs it, just like the rope moves up and down when someone shakes it. Unlike a wave in water or a sound wave in air, light waves don't need a physical substance to travel through. They can cross empty space because their medium does not involve physical matter.

Types of waves

- **Transverse waves:** - The waves in which the medium moves at right angles to the direction of the wave. Example of transverse waves is light wave.

- **Longitudinal Wave:** - A longitudinal wave has the movement of the particles in the medium in the same dimension as the direction of movement of the wave. **Example of longitudinal waves is sound waves.**
- **Electromagnetic Waves:** - Radio signals, light rays, x-rays, and cosmic ray.
- **Mechanical waves:** - Waves which need a medium in order to propagate itself are mechanical waves. **Sound waves, waves in a water is the example of it.**
- **Matter waves:** - Any moving object can be described as a wave When a stone is dropped into a pond, the water is disturbed from its equilibrium position as the wave passes; it returns to its equilibrium position after the wave has passed.
- **Electromagnetic Waves:** - These waves are the disturbance that does not need any object medium for propagation and can easily travel through the vacuum. They are produced due to magnetic and electric fields. The periodic changes that take place in magnetic electric fields and therefore known as electromagnetic waves.

Wave speed formula

It is the total distance covered by the wave in a given time period. The formula for wave speed is given as,

Wave Speed = Distance Covered/Time taken

Properties of waves:

- **Amplitude-** Wave is an energy transport phenomenon. Amplitude is the height of the wave, usually measured in meters.
- **Wavelength** – The distance between identical points in the adjacent cycles of crests of a wave is called a wavelength. It is also measured in meters.

- **Time Period** – The time period of a wave is the time for a particle on a medium to make one complete vibrational cycle.
- **Frequency** – Frequency of a wave is the number of waves passing a point in a certain time. The unit of frequency is hertz (Hz)

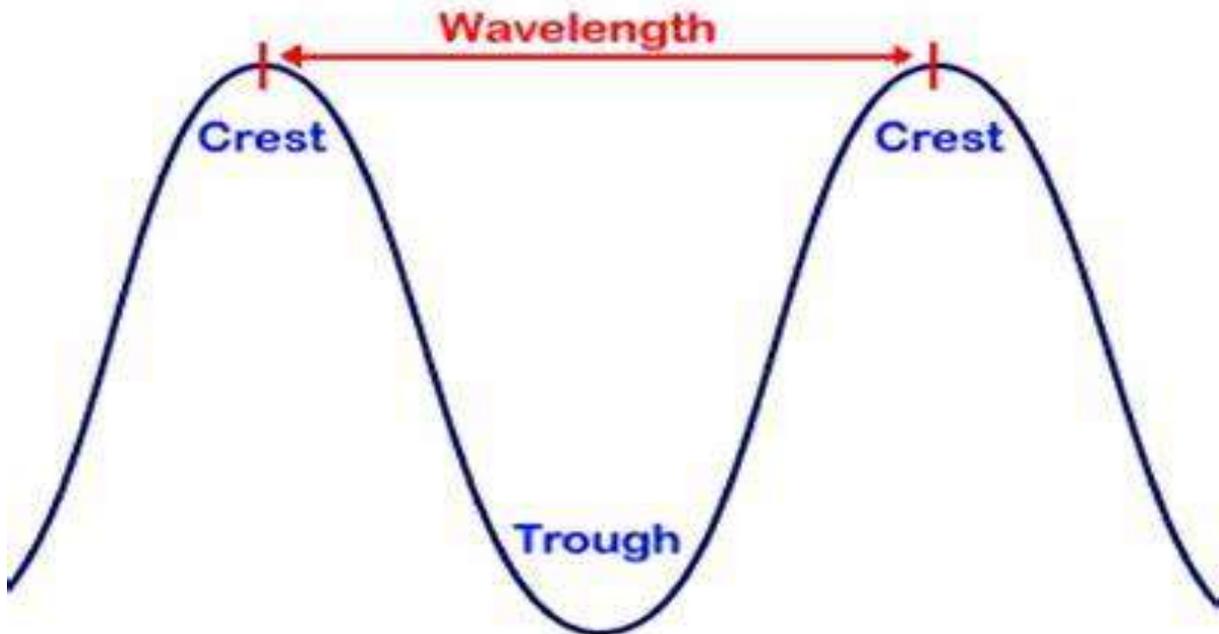
$$\text{Frequency} = 1 / \text{Time Period}$$

- **Speed** – The speed of an object means how fast an object moves and is usually expressed as the distance travelled per time of travel. The speed of a wave refers to the distance travelled by a given point on the wave (crest) in a given interval of time.

$$\text{Speed} = \text{Distance} / \text{Time}$$

Speed of a wave is thus measured in meter/second i.e. m/s.

