Earth's Origin Gaseous

Life on Earth emerged out of thin air, scientists now say.

By mimicking in a lab the gases that could have been present on early Earth, researchers have concluded that a layer of haze blanketing our planet produced organic material that helped living organisms develop, NaturalScience wrote.

The haze, they found, resembles that of Saturn's moon Titan, demonstrating for the first time a long-held notion that early Earth and this mysterious moon supported similar atmospheric conditions.

When sunlight hits an atmosphere of methane and nitrogen, the ultraviolet light triggers chemical reactions that result in the formation of aerosol particles. These particles accumulate to generate a thick misty layer.

In the lab, scientists exposed methane gas to ultraviolet light, conditions similar to the hazy skies of Titan, as observed by the Huygens probe on Titan's atmosphere last year during the NASA-European Space Agency's Cassini mission.

They then added carbon dioxide gas to see if early Earth conditions could produce a similar haze.

The haze spreading over early Earth could have supplied the planet with more than 100 million tons of organic material annually. (Google Photo)

"It turns out that organic haze can form over a wide range of methane and carbon dioxide concentrations," said study co-author Margaret Tolbert of the University of Colorado at Boulder. "This means that hazy conditions could have been present for many millions or even a billion years on Earth while life was evolving."

The haze spreading over early Earth could have supplied the planet with more than 100 million tons of organic material annually, the researchers note this week's online early edition of the Proceedings of the National Academy of Sciences.

"As these particles settled out of the skies, they would have provided a global source of food for living organisms," said study co-author Melissa Trainer, also from the University of Colorado at Boulder.

The researchers believe that the vapory layer also protected the young Earth from harmful radiation and helped regulate climate.

Scientists still do not know exactly what triggered the onset of biology, however.

Nimble New Robot Safe and Speedy

Like the vast majority of assembly line robots, Katana is a moving arm. But that's where the resemblance ends. Unlike the hulking robotic arms used on assembly lines, Katana is designed to work next to humans.

Industrial robots often tower over their masters and move at breakneck speeds, which is why factories surround them with cages to keep workers away. When factory robots do get tangled up, built-in sensors help them disengage automatically, LiveScience reported.

This keeps tightly sprung robots from abruptly unwinding on workers trying to free them.

Katana, on the other hand, is puny. It has a 20-inch reach, weighs only 6 to 9 pounds, and can fit inside most high school backpacks. It struggles to lift more than 1 pound. A child could grasp its small grippers and arm wrestle it to the table.

According to Werner Klecka of Swiss developer Neuronics AG, Katana is the European Union's first robot certified as inherently safe. Neuronics designed the small robotic arm to work with people the same way a nurse works with a surgeon.

That means changing conventional robot physiognomy. Like more powerful industrial robots, Katana uses several small motors for six-axis motion (up-down, left-right, and diagonally back-and-forth). But unlike larger robots, which need massive power supplies, it uses a laptop computer-style power supply that plugs into a wall socket.

Katana is also slow. It tops out at 3.3 feet per second. It would take 27 seconds to move the same 90 feet that New York Met Jose Reyes covers in 3 seconds when he steals second base. Unlike Reyes, Katana stops automatically when it hits anything solid.

Slow and weak does not mean incapable. Katana is designed for precision work. With one conductivity, four force, and nine infrared sensors, its gripper is sensitive enough to place objects with 1/250th of an inch accuracy. An optional video camera also lets it recognize shapes.

According to Neuronics, people are using Katana to slide samples under a microscope faster and more precisely than any human ever could. "The robot can move and position the slide faster and better than the inspector," Klecka said.

Katana is the European Union's first robot certified as inherently safe. (Google Photo)

Katana has also been used to place and remove pressure sensors for ultrasonic welding, remove parts from molds, position inspection cameras, and shuttle test tubes in laboratories.

Best of all, Katana does not take a robot expert to set up and operate. Users can move the robot arm where they want it to go manually, and then improve their rough positioning using control software. The robot comes with neuronal software that actually learns on the job and gradually improves Katana's ability to make decisions.

The cost? About $25,000 including robot, gripper, and software. Yet as Klecka notes, you won't have to spend a dime building a fence to keep workers away.

Humans Left Chimps Behind In Evolution's Playground

Micro-RNA, snippets of RNA that control gene expression, could be what makes the difference between us and chimps, NewScientist reported.

Variation between individuals, in traits ranging from pigment to behavior, is the raw material of evolution. The difference can be down to very subtle changes: the genes involved may code for exactly the same proteins but make them at other places and times. So could micro-RNA be the determining factor?

Micro-RNAs are a mere 22 nucleotides long and block the messenger RNA that translates DNA into protein. This allows them to fine-tune gene expression. Discovered only a few years ago, micro-RNA has been shown to determine what cell types form, and, for example, whether sheep become muscular or puny.

