

Skin mucus of South Indian frog kills flu virus

Scientists have discovered a flu-fighting compound in the skin mucus secreted by a colorful South Indian frog species.

Emory University School of Medicine coaxed the skin slime from frogs by shocking *Hydrophylax bahuvistara* specimens with a small jolt of electricity, UPI reported.



The South Indian frog *Hydrophylax bahuvistara* secretes skin mucus boasting a molecule with antiviral properties. UPI

In the lab, researchers isolated molecules from the secretion and tested them on human blood cells infected with various flu virus strains.

One of the molecules, urumin, successfully killed several viral strains, as well as a number of harmful microbes.

The research — detailed in the journal *Immunity* — showed the molecule attacks hemagglutinin, the glycoprotein that binds the virus to cells. Other antiviral medications attack different parts of the virus.

Unlike other peptides with antiviral properties, urumin is not toxic to human cells and concentrates its destructive forces on pathogens.

It's likely the urumin has capabilities beyond fighting the flu, as frogs aren't vulnerable to the flu.

Lead researcher Joshy Jacob said, "The frogs secrete this peptide almost certainly to combat some pathogen in [their] niche."

"The flu virus most likely shares a common motif with whatever the peptide is targeted to."

In lab tests, scientists found a small dose of urumin, delivered through the nose, protected unvaccinated mice against several flu strains.

Researchers are now working on developing urumin into a medicine that remains stable in the human body.

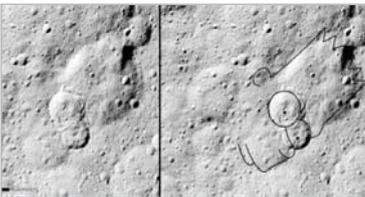
Scientists are also searching for frog-derived peptides that could be used to combat other pathogens like the Zika virus.

Ceres' landslides reveal patches of hidden ice

The evidence of water ice on Ceres continues to mount. Scientists said newly discovered landslides on the dwarf planet offer further proof that significant amounts of ice are hiding just beneath Ceres' surface.

Using images captured by NASA's Dawn spacecraft, researchers at the Georgia Institute of Technology identified three types of landslides on Ceres — the solar system's only asteroid classified as a dwarf planet, UPI wrote.

Type I landslides are found among Ceres' high-altitude terrain. They're large, round and resemble icy landslides found in the Arctic.



UPI

Type II landslides are thinner, longer and populate Ceres' mid-latitudes. They're the most common type of landslide found on Ceres.

Type III are found along the edges of low-altitude impact craters. They're triggered when impacts melt subsurface ice.

Lead researcher Britney Schmidt, an assistant professor at Georgia Tech's School of Earth and Atmospheric Sciences, said, "Landslides cover more area in the poles than at the equator, but most surface processes generally don't care about latitude."

"That's one reason why we think it's ice affecting the flow processes. There's no other good way to explain why the poles have huge, thick landslides; mid-latitudes have a mixture of sheeted and thick landslides; and low latitudes have just a few."

Researchers found a surprisingly large number of landslides on Ceres' surface.

Nearly a third of all surveyed craters wider than six miles (9.6km) were accompanied by a landslide. The abundance of landslides suggested ice makes up between 10 and 50 percent of Ceres' upper layers.

Researchers said their revelations — detailed in the journal *Nature Geoscience* — were made possible by comparing Ceres' geologic features to those found on Earth.

Schmidt said, "It's just kind of fun that we see features on this small planet that remind us of those on the big planets, like Earth and Mars. It seems more and more that Ceres is our innermost icy world."

Iran ready to cooperate with Italy in all scientific fields

Science Desk

Iran is ready to cooperate with Italy in all scientific fields, said Science, Research and Technology Minister Mohammad Farhadi.

Speaking at the first joint Iran-Italy science, technology and innovation gathering at Shahid Beheshti University in Tehran on Wednesday, the minister recalled that a memorandum of understanding was signed by Iran and Italy on scientific cooperation in September 2015.

Joint scientific committees were formed, resulting in university ties between Iran and Italy for boosting scientific cooperation, he added.

Farhadi continued: "We need to gain experience from other countries on links between industry and university, mass production of research products and creating knowledge-based jobs."

There should be no obstacle to collaboration between scientists of various countries, he said, adding "We hope that collaboration with Italy will lead to cooperation in the fields of scientific parks and support funds of the two nations."

He said the second gathering would be held in Italy.

Also, Italian Minister of Education



Iran's Science, Research and Technology Minister Mohammad Farhadi

mehrnews.com

Valeria Fedeli said currently 112 cooperation agreements have been signed between Iranian and Italian universities.

She added that a memorandum of

understanding was signed between Tehran University and one of Italian universities on PhD courses in ancient languages in 2014.

The Italian minister declared her

country's readiness to offer scholarships to Iranian students.

In conclusion, a joint statement was signed between Farhadi and Fedeli for further scientific cooperation.

