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I, Shri Dr. S. P. Jagadale hereby declared that the particulars given above are true to the best of my knowledge and belief.

Sign /-
(Dr. S.P. Jagadale, Principal)
(The editor and publisher may not agree with the views expressed in articles.)

India Discovers New plant species in Antarctica

Polar biologists stumbled upon a species of moss during an expedition to the ice-covered continent in 2017.

Identification is laborious, and it took the scientists five years to confirm that the species had been discovered for the first time.

The peer-reviewed paper describing this discovery has been accepted in the leading international journal, Journal of Asia-Pacific Biodiversity.

The biologists, based in the Central University of Punjab, have named the specie Bryum bharatiensis. Bharati is the Hindu goddess of learning and the name of one of India's Antarctic research stations.

Prof Felix Bast, a biologist who was part of the six-month-long expedition to the continent - the 36th by Indian scientists - discovered the dark green specie at Larsemann Hills, overlooking the Southern Ocean, in January 2017. This is located near Bharati, one of the remotest research stations in the world.

Plants need nitrogen, along with potassium, phosphorus, sunlight and water to survive. Only 1% of Antarctica is ice free. "The big question was that how does moss survive in this landscape of rock and ice," Prof Bast said.

The scientists found that this moss mainly grew in areas where penguins bred in large numbers. Penguin poop has nitrogen. "Basically, the plants here survive on penguin poop. It helps that the manure doesn't decompose in this climate," said Prof Bast.

What about sunlight? The scientists say they still fully don't understand how the plants survive under thick snow during the six winter months with no sunlight and temperatures dropping to as low as -76C.

Scientists say it is likely that the moss "dries up to a dormant stage, almost to a seed" at this time, and germinates again during summer in September when they begin getting sunlight again. The dried up moss then absorbs water from the melting snow.

After collecting the samples, the Indian scientists spent five years sequencing the plant DNA and comparing its form with other plants. More than 100 species of moss have been documented from Antartica, the driest, coldest and windiest continent, so far.

What worried the scientists was the "alarming evidence" of climate change that they saw during the expedition. They say they came across melting glaciers, crevasse-infested ice sheets and glacial melt-water lakes on top of ice sheets.

"Antartica is getting greenified. Many temperate species of plants that previously could not survive in this frozen continent are now seen everywhere because

of the warming up of the continent," said Prof Bast.

The finding that Antarctica was greenifying was disturbing," said Prof Raghavendra Prasad Tiwari, a leading biologist and the vice chancellor of the Central University of Punjab. "We don't know what lies under the thick ice sheets. There could well be pathogenic microbes which could emerge when the ice melts due to global warming,"

This is the first time India has discovered a plant species in the four decades since it first set up a research station in the continent.

The first station was set up in 1984, and was abandoned in 1990 after it submerged under ice. Two stations - Maitri and Bharati - were commissioned in 1989 and 2012, and remain operational through the year.

Article by-
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The Nobel Prize in Chemistry 2021

Benjamin List

David

The Royal Swedish Academy of Sciences has decided to award the Nobel Prize in Chemistry 2021 to Building molecules is a difficult art. Benjamin List and David MacMillan are awarded the Nobel Prize in Chemistry 2021 for their development of a precise new tool for molecular construction: organo catalysis. This has had a great impact on pharmaceutical research, and has made chemistry greener. Many research areas and industries are dependent on chemists' ability to construct molecules that can form elastic and durable materials, store energy in batteries or inhibit the progression of diseases.

This work requires catalysts, which are substances that control and accelerate chemical reactions, without becoming part of the final product. For example, catalysts in cars transform toxic substances in exhaust fumes to harmless molecules. Our bodies also contain thousands of catalysts in the form of enzymes, which chisel out the molecules necessary for life. Catalysts are thus fundamental tools for chemists, but researchers long believed that there were, in principle, just two types of catalysts available: metals and enzymes. Benjamin List and David MacMillan are awarded the Nobel Prize in Chemistry 2021 because in 2000 they, independent of each other, developed a third type of catalysis. It is called asymmetric organocatalysis and builds upon small organic molecules. "This concept for catalysis is as simple as it is ingenious, and the fact is that many people have wondered why we didn't think of it earlier," says Johan Åqvist, who is chair of the Nobel Committee for Chemistry. Organic catalysts have a stable framework of carbon atoms, to which more active chemical groups can attach.