Wavelength: Wavelength is inversely proportional to frequency. It means longer the wavelength, lower the frequency. Wavelength can be defined as the distance between two successive crests or troughs of a wave.



How are eyes make sense of light?

- Shruti Ohja

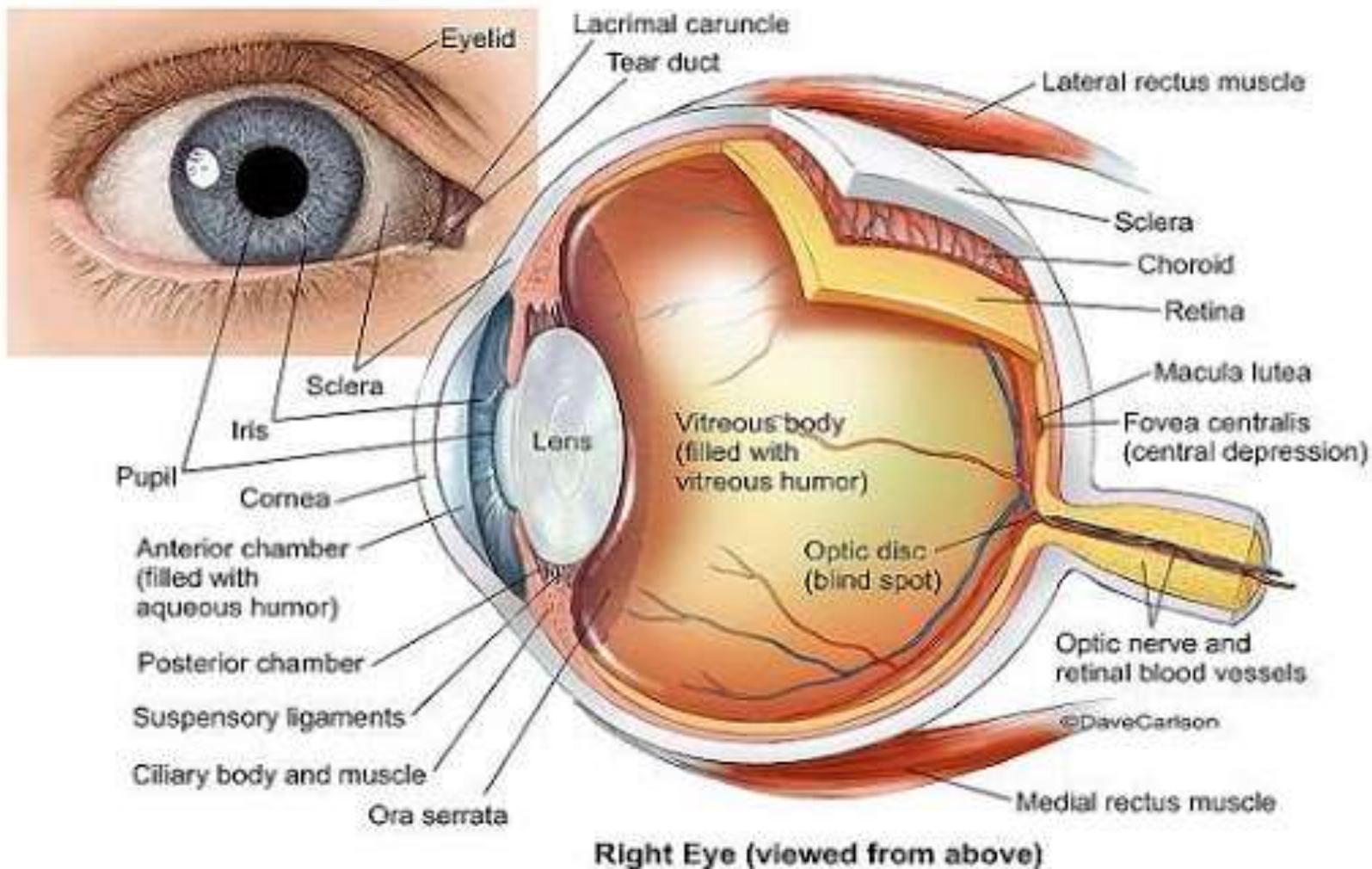


What if we could not see the beauty around us, the brightening sun, beautiful landscape, seven wonders of the world, colorful flowers and birds and everything that we can visualize?? What if the whole world seems black??

