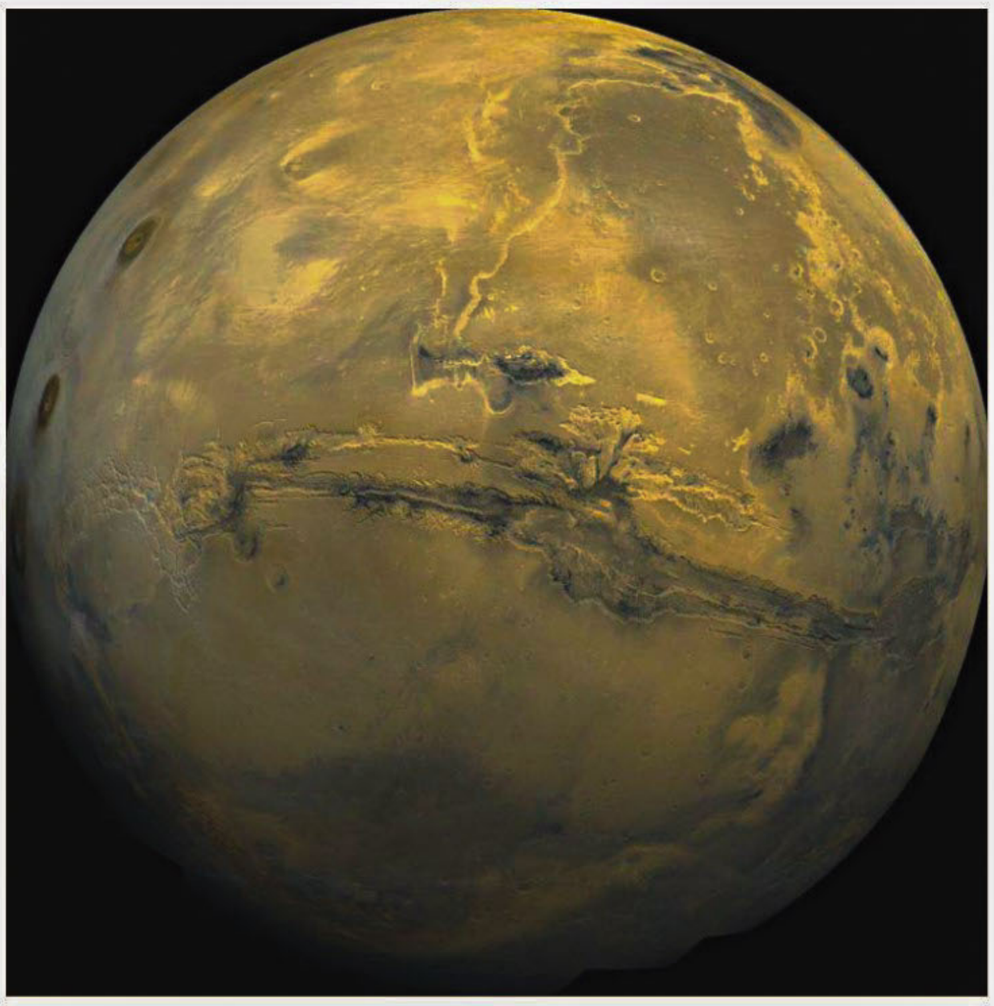
Mars an unlikely place for life?

MARS may have been arid for more than 600 million years, making it too hostile for any life to survive on the planet's surface, according to researchers who have been carrying out the painstaking task of analysing individual particles of Martian soil. Dr Tom Pike, from Imperial College London, will discuss the team's analysis at a European Space Agency (ESA) meeting on 7 February 2012.

The researchers have spent three years analysing data on Martian soil that was collected during the 2008 NASA Phoenix mission to Mars. Phoenix touched down in the northern arctic region of the planet to search for signs that it was habitable and to analyse ice and soil on the surface.

The results of the soil analysis at the Phoenix site suggest the surface of Mars has been arid for hundreds of millions of years, despite the presence of ice and the fact that previous research has shown that Mars may have had a warmer and wetter period in its earlier history more than three billion years ago. The team also estimated that the soil on Mars had been exposed to liquid water for at most 5,000 years since its formation billions of years ago. They also found that Martian and Moon soil is being formed under the same extremely dry conditions.

Satellite images and previous studies have proven that the soil on Mars is uniform across the planet, which suggests that the results from the team's analysis could be applied to all of Mars. This implies that liquid water has wbeen on the surface of Mars for far too short a time for life to maintain a foothold on the surface.



Mars may have been arid for more than 600 million years, making it too hostile for any life to survive on the planet's surface, according to researchers who have been carrying out the painstaking task of analysing individual particles of Martian soil.

Dr Pike, from the Department of Electrical and Electronic Engineering at Imperial, who is lead author on the study published in the journal Geophysical Research Letters, explains:

"We found that even though there is an abundance of ice, Mars has been experiencing a super-drought that may well have lasted hundreds of millions of years. We think the Mars we know today contrasts sharply with its earlier history, which had warmer and wetter periods and which may have been more suited to life. Future NASA and ESA missions that are planned for Mars will have to dig deeper to search for evidence of life, which may still be taking refuge underground."

