

News in Brief

Flies' Eyes Could Enhance Robot Vision



Robots with flies' eyes could take advantage of the insect's vision system to better locate the edges and boundaries of objects.

This ability could help robots perform a variety of tasks more quickly and accurately than if they were using traditional sensors, Physorh wrote.

Researchers from the Naval Air Warfare Center in China Lake, California, and the University of Wyoming have developed a fiber optic sensor inspired by the compound eye of the common housefly, *Musca domestica*.

One of the biggest advantages of the design is that it can quickly locate edges and boundaries of images. Machines such as unmanned vehicles, guided missiles, and high-speed industrial inspection robots might take advantage of this ability to locate tiny, moving objects with high precision.

In a recent issue of *Bioinspiration & Biomimetics*, researchers D. Riley, et al, describe how flies' vision systems are uniquely geared toward locating small objects with high precision. In fact, flies possess a visual precision beyond the resolution limit—a property called hyperacuity.

Cow's Milk May Increase Diabetes Risk



Does drinking infant formula made of cow's milk increase the risk of developing type 1 diabetes?

According to *NewScientist*, in 1993, a Finnish study found that consuming dairy products early on correlated with diabetes risk. One explanation is that beta-lactoglobulin, a protein in cow's, but not human, milk prompts babies to make antibodies that also attack glycodeilin, a protein vital for training the immune system. The mistuned immune system then mistakenly destroys insulin-producing pancreatic cells, leading to type 1 diabetes.

Now Marcia Goldfarb of the company Anatek-EP in Portland, Maine, has found that five children with type 1 diabetes, who were fed cow's-milk formula, all have antibodies to beta-lactoglobulin.

Diabetes researchers are cautious, though. "It's fascinating, but needs more backup data," says Mikael Knip of the Hospital for Children and Adolescents in Helsinki, Finland.

Mystery of Mercury's Magnetic Field Solved



Flakes of iron snow could be falling inside the planet Mercury, according to a new experiment. This hot metal snowfall might help generate Mercury's puzzling magnetic field.

Researchers in the US have attempted to recreate the likely conditions within Mercury's liquid outer core, which is thought to be a mixture of iron and sulfur, *NewScientist* reported.

They used an arrangement of magnesium-oxide blocks, called a multi-anvil cell, to squeeze their iron and sulfur mixture to immense pressures, at temperatures above 2000 °Celsius. Iron crystals formed in the mixture.

"We saw iron crystals gathered at the bottom of the sample, while the liquid phase stayed on top," says team member Jie Li of the University of Illinois in Urbana-Champaign. Mercury's iron snow should form simple cubic crystals, rather than the intricate hexagonal patterns of water-ice snowflakes on Earth. The detailed weather forecast for Mercury's interior depends on exactly how much sulfur is added to the mix.

Ancient Sea Creatures Dressed Up in Diamonds



A glimpse into prehistoric fashion has revealed that ancient sea creatures liked to doll themselves up with diamonds imported from outer space.

Scientists have discovered that the organisms coated themselves with tiny diamonds made from carbon brought to Earth on the asteroid which may have wiped out dinosaurs.

Fossils of the single-celled creatures were discovered in the Umbria-Marche basin of eastern Italy, *Telegraph* said.

The amoeba-like creatures made their own armor by sticking together sediment grains from the ocean floor.

Researchers collected the fossils from rock samples just above and below the sediment layer created by the massive asteroid impact 65 million years ago.

When the asteroid smashed into the Earth off the coast of Mexico the extreme pressure and temperatures generated manufactured diamonds.

Some of the tiny jewels were formed by crushing and heating Earthly graphite rock. But others were truly extraterrestrial, being made from carbon carried in the asteroid. The scientists found evidence of these microscopic diamonds in the fossils.

Why Didn't Earth Freeze?

Billions of years ago, a weaker sun should have made the Earth a chilly place—so why was it balmy instead?

The sun that shone on the early Earth was around 25 percent dimmer than today, so atmospheric temperatures should have been colder by around 25 °C. But ancient rocks show that liquid water existed, proving that temperatures must have been above freezing, *NewScientist* said.

This can be explained if greenhouse gases acted as an insulator—but modeling has shown that carbon dioxide in the atmosphere would need to have had an implausibly high partial pressure of over 50 millibars to trap the heat.