Let's dig about it. This amazing physics phenomenon which makes the world more beautiful.

Your eyes are amazing tools for viewing the environment around you. They are made up of countless nerves and parts that all work together to make vision possible. How your Eyes enable you to interpret light? For this we need to understand the structure of light.

The human eye belongs to a general group of eyes found in nature called "camera-type eyes." Just as a camera lens focuses light onto film, a structure in the eye called the cornea focuses light onto a light-sensitive membrane called the retina.



STRUCTURE OF EYE AND HOW IT WORKS?

Orbit is the bony cavity that contains the Eyeball, muscles, nerves and blood vessels as well as structure that produces and drain tears.

The outer covering of the eyeball consists of a relatively tough white layer called **sclera**.

Cornea - As light enters our eyes, it first heads through a tough outer tissue called the cornea. This protects the delicate inner eye from everything the world might throw at it. Light passes right through the cornea and into a transparent, flexible tissue called the lens. This lens focuses the light, sending it through the liquid-filled globe of the eyeball to the back interior wall of the eye.

Retina - The tissue known as the retina, contains millions of light-sensitive cells. They are especially concentrated in an area called the fovea. This densely packed set of cells gives us the clearest picture of our world. When the eye focuses on an object, it directs the light bouncing off the object directly onto the fovea to get the best image. In fact, when the eye focuses on something, that's called foveating.

Photoreceptors -The most sensitive part on retina is a small area called **macula** which has tightly packed light-sensing cells known as photoreceptors. Two important types are rods and cones. Each human retina (and you have two, one in each eye) contains 125 million rods and about 6 million cones. This is 70 percent of all the sensory receptors in your entire body — for touch, taste smell, hearing and sight all put together.

Each rod or cone cell at the back of the eye has a stack of discs inside, The discs contain a pigment molecule. It's bound to a protein called an **opsin**. Rods and cones each have a different opsin.

Cones have a pigment-protein pair called **photopsin**. It comes in three different types, and each cone has just one type. They come in red, green or blue — the colors that each cone type is best at absorbing. Cones respond to light that has passed through the lens and onto the fovea. As each cone absorbs its color of light, it produces an electrical signal. These signals travel to the brain, filling our worlds with color.

Red, green, blue, black and white. These five colors end up making every single color that we see. Cone cells are especially concentrated in the fovea, and work only in bright light. At night, you need your rods.

So this is an amazing journey of light in our eyes that makes this world beautiful and colorful.

Why some clouds glow in the dark?

- Nikita Pachouri

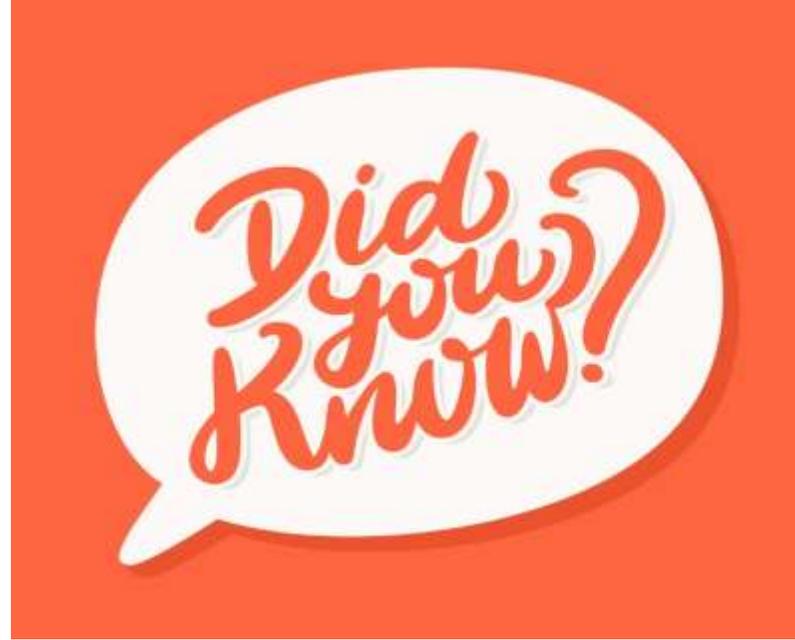


Meteors burn up high in the atmosphere so these noctilucent clouds also form high up, given the curvature of the earth, objects high in the sky can still catch some sunlight well after the sun sets closure to the ground.

