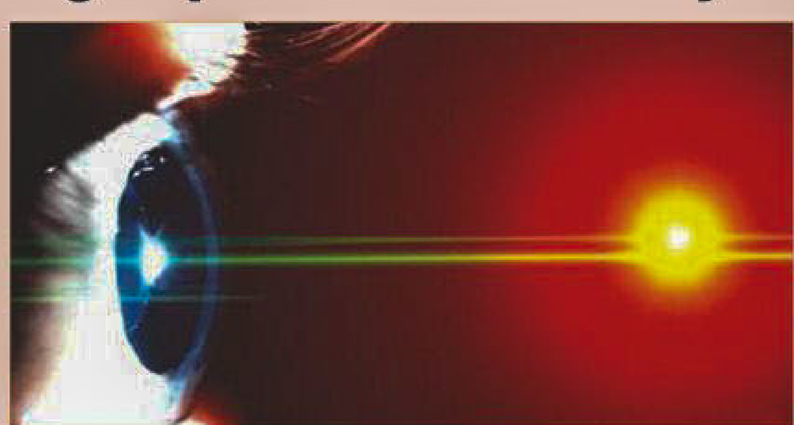
BEATING BLINDNESS

Light-powered bionic eye



A retinal implant - or bionic eye - powered by light invented by scientists at Stanford University.

IMPLANTS currently used in patients need to be powered by a battery. The new device, described in the journal Nature Photonics, uses a special pair of glasses to beam near infrared light into the eye.

This powers the implant and sends the information which could help a patient see.

Diseases such as age-related macular degeneration and retinal pigmentosa result in the death of cells which can detect light in the eye.

Eventually this leads to blindness.

Retinal implants stimulate the nerves in the back of the eye, which has helped some patients to see.

Early results of a trial in the UK mean two men have gone from being totally blind to being able to perceive light and even some shapes.

However, as well as a fitting a chip behind the retina, a battery needs to be fitted behind the ear and a cable needs to join the two together.

The Stanford researchers say their method could be a step forward by "eliminating the need for complex electronics and wiring".t

A retinal implant, which works in a similar way to a solar panel, is fitted in the back of the eye.

Source: BBC

Particles walk through walls

THOUGH it sounds like science fiction, the phenomenon is well documented and even understood under the bizarre rules that govern the microscopic world called quantum mechanics.