These often contain common elements such as oxygen, nitrogen, sulphur or phosphorus. This means that these catalysts are both environmentally friendly and cheap to produce. The rapid expansion in the use of organic catalysts is primarily due to their ability to drive asymmetric catalysis. When molecules are being built, situations often occur where two different molecules can form, which – just like our hands – are each other's mirror image. Chemists will often only want one of these, particularly when producing pharmaceuticals. Organocatalysis has developed at an astounding speed since 2000. Benjamin List and David MacMillan remain leaders in the field, and have shown that organic catalysts can be used to drive multitudes of chemical reactions. Using these reactions, researchers can now more efficiently construct anything from new pharmaceuticals to molecules that can capture light in solar cells. In this way, organocatalysts are bringing the greatest benefit to humankind.

Article by-
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Linux Kernel

The Kernel of an Operating System is the program which makes the hardware and the software work together. With the help of device drivers, the Linux kernel acts as a translator allowing communication between the software and the user interface with the hardware. This article will focus on Linux kernel, which is a Monolithic Kernel based on Unix. Other kernels may be Micro Kernels delegating some functions to other programs such as external drivers. A monolithic kernel is a kernel monopolizing all hardware and driver operations as parts of itself, in contrast with microkernels which deal with a few basic tasks while leaving the rest as external tasks, due the lack of popular operating systems using microkernels we'll ignore their existence for now.We can think about the kernel as the first level or lower level of communication between our OS (operating system) and our physical device. Being a "hardware-software translator" the kernel's main task is allocating hardware resources to software processes, mainly memory and processor. The kernel also can limit memory allocation to failing devices to prevent crashes. Let's say we installed a new Linux system and some of our devices fail to work properly, like an undetected wifi card. After doing some checks we realize the operating system we just installed does not support our wifi card. Before such scenario we may edit our kernel's configuration adding support for the device we need. On a previous article on Linux Hint we took this scenario to teach how to compile the Slackware Linux kernel to add hardware support. If we want we can also remove hardware support we don't need from our kernel to make it lighter. While modifying a kernel we can edit the hardware support as native or we can load support as a loadable module called upon need, and of course you can write your own modules if needed.

Kernel modules have advantages over regular applications with the same utility (such as external drivers) because modules only work upon need. In contrast with applications kernel modules release hardware resources terminating all it's activity while regular applications may retain them. On the other hand it's disadvantage is regular applications are less likely to make the system crash.

The Linux® kernel is the main component of a Linux operating system (OS) and is the core interface between a computer's hardware and its processes. It communicates between the 2, managing resources as efficiently as possible.

The kernel is so named because—like a seed inside a hard shell—it exists within the OS and controls all the major functions of the hardware, whether it's a phone, laptop, server, or any other kind of computer.

The kernel has 4 jobs:

1. Memory management: Keep track of how much memory is used to store what, and where
2. Process management: Determine which processes can use the central processing unit (CPU), when, and for how long

3. Device drivers: Act as mediator/interpreter between the hardware and processes

4. System calls and security: Receive requests for service from the processes

The kernel, if implemented properly, is invisible to the user, working in its own little world known as kernel space, where it allocates memory and keeps track of where everything is stored. What the user sees—like web browsers and files—are known as the user space. These applications interact with the kernel through a system call interface (SCI).

To put the kernel in context, you can think of a Linux machine as having 3 layers:

1. The hardware: The physical machine—the bottom or base of the system, made up of memory (RAM) and the processor or central processing unit (CPU), as well as input/output (I/O) devices such as storage, networking, and graphics. The CPU performs computations and reads from, and writes to, memory.

2. The Linux kernel: The core of the OS. (See? It's right in the middle.) It's software residing in memory that tells the CPU what to do.