Noctilucent clouds' extreme height is what keeps them shining in the dark.

Noctilucent clouds typically descend even lower after the summer solstice. The brightness of the cloud depends on the direction of sunlight, darker clouds are thicker and have bigger, heavier cloud droplets. they are very faint and may be observed only in twilight around sunrise and sunset when the clouds of the lower atmosphere are in shadow but the noctilucent cloud is illuminated by the sun. they are best seen when the sun is between 6° and 16° below the horizon.

Question Corner???

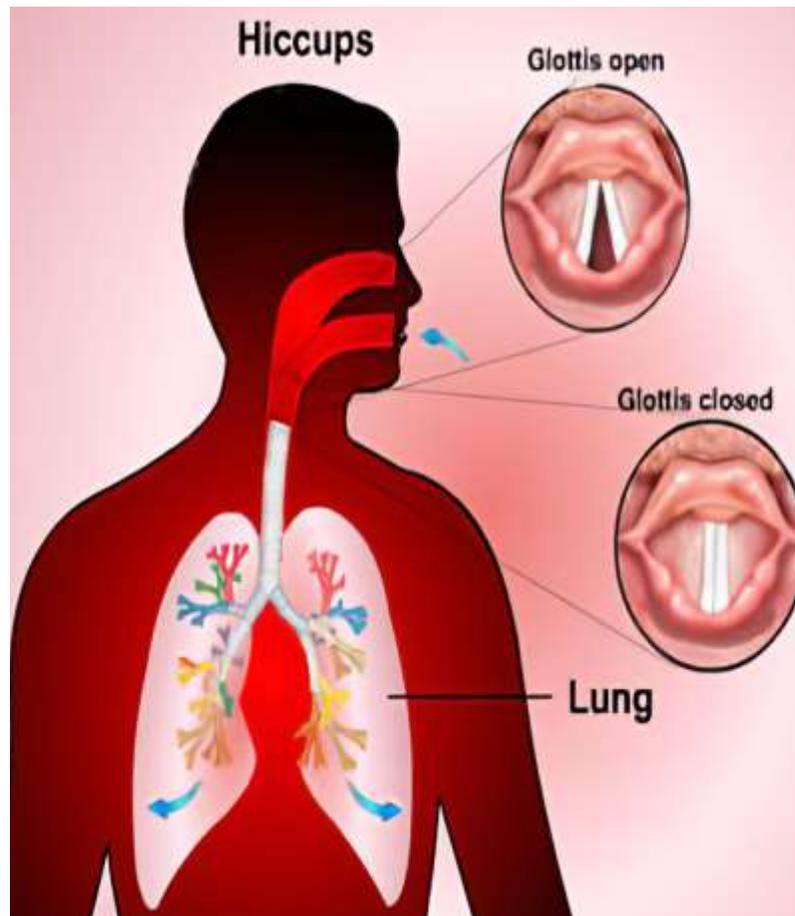


Q1. Why do we get hiccups?

carbonated drinks or chewing gum.



Answer: The meaning of hiccups is the involuntary contractions of the diaphragm and the reason of getting hiccups are different but some of them are an overindulgent meal, a sudden change in temperature, excitement or stress, drinking



Q2. Why do leaves die off in autumn?



Answer: This happens due to combination of things like decreasing temperatures, shorter days, and the chemical changes going on in the leaves. In summer, the leaves are needed to transform the sun rays into energy. While in autumn, the green leaves turn to orange or yellow as chlorophyll degrades and is no longer made. So the leaves fall off.