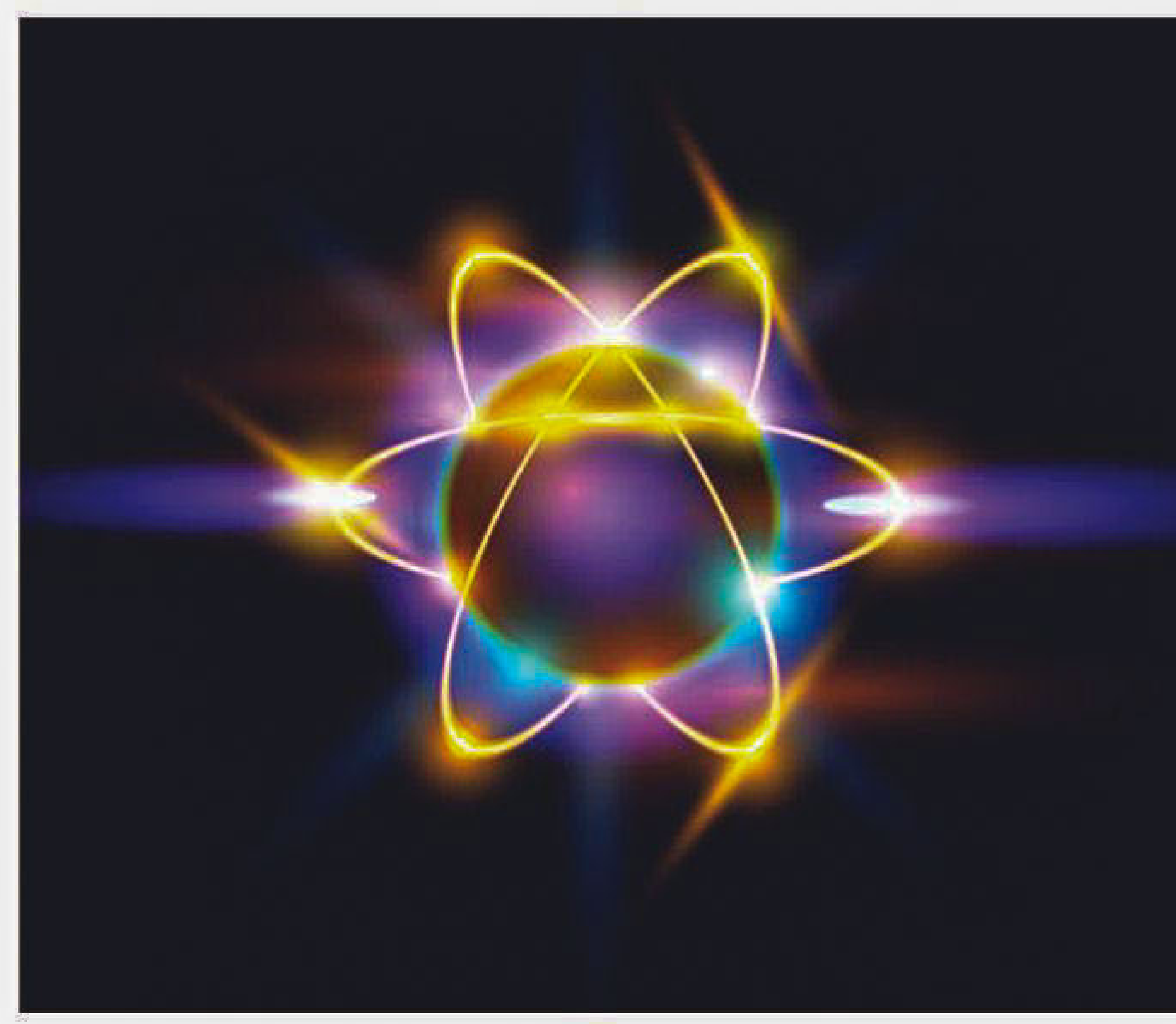
Now, scientists have measured the timing of this passing-through-walls trick more accurately than ever before, and report their results in today's (May 17) issue of the journal Nature.

The process is called quantum tunneling, and occurs when a particle passes through a barrier that it seemingly shouldn't be able to. In this case, scientists measured electrons escaping from atoms without having the necessary energy to do so. In the normal world around us, this would be like a child jumping into the air, and somehow clearing a whole house. [Graphic: Nature's Tiniest Particles Explained]

Quantum tunneling is possible because of the wave-nature of matter. Confounding as it sounds, in the quantum world, particles often act likes waves of water rather than billiard balls. This means that an electron doesn't exist in a single place at a single time and with a single energy, but rather as a wave of probabilities.

"Electrons are described by wave functions that extend smoothly from the inside to the outside of atoms part of the electron is always outside the atom," explains physicist Manfred Lein of Leibniz Universität Hannover in Germany in an accompanying essay in the same issue of Nature.

Now, physicists led by Dror Shafir of Israel's Weizmann Institute of Science have prompted electrons to tunnel out of atoms, and measured when they do so to within 200 attoseconds (an attosecond is 10-18 seconds, or 0.000000000000000001 seconds).



Electrons bound to an atom can sometimes escape, even if they lack the requisite energy, through a phenomenon known as quantum tunneling.

The researchers used a laser light to suppress the energy barrier that would normally trap an electron inside a helium atom. This laser reduced the strength of the barrier just enough so that an electron wouldn't have the energy required to escape the atom, but it could cheat and tunnel its way through. (The laser also nudges the electron back to its parent atom after it tunnels out.)

"We know the electron tunnels through in a very short window," said the Weizmann Institute's Nirit Dudovich, a member of the experiment team. "We are trying to trace back to the point where the electron left the barrier and say exactly when during the cycle the electron left the barrier."

To measure this, the physicists looked for the photon of light produced when an electron rejoined the atom after tunneling through. In some instances, the scientists used a laser to kick the electron away, preventing it from recombining with the atom.

"It's a time-dependent kick," Dudovich told LiveScience. "It eventually tells us something about the point where the electron was set free. The outcome is that tunneling occurs in less than a few hundred attoseconds."

This is the first time scientists have been able to pinpoint when an electron has tunneled through an atom. Previously, theoretical calculations had predicted the timing of quantum tunneling, but never before has it been directly measured with this accuracy.