Now Philip von Paris of the German Aerospace Center in Berlin and colleagues have built a model that they say better simulates the types, pressures and layering of atmospheric gases at that time.

This showed that the atmosphere itself was a better insulator than we thought, and CO₂ with a partial pressure of only 2.9 millibars would have kept temperatures above freezing between 2 and 2.5 billion years ago. The work will appear in *Planetary and Space Science*.

Unfortunately, this still doesn't resolve the paradox between 2.5 and 4.6 billion years ago, when the sun was even weaker, and not everyone is convinced the researchers are right.

Safety Seats Should Be Centered in Back Seat

Positioning child safety seats in the center of the back seat could cut infants' and toddlers' injury risks by nearly half, a new study suggests.

In a study of car crash data from 16 US states, researchers found that children younger than 3 years old were 43 percent less likely to be injured when their seat was fastened in the center of the back seat rather than on one of the side seats, *Reuters* said.

Experts already recommend that parents position car seats in the center of the rear seat, and the current findings bolster that advice, according to Michael J. Kallan and colleagues at the University of Pennsylvania and Children's Hospital of Philadelphia.

Unfortunately, only 28 percent of children in their study were sitting in that position at the time of the car accident, the researchers report in the journal *Pediatrics*.

There are obstacles to placing a car seat in the center position, Kallan's team acknowledges.

It is physically harder to strap a child, especially a heavier child, into a center-positioned seat. A centered child seat can also make it difficult for other people to sit in the rear of the car. But based on the current findings, the researchers write, this center position is the safest place for babies and toddlers to ride.

Vegetables Protect Against Gastric Ulcers



Nitrate-rich vegetables such as spinach, lettuce, radishes and beetroot have a positive effect on the stomach by activating the mucous membranes' own protective mechanisms.

Fruits and vegetables that are rich in nitrates protect the stomach from damage.

According to *ScienceDaily*, this takes place through conversion of nitrates into nitrites by the bacteria in the oral cavity and subsequent transformation into biologically active nitric oxide in the stomach.

The Swedish researcher Joel Petersson has described the process, which also means that antibacterial mouthwashes can be harmful for the stomach.

"Nitrates in food have long been erroneously linked to an increased risk of cancer," says Joel Petersson of Uppsala University's Department of Medical Cell Biology.

He instead thinks that nitrate-rich vegetables such as spinach, lettuce, radishes and beetroot have a positive effect on the stomach by activating the mucous membranes' own protective mechanisms, thus reducing the risk of problems such as gastric ulcers.

In the body the blood circulation transports nitrates to the salivary glands, where they are concentrated. When we have eaten nitrate-rich food our saliva thus contains large amounts of nitrates, which the bacteria of the oral cavity partially convert into nitrites. When we swallow the nitrites they come into contact with acid gastric juice, and are then converted into the biologically active substance nitric oxide. This results in our developing high levels of nitric oxide in the stomach after eating vegetables.

It has long been known that nitric oxide is produced by various en-

zymes in the human body, but the fact that nitric oxide can also be formed in the stomach from nitrites in the saliva, entirely without the involvement of enzymes, is a relatively new discovery.

Researchers still have very little idea of how the stomach is affected by these high levels of nitric oxide. Joel Petersson's thesis shows that the nitric oxide that is formed in the stomach stimulates the protective mechanisms of the mucous membrane—because the stomach constantly has to protect itself so as not to be broken down together with the food ingested.

Two such important defence mechanisms are the stomach's constant renewal of the mucous layer that covers the mucous membrane and its maintenance of a stable blood flow in the mucous membrane.

The nitric oxide widens the blood vessels in the mucous membrane, thus increasing the blood flow and regulating elimination of the important mucus. Together, these factors lead to a more resistant mucous membrane.

Using animal models Joel Petersson and his colleagues have shown that nitrate additives in food protect against both gastric ulcers and the minor damage that often occurs in the gastrointestinal tract as a result of ingestion of anti-inflammatory drugs.

"These sorts of drugs are very common in the event of pain and inflammation. They have the major disadvantage of causing a large number of serious side-effects in the form of bleeding and ulcers in the gastrointestinal tract. With the aid of a nitrate-rich diet you can thus avoid such damage," he explains.

Private Tuition

High school & undergraduate maths and physics taught by a former university lecturer from England.

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