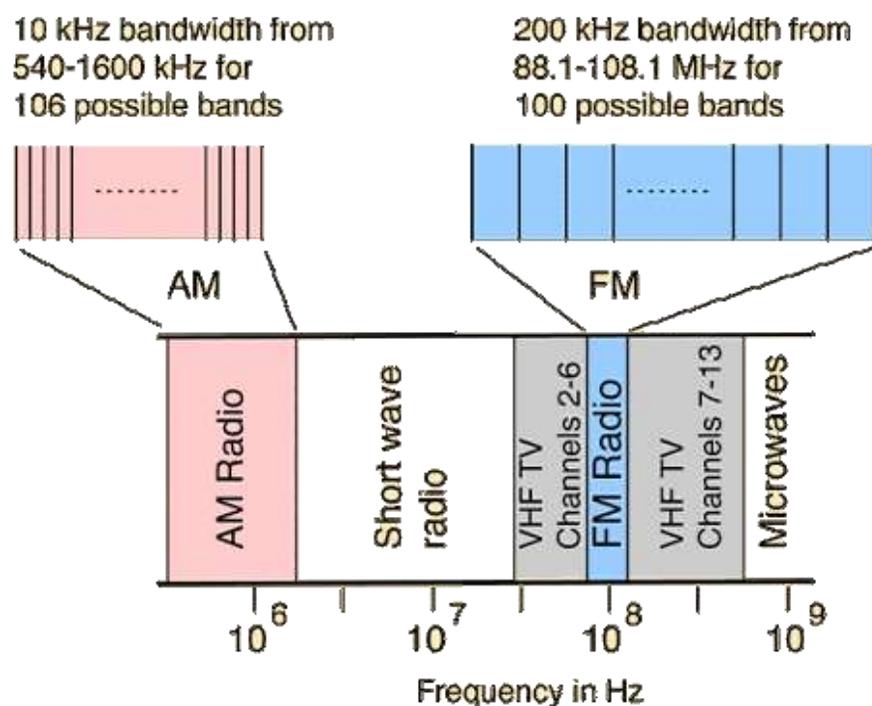
Q3. Why do we put a thermometer under our tongue while measuring body temperature?



Answer: Thermometer is kept under tongue because we need true reading that is true reading of inner body heat. The intense heat of our body is present under our tongue and so we can measure our whole body temperature.



Q4. Why are we able to get only FM radio channels in mobile phones and not AM or short wave radio channels?



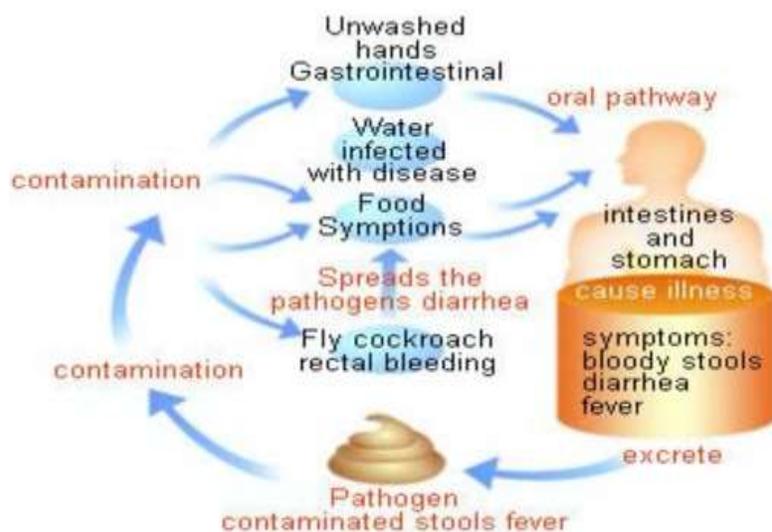
Answer: In short, the AM is amplitude modification while FM is frequency modification. The difference between them is how the carrier waves are modulated or altered. So the reason is that FM is more clear and clean in transmission and sound quality than AM. FM has short wavelength and frequency is high and it is vice versa for AM. Hence we get only FM radio channels in mobile phones.

Q5. What is shigella infection?



Answer:

Shigella infection, also known as shigellosis is an intestinal infection caused by a family of bacteria known as shigella. Shigella is very contagious and therefore, spread easily. Mostly the people who get infected by Shigella have diarrhea (sometimes bloody), fever and stomach cramps. Washing hands often with soap and running water and taking other hygiene measures can help to protect from the infection.





FACTOPEDIA

- The summer solstice, the longest day of the year happens when earth axis is most tilted towards the sun. In Uranus northern hemisphere it last happened in 1944, and will next happen in 2028.
- The spiral shapes of sunflower follow a Fibonacci sequence: 1, 1, 2, 3, 5, 8 each number is the sum of the last two. This maximizes sunlight for each floret.
- A summer sunset is mostly red because the shorter wavelengths of green, violet, and blue are scattered by the earth's atmosphere like a giant prism.
- We do not fall out of a roller coaster during a loop because your inertia resists the acceleration and anchors you to the seat.
- World's smallest poisonous frog is less than a centimeter long and its skin is 200 times more toxic than Morphine.
- Sharks are the only animals that never get sick. They are even immune to every known disease including cancer.
- The only part of the body that has no blood is the cornea of the eye. It receives oxygen directly from the air.

"Empowering and Nurturing
Young Women to
Build Strong Nation"



Ms Preeti Shehrawat conferred with prestigious Indira Gandhi National NSS Award