The findings could help scientists understand other super-fast processes that rely on quantum tunneling.

"We know this phenomenon initiates many fast processes, which are very basic in nature," Dudovich said. "So we can think of this as we really measured the first step in many processes in nature."

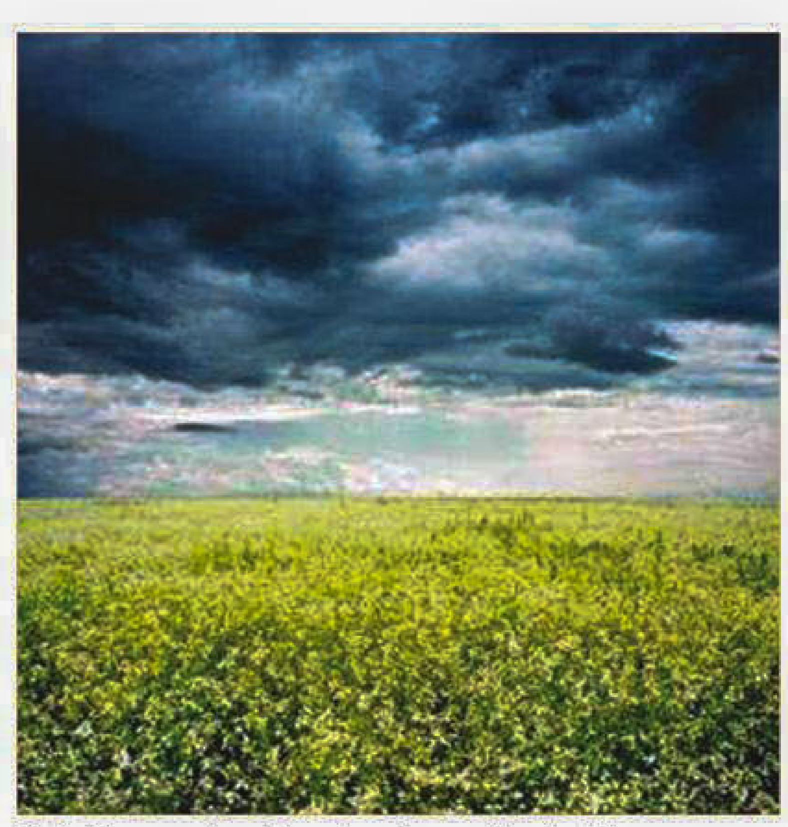
Source: Live Science

DANGEROUS MIX

Pollution teams with thunderclouds

POLLUTION is warming the atmosphere through summer thunderstorm clouds, according to a computational study published May 10 in Geophysical Research Letters. How much the warming effect of these clouds offsets the cooling that other clouds provide is not yet clear. To find out, researchers need to incorporate this new-found warming into global climate models

Pollution strengthens thunderstorm clouds, causing their anvil-shaped tops to spread out high in the atmosphere and capture heat -- especially at night, said lead author and climate researcher Jiwen Fan of the Department of Energy's Pacific Northwest National Laboratory.



Pollution makes thunderstorm clouds bigger.

"Global climate models don't see this effect because thunderstorm clouds simulated in those models do not include enough detail," said Fan. "The large amount of heat trapped by the pollution-enhanced clouds could potentially impact regional circulation and modify weather systems."

Clouds are one of the most poorly understood components of Earth's climate system. Called deep convective clouds, thunderstorm clouds reflect a lot of the sun's energy back into space, trap heat that rises from the surface, and return evaporated water back to the surface as rain, making them an important part of the climate cycle.

To more realistically model clouds on a small scale, such as in this study, researchers use the physics of temperature, water, gases and aerosols -- tiny particles in the air such as pollution, salt or dust on which cloud droplets form.

In large-scale models that look at regions or the entire globe, researchers substitute a stand-in called a parameterization to account for deep convective clouds. The size of the grid in global models can be a hundred times bigger than an actual thunderhead, making a substitute necessary.

However, thunderheads are complicated, dynamic clouds. Coming up with an accurate parameterization is important but has been difficult due to their dynamic nature.