3. User processes: These are the running programs that the kernel manages. User processes are what collectively make up user space. User processes are also known as just processes. The kernel also allows these processes and servers to communicate with each other (known as inter-process communication, or IPC).

Code executed by the system runs on CPUs in 1 of 2 modes: kernel mode or user mode. Code running in the kernel mode has unrestricted access to the hardware, while user mode restricts access to the CPU and memory to the SCI. A similar separation exists for memory (kernel space and user space). These 2 small details form the base for some complicated operations like privilege separation for security, building containers, and virtual machines.

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Article By
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An Introduction to Intellectual Property Rights and their Importance in Indian Context

Introduction-

The intellectual property rights (IPR) are intangible in nature and gives exclusive rights to inventor or creator for their valuable invention or creation. IPR is the main focus in current globalisation scenarios in terms of trade and daily life.

Intellectual Property Rights and their Classification-

The following classification of intellectual property rights are based on the types of human inventions and creations as well as their uses: Patents, trademarks, industrial designs, semiconductor integrated circuit layout designs, geographic indications of source, and copyright and related rights (including literary and artistic works, musical compositions, artistic works, photographic productions, motion pictures, computer programmes, and performing and broadcasting works) are examples of property rights.

WIPO-

The World Intellectual Property Organization (WIPO) was established in Stockholm in 1967 to safeguard IPR around the globe. WIPO establishes and controls different IPR-related laws and regulations worldwide. The primary goal of WIPO is to promote economic, social, and sustainable cultural growth while protecting biodiversity and traditional knowledge through a balanced and efficient global IP system.

Patent-

A patent is a form of intellectual property rights that a relevant government body grants to an inventor for a new technical invention.

Trademark-

A trade mark is a distinguishing symbol or emblem that indicates that a certain product is created or offered by a particular person, business, or industry. A trademark or service mark is made up of words (such as a company's name, its surname, its location, its slogan, etc.), letters, numbers, drawings, logos, phrases, images, designs, or a mix of these components to differentiate one good or service from another.

Layout Design of Semiconductor Integrated Circuit-

Electronic gadgets i.e. mobile or smart phone, laptops, computer, watches, cameras, safety or health care devices, home appliances, etc. These circuit designs are works of human imagination that result from significant investments and efforts made by highly qualified professionals.

Geographical Indications-

"The term Geographical Indication has been chosen by WIPO to include all currently available means of protecting such names and symbols, regardless of whether they indicate that qualities of a given product are attributable to its geographical origin (such as appellations of origin) or they merely indicate place of origin of a product (such as indication of source)."

Trade Secrets-

Any knowledge that is valuable for business and offers financial advantages but is not novel or inventive (and hence not patentable) may be preserved as a trade secret.

Copyrights-

Copyrights safeguard the expression of an author's, artists, or other artists' ideas. Copyright encourage such type of activities. The following literary and artistic works are covered under copyrights:

i. Literary and scientific works ii. Musical work iii. Artistic works iv.Photographic

work v. Motion pictures vi Computer programs.

Conclusion-

Intellectual property rights are crucial for the development of a society in a knowledge-based economy.

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Article By

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Department of Commerce

Flammable Invasive Grasses Are Increasing the Risks of Damaging Wildfires

In forests, by contrast, fires do appear to help spread the grass. An examination of a decade of fires in the region revealed that more severely burned areas were more likely to be invaded.

In many location, scientists are just beginning to document the impact of invasive grasses. In Hawaii, however, D'Antonio has been closely observing the interlopers since the early 1990s. And her ringside seat has enabled her to see how the effects can echo through a landscape in complex and surprising ways.

In Hawaii's Volcanoes National Park, for example, she has tracked how a handful of invasive grasses—many introduced by cattle ranchers—have altered environments once rarely touched by fire. Studying places that first burned in 1970, D'Antonio found that in forests dominated by the native 'Ōhi'a tree, relatively shade-tolerant beardgrass from South America took root first. But if the beardgrass later fuels a fire, she says, then a "second invader, molasses grass, pours in." Native grasses simply can't compete. Whereas invasive grasses produce large numbers of airborne seeds, for example, a native species called Kawelu, or love grass, produces just a few seeds that drop nearby. Compared with molasses grass, she says, "It's a total wimp."