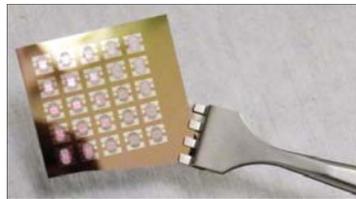
Harnessing heat to power computers

One of the biggest problems with computers, dating to the invention of the first one, has been finding ways to keep them cool so that they don't overheat or shut down.

Instead of combating the heat, two University of Nebraska-Lincoln engineers have embraced it as an alternative energy source that would allow computing at ultra-high temperatures, according to sciencedaily.com.

Sidy Ndao, assistant professor of mechanical and materials engineering, said his research group's development of a nano-thermal-mechanical device, or thermal diode, came after flipping around the question of how to better cool computers.

Ndao said, "If you think about it, whatever you do with electricity you should (also) be able to do with heat, because they are similar in many ways.



Sidy Ndao and Mahmoud Elzouka, University of Nebraska-Lincoln College of Engineering, developed this thermal diode that may allow computers to use heat as an alternate energy source.

"In principle, they are both energy carriers. If you could control heat, you could use it to do computing and avoid the problem of overheating."

A paper Ndao coauthored with Mahmoud Elzouka, a graduate student in mechanical and materials engineering,

was published in the March edition of *Scientific Reports*. In it, they documented their device working in temperatures that approached 332°C.

Ndao said he expects the device could eventually work in heat as extreme as 704°C, which could have major implications in

many industries.

Ndao added, "We are basically creating a thermal computer. It could be used in space exploration, for exploring the core of the earth, for oil drilling, (for) many applications. It could allow us to do calculations and process data in real time in places where we haven't been able to do so before."

"By taking advantage of an energy source that has long been overlooked, the thermal diode could also help limit the amount of energy that gets wasted."

"It is said now that nearly 60 percent of the energy produced for consumption in the US is wasted in heat. If you could harness this heat and use it for energy in these devices, you could obviously cut down on waste and the cost of energy."

"The next step is making the device more efficient and

making a physical computer that could work in the highest of temperatures."

Though the researchers have filed for a patent, Elzouka said there is still work to be done to improve the diode and its performance.

"If we can achieve high efficiency, show that we can do computations and run a logic system experimentally, then we can have a proof-of-concept. (That) is when we can think about the future."

Yet Ndao has even bigger ambitions for his group's research.

He said, "We want to create the world's first thermal computer. Hopefully one day, it will be used to unlock the mysteries of outer space, explore and harvest our own planet's deep-beneath-the-surface geology, and harness waste heat for more efficient-energy utilization."

Study: With beetroot juice before exercise, aging brains look younger

Drinking a beetroot juice supplement before working out makes the brain of older adults perform more efficiently, mirroring the operations of a younger brain, according to a new study by scientists at Wake Forest University.

Quoting W. Jack Rejeski, study coauthor, *phys.org* reported, "We knew, going in, that a number of studies had shown that exercise has positive effects on the brain."

"But what we showed in this brief training study of hypertensive older adults was that, as compared to exercise alone, adding a beet root juice supplement to exercise resulted in brain connectivity that closely resembles what you see in younger adults."

While continued work in this area is needed to replicate and extend these exciting findings, they do suggest that what we eat as we age could be critically important to the maintenance of our brain health and functional independence.

Rejeski is the director of the Behavioral Medicine Laboratory in the Department of Health and Exercise Science.

The study, "Beet Root Juice: An Ergogenic Aid for Exercise and the Aging Brain," was published in the peer-reviewed *Journals of Gerontology: Medical Sciences*.

One of his former undergraduate students, Meredith



phys.org

Petrie, was the lead author on the paper.

Rejeski said, "This is the first experiment to test the combined effects of exercise and beetroot juice on functional brain networks in the motor cortex and secondary connections between the motor cortex and the insula, which support mobility."

The study included 26 men and women age 55 and older who did not exercise, had high blood pressure, and took no more than two medications for high blood pressure.

Three times a week for six weeks, they drank a beetroot juice supplement called "Beet-It Sport Shot" one

hour before a moderately intense, 50-minute walk on a treadmill.

Half the participants received Beet-It containing 560mg of nitrate; the others received a placebo Beet-It with very little nitrate.

Beets contain a high level of dietary nitrate, which is converted to nitrite and then nitric oxide (NO) when consumed. NO increases blood flow in the body, and multiple studies have shown it can improve exercise performance in people of various ages.

Rejeski added, "Nitric oxide is a really powerful molecule. It goes to the areas of the body which are hypoxic, or needing oxygen, and the brain is a heavy feeder of oxygen in your body."

When you exercise, the brain's somatomotor cortex, which processes information from the muscles, sorts out the cues coming in from the body. Exercise should strengthen the somatomotor cortex.

So, combining beetroot juice with exercise delivers even more oxygen to the brain and creates an excellent environment for strengthening the somatomotor cortex.

Post-exercise analysis showed that, although the study groups had similar levels of nitrate and nitrite in the blood before drinking the juice, the beetroot juice group had much higher levels of nitrate and nitrite than the placebo group after exercise.