Inside a thunderstorm cloud, warm air rises in updrafts, pushing tiny aerosols from pollution or other particles upwards. Higher up, water vapor cools and condenses onto the aerosols to form droplets, building the cloud. At the same time, cold air falls, creating a convective cycle. Generally, the top of the cloud spreads out like an anvil.

Previous work showed that when it's not too windy, pollution leads to bigger clouds. This occurs because more pollution particles divide up the available water for droplets, leading to a higher number of smaller droplets that are too small to rain. Instead of raining, the small droplets ride the updrafts higher, where they freeze and absorb more water vapor. Collectively, these events lead to bigger, more vigorous convective clouds that live longer.

Now, researchers from PNNL, Hebrew University in Jerusalem and the University of Maryland took to high-performance computing to study the invigoration effect on a regional scale.

To find out which factors contribute the most to the invigoration, Fan and colleagues set up computer simulations for two different types of storm systems: warm summer thunderstorms in southeastern China and cool, windy frontal systems on the Great Plains of Oklahoma. The data used for the study was collected by different DOE Atmospheric Radiation Measurement facilities.

The simulations had a resolution that was high enough to allow the team to see the clouds develop. The researchers then varied conditions such as wind speed and air pollution.

Source: Science Daily

BORNEO'S SURPRISE

New Borneo frog found

This photo was taken in 2010.

A Malaysian researcher known for finding new amphibian species said Friday his team had discovered at least one new species of frog in studies he said highlight Borneo's rich biodiversity.

Indraneil Das of the Universiti Malaysia Sarawak said the brown frog is just 4-5 centimetres (1.6-2.0 inches) long and makes a distinctive high-pitched chirp.

His team discovered the frog during an expedition to the rainforests of Mount Singai in the Malaysian state of Sarawak on Borneo island in September 2010. They later found another of the same species in nearby Kubah National Park.

Ascertaining whether a species is new is a lengthy scientific process and his discovery remains to be peer-reviewed, he said.

"We heard a call we hadn't heard before. It called from under the leaf litter. That's probably why no one saw it before," Das told AFP.

"It's the call that is very distinctive. It was high-pitched, loud and repeated."

Das said his team had also found several other species of frog that could be previously unknown and was currently investigating them.

He now hopes to publish his findings to draw attention to Borneo's amazing biodiversity and help promote conservation efforts of its rainforests, currently threatened by logging and other development.

Source: Yahaoo news

EXPLOSIVE HISTORY

Sumatra volcanoes back

THE oft-disaster-battered island of Sumatra may have yet another threat to add to the roster of natural phenomena that afflict the Indonesian island: colossal volcanic eruptions.

Although Sumatra residents are likely well-acquainted with the string of volcanoes that line the Indian Ocean island's western coastline, new research has revealed that some of these volcanoes are capable of far more violence than once thought.

"Our study found some of the first evidence that the region has a much more explosive history than perhaps has been appreciated," said Oregon State University's (OSU) Morgan Salisbury, lead author of research recently published in the Journal of Volcanology and Geothermal Research.

"Sumatra has a number of active and potentially explosive volcanoes, and many show evidence of recent activity," Salisbury said in a statement. However, he added, most of the eruptions are small, so little attention has been paid to the potential for a catastrophic eruption.

In 2007, OSU professor Chris Goldfinger led an expedition to Sumatra to dig up evidence of earthquakes that had rocked the region in the past. During the field work, the OSU team, along with Indonesian colleagues, stumbled upon unmistakable evidence of volcanic ash and began conducting a parallel investigation into the region's volcanic history.

The researchers unearthed the signatures of six major volcanic eruptions that hit Sumatra over the past 35,000 years. Most equaled or surpassed the explosive intensity of Mount St. Helens' deadly 1980 eruption.