During the Phoenix mission, Dr Pike and his research group formed one of 24 teams based at mission control in the University of Arizona in the USA, operating part of the spacecraft's onboard laboratories. They analysed soil samples dug up by a robot arm, using an optical microscope to produce images of larger sand-sized particles, and an atomic-force microscope to produce 3D images of the surface of particles as small as 100 microns across. Since the end of the mission, the team has been cataloguing individual particle sizes to understand more about the history of the Martian soil.

In the study, the researchers looked for the microscopic clay particles that are formed when rock is broken down by water. Such particles are an important marker of contact between liquid water and the soil, forming a distinct population in the soil. The team found no such marker. They calculated that even if the few particles they saw in this size range were in fact clay, they made up less than 0.1 percent of the total proportion of the soil in the samples. On Earth, clays can make up to 50 percent or more of the soil content, so such a small proportion in the Martian samples suggests that the soil has had a very arid history.

They estimated that the soil they were analysing had only been exposed to liquid water for a maximum of 5,000 years by comparing their data with the slowest rate that clays could form on Earth.

The team found further evidence to support the idea that Martian soil has been largely dry throughout its history by comparing soil data from Mars, Earth and the Moon. The researchers deduced that the soil was being formed in a similar way on Mars and the Moon because they were able to match the distribution of soil particle sizes. On Mars, the team inferred that physical weathering by the wind as well as meteorites breaks down the soil into smaller particles. On the Moon, meteorite impacts break down rocks into soil, as there is no liquid water or atmosphere to wear down the particles.

This research has received support from the UK Science and Technology Facilities Council; the Danish Research Agency; the Wolfermann-Nägeli Foundation, Switzerland; the Space Center at EPFL, Switzerland; the Swiss National Science Foundation; and the National Aeronautics and Space Administration.

Source: Science Daily

BIG ERUPTIONS

Big volcanoes wake up fast

As seen from space, the caldera of Santorini, Greece, appears as several islands surrounding the now-drowned center blasted out in a mammoth eruption around 1600 B.C.

LONG-SLUMBERING volcanoes can jolt to life faster than students drinking Red Bull, a new study suggests.

Studies of millennia-old rocks that erupted at Santorini, Greece, show that the chemical composition of its magma changed just a few decades before the volcano blew its top around 1600 B.C. That blast came after 18,000 years of relative calm.

"All this happens at a very late stage relative to this long period of repose," says Tim Druitt, a volcanologist at the Blaise Pascal University in Clermont-Ferrand, France. "There's kind of a rapid wake up."

Druitt and his colleagues describe the awakening in the Feb. 2 Nature.

Santorini's Bronze Age eruption is one of the most famous in history. When the volcano blew, it sent a tsunami racing across the eastern Mediterranean that wiped out dozens of coastal towns. So much magma erupted that Santorini collapsed to form a lagoon. (Some scientists argue this is the source of the legend of Atlantis.) What was left of the volcano's caldera forms the islands surrounding the lagoon, which is now dotted by a small peak created by more recent volcanic activity.

Source: Science News

ALTER EGO

Dark Matter and Anti-Matter

DEBASHISH CHAKRABARTY

EVERY basic particle in the universe appears to have an associate particle called its anti-particle that shares several of the same uniqueness, but many other uniqueness are the opposite of those for the particle. For example, the electron has as its antiparticle the anti-electron. The electron and the anti-electron have exactly the equal masses, but they have exactly opposite electrical charges.

The common substance just about us appears to be "matter", but we usually produce antimatter in small quantities in high energy accelerator experiments. When a matter particle meets its antimatter particle they destroy each other completely, releasing the equivalent of their rest masses in the form of pure energy (according to the Einstein E=mc^2 relation). For example, when an electron meets an anti-electron, the two annihilate and produce a burst of light having the energy corresponding to the masses of the two particles.

The mirror unviverse

Because the properties of matter and antimatter parallel each other, we believe that the physics and chemistry of a galaxy made entirely from antimatter would closely parallel that of our our matter galaxy. Thus, is conceivable that life built on antimatter could have evolved at other places in the Universe, just as life based on matter has evolved here. However, we have no evidence thus far for large concentrations of antimatter anywhere in the Universe. Everything that we see so far seems to be matter. If true, this is something of a mystery, because naively there are reasons from fundamental physics to believe that the Universe should have produced about as much matter as antimatter.

Dark matter is the general term for matter that we cannot see to this point with our telescopes, but that we know must be there because we see its gravitational influence on the rest of the Universe. Many different experiments indicate that there is probably 10 times more matter in the Universe than the matter that we see. Thus, dark matter is basically what the Universe is made out of, but we don't yet know what it is!

As one simple example of the evidence for dark matter is the velocity of rotation for spiral galaxies depends on the amount of mass contained in them. The outer parts of our own spiral galaxy, the Milky Way, are rotating much too fast to be consistent with the amount of matter that we can detect; in fact the data indicates that there must be about 10 times as much matter as we can see distributed in some diffuse halo of our galaxy to account for its rotation. The same is true for most other spiral galaxies where the velocities can be measured.

There are various candidates for the dark matter, ranging from ordinary matter