Molasses grass can also alter soil nutrient cycles in ways that ultimately benefit invasive species, D'Antonio has found. As the grass leaves decomposed, for instance, they led to a bounty of soil nitrogen that helped the grass. After 16 years, however, nitrogen returned to preinvasion levels as the nutrient leached out of the soil. Rather than pave the way for a return of native plants, however, the leaching opened the door to an invasive tree known, appropriately, as the fire tree. That tree, in turn, again increased soil nitrogen levels, which revived the molasses grass. "The situation there gets more and more grim," D'Antonio says.

These new grasses could also scramble how much carbon is stored in vegetation and soils. In Hawaii, D'Antonio found that in unburned areas where native 'Ōhi'a trees remained, the plants held twice the carbon of burned areas taken over by grass—even 25 years after a fire.

Reference:

https://www.science.org/content/article/flammable-invasive-grasses-increasing-risk-devastating-wildfires

Article By-
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Department of Environment Science

Understanding Waves and Wavelengths

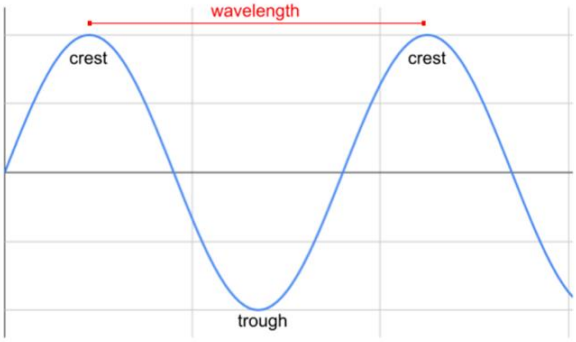
Waves Transfer Energy, Not Matter, From One Place to Another

Waves appear in many different forms. Seismic waves 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. So what do all these different waves have in common?

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 forth repeatedly, returning to its original position. But the wave travels along the medium. It does not stay in one place.

Imagine holding one end of a piece of rope. If you shake it up and down, you create a wave, with the rope as your medium. When your hand moves up, you create a high point, or crest. As your hand moves down, you create a low point, or trough (TRAWF). The piece of rope touching your hand doesn't move away from your hand. But the crests and troughs do move away from your hand as the wave travels along the rope.



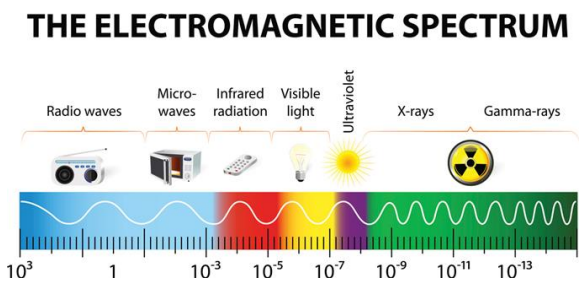
In this wave, blue particles move up and down, passing through the line in the center. Some waves in nature behave like this, too. For example, in the ocean, the water moves up and down, but returns to surface level. This creates high points called crests and low points called troughs. As the water moves up and down, the crests and troughs move to the side, carrying energy. The same thing happens in other waves. If you jump in a puddle, your foot pushes on the water in one spot. This starts a small wave. The water that your foot hits moves outward, pushing on the water nearby. This movement creates empty space near your foot, pulling water back inwards. The water oscillates, moving back and forth, creating crests and troughs. The wave then ripples across the puddle. The water that splashes at the edge is a different bit of water than where your foot made contact. The energy from your jump moved across the puddle, but the matter (the molecules of water) only rocked back and forth.

Light, or electromagnetic radiation, also can 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 as 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.