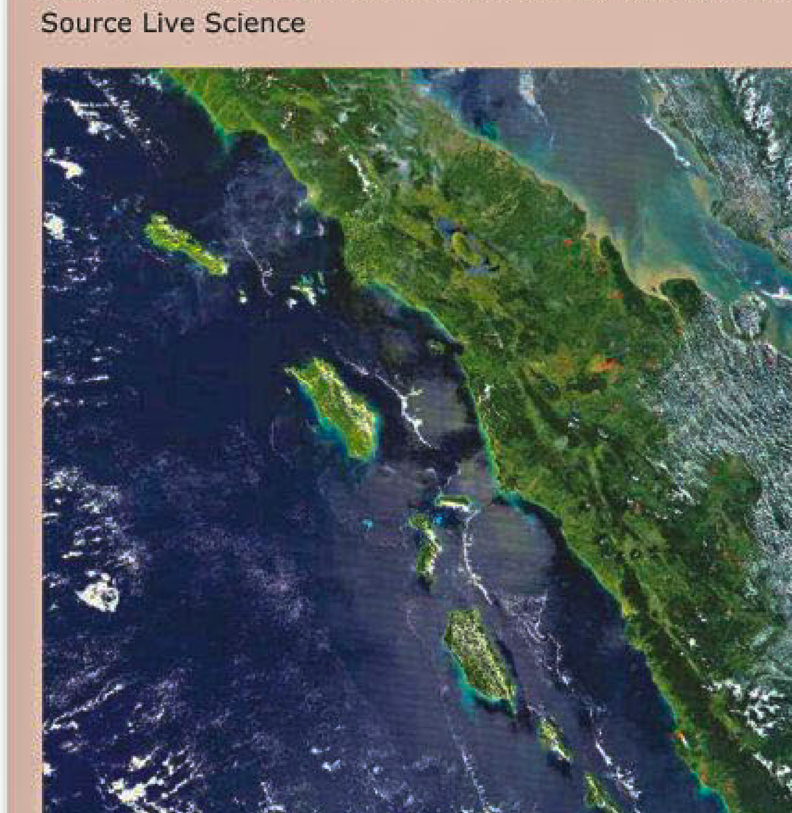
Some of the eruptions dumped ash as far as 185 miles (300 kilometers) away.

Sumatra has more than 30 potentially active volcanoes. And although the mountains do erupt, occasionally belching forth ash and gas, Goldfinger said, residents may not be aware of the potential for catastrophic violence that lurks within the peaks.

In 2004, the Indian Ocean island was devastated by an earthquake and an ensuing tsunami that killed more than 200,000 people around the world.

"Prior to 2004, the risk from a major earthquake was not widely appreciated except, perhaps, in some of the more rural areas," Goldfinger said in a statement. "And earthquakes happen more frequently than major volcanic eruptions."

Source Live Science



Sumatra, Earth's sixth-largest island, spied from space.

BIRD-FRIENDLY FOREST

Better bird nesting saves ecosystem

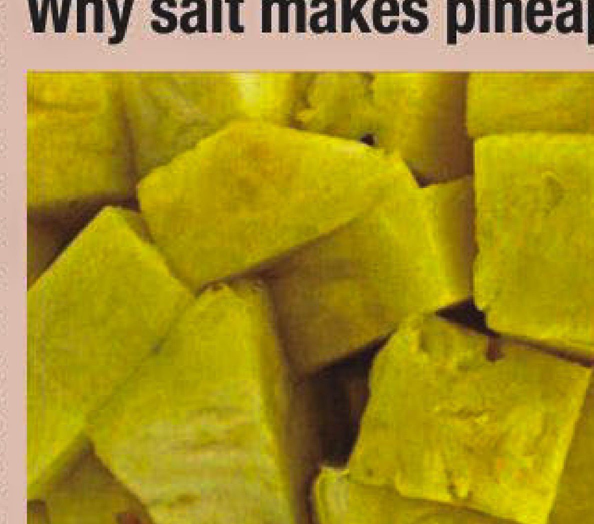
By following a pinball cascade of ecological consequences, researchers have traced the far-flung influences of preserving bird-friendly native forests versus replacing those forests with coconut palms on the Pacific atoll of Palmyra.

Red-footed boobies, black noddies and other seabirds that feast on fish nest in the islands' sturdy, many-branched native trees, says ecologist Douglas McCauley of the University of California, Berkeley. The birds tend to avoid the branch-poor, bendy coconut palms that were planted when people reached the far-flung atoll.

Source: Science News

DID YOU KNOW?

Why salt makes pineapple sweeter?



When the sodium chloride dissolves into the pineapple it will break apart into sodium and chloride ions. The sodium ion will then react with the malic and citric acids present in the pineapple to form neutral sodium salts. Acids normally have a tart or sour taste but when they are converted into neutral compounds they lose this sourness, and so the pineapple tastes sweeter. Source