Now, researchers at the Hubrecht Laboratory in Utrecht, the Netherlands, have combed painstakingly through the RNA in human and chimp brains, and found 447 new micro-RNAs, more than doubling the number discovered so far. Some were expressed very rarely.

"The brain has 10,000 cell types," says team member Edwin Cuppen. "Perhaps that is because of all these micro-RNAs." Many were unique to chimps and humans, and some only to humans. So even though we share most of our DNA with chimps, small genetic changes that fine-tune its expression might account for the radical differences in our brains. "This is the playground of evolution," says Cuppen.

Green Plants Share Bacterial Toxin

A toxin that can make bacterial infections turn deadly is also found in higher plants, researchers at UC Davis, the Marine Biology Laboratory at Woods Hole, Mass. and the University of Nebraska have found. Lipid A, the core of endotoxin, is located in the chloroplasts, structures that carry out photosynthesis within plant cells, EureKalert reported.

The lipid A in plant cells is evidently not toxic. The human intestine contains billions of Gram-negative bacteria, but lipid A does not become a problem unless bacteria invade the bloodstream.

"We've no idea what it's doing, but it must be something important because it's been retained for a billion years of evolution of plant chloroplasts," said Peter Armstrong, professor of molecular and cellular biology at UC Davis and senior author on the paper.

The lipid A core of bacterial endotoxin activates the immune system and can cause septic shock, a major cause of death from infection. (Yahoo Photo)

Endotoxin is better known to bacteriologists and physicians as part of the outer coat of Gram-negative bacteria such as E. coli. The lipid A core of bacterial endotoxin activates the immune system and can cause septic shock, a major cause of death from infection. It is distinct from the toxin found in E. coli strain 0157, responsible for the recent outbreak of food poisoning tied to spinach.

Bacteria were thought to be the only source of lipid A. However, R.L. Pardy, professor at the University of Nebraska-Lincoln, recently found a similar molecule in Chlorella, a single-celled relative of more advanced plants. Armstrong's lab at UC Davis developed methods to visualize lipid A in cells, using a protein from the immune system of the horseshoe crab, and the researchers began collaborating.

"It was one of those celebratory moments, when I looked in the microscope and saw these gloriously stained algal cells," Armstrong said, describing their first experiment. The group has now found lipid A in chloroplasts of garden pea plants as well as green algae, and Armstrong suspects that it is present in all higher plants with chloroplasts.

That idea is supported by genetics. Sequencing of the Arabidopsis genome--the first higher plant to have its entire DNA sequence read--revealed that the common lab plant has all the biochemical machinery to make lipid A, an observation that had gone largely unnoticed until now. Chloroplasts themselves are thought to have evolved from cyanobacteria, independent photosynthetic bacteria that took up residence in ancestral plant cells.

Other authors on the paper, in addition to Armstrong and Pardy, are postgraduate researcher Margaret Armstrong; Steven Theg, professor of plant biology, and graduate student Nikolai Braun at UC Davis; and Norman Wainwright at the Woods Hole Marine Biology Laboratory.

Jetlag Can Damage Health

Jetlag--or working irregular shifts--damages health, a US study of elderly mice has suggested.

Animals who were subjected to changes like those experienced by humans with jetlag or who work unusual shift patterns, died earlier than others.

Writing in Current Biology, the researchers say it raises concerns for humans affected by time disruption, BBC said.

But a UK expert said, while the study was interesting, frequent-fliers and shift-workers should not panic.

The body's physiological reaction to the circadian rhythm--the natural cycle of light and dark--is thought to be complex, but the effects on the body are not fully understood.

The team, from the University of Virginia, compared how old and young mice were affected by changes to the usual balance of "day" and "night".

In one regimen, the mice's clocks were "put forward" by six hours once a week--the equivalent of the time difference between the UK and Dhaka in Bangladesh--so they had less time in the dark.

Other mice experienced a six-hour backward shift--nd therefore more time in the dark--which would equate to the difference between the UK and Chicago.

Separate groups of young and old mice had normal cycles.

Younger animals appeared unaffected by alterations to their schedule.

But only 47% of the older mice whose "nights" were shortened survived, compared with 68% of those whose nocturnal time was lengthened and 83% of those who remained on a normal schedule.

Chronic stress--which has been cited as a mechanism for causing ill-health in those with disrupted schedules and which can be measured through daily corticosterone levels - did not increase in any of the old mice.

The researchers suggest the cause of increased mortality in the mice could be linked to sleep deprivation or immune-system disruption.

They also suggest that age may alter how the circadian system works, or that their elderly mice's general frailty might mean they are less able to tolerate changes in light cycles.