Scientists use several properties to measure and describe all these types of waves. Wavelength is the distance from one point on a wave to an identical point on the next, such as from crest to crest or from trough to trough. Waves can come in a wide range of lengths. The wavelength for an ocean wave might be around 120 meters (394 feet). But a typical microwave oven generates waves just 0.12 meter (5 inches) long. Visible light and some other types of electromagnetic radiation have far tinier wavelengths.

Frequency describes how many waves pass one point during one second. The units for frequency are hertz. Traveling through the air, a music note with a frequency of 261.6 hertz (middle C) pushes air molecules back and forth 261.6 times every second requency and wavelength are related to the amount of energy a wave has. For example, when making waves on a rope, it takes more energy to make a higher frequency wave. Moving your hand up and down 10 times per second (10 hertz) requires more energy than moving your hand only once per second (1 hertz). And those 10 hertz waves on the rope have a shorter wavelength than ones at 1 hertz. Many researchers rely on the

properties and behavior of waves for their work. That includes astronomers, geologists and sound engineers. For example, scientists can use tools that capture reflected sound, light or radio waves



For light in the electromagnetic spectrum, wavelengths can range from very long (kilometers-long for radio waves) to very small (a millionth of a millionth of a meter for gamma rays). The ruler shows how long these electromagnetic waves are in meters or fractions of a meter. Human eyes can see only a very small portion of these waves.

Article By-
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Marine Mammals


Sea otter


Marine Mantee


Seal

Marine mammals are aquatic mammals that rely on the ocean and other marine habitats for their existence. Marine mammals form a diverse group of 129 species. They include animals such as seals, whales, manatees, sea otters and polar bears. Marine mammals are widely distributed throughout the globe, but their distribution is patchy and coincides with the productivity of the oceans. They are an informal group, that depend on marine environments for feeding and survival.

They show different types of adaptations to an aquatic lifestyle. The adaptations considerably vary between species. Some marine mammals are fully aquatic and therefore are obligate water dwellers. Seals and sea-lions are semiaquatic. As, they spend the majority of their time in the water but need to return to land for important activities such as mating, breeding and molting. In contrast, both otters and the polar bear are much less adapted to aquatic living.

The diets of marine mammals vary considerably. Some are feeds on planktonic forms, fish, squid, shellfish or sea-grass. While some are feeds on other mammals. The number of marine mammals is small compared to those found on land. Their roles in various ecosystems are large, especially concerning the maintenance of marine ecosystems, through processes including the regulation of prey populations. This role in maintaining ecosystems makes them of particular concern as 23% of marine mammal species are currently threatened.

Marine mammals were first hunted by man for food and other resources. Many were also the target for commercial industry, leading to a sharp decline in all populations of exploited species, such as whales and seals.

Commercial hunting led to the extinction. After commercial hunting ended, some species, such have rebounded in numbers. Other than hunting, marine mammals can be killed as bycatch from fisheries.

Many marine mammals seasonally migrate. Marine mammals are able to dive for long periods. Marine mammals have a number of physiological and anatomical features to overcome the unique challenges associated with aquatic living. These features are very species-specific.

The features include-

- They have Torpedo-shaped bodies to reduce drag for efficient locomotion.
- They have Modified limbs: for propulsion and streeing.
- The have Tail flukes and Dorsal fin: for propulsion and balance.
- There is presence of fur or blubber- for thermoregulation.
- They Show circulatory adjustments.

- They have Reduced appendages for better mobility
- Their large size to prevent heat loss.
- They are also capable of reduced heart rate.
- They shunting most of the oxygen to vital organs such as the brain and heart to allow extended diving times and cope with oxygen deprivation.
- They show adaptations to ensure effective communication, prey capture, and predator detection in water.
- Marine mammals have evolved a wide variety of features for feeding.

Marine mammals were hunted by man historically for food and other resources

Reference

Source of Information: Wikipedia

Article by

Dr. R.S. More (HOD)

Department of Zoology


मुंबई विद्यापीठ
UNIVERSITY WITH POTENTIAL FOR EXCELLENCE
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Mumbai, 26th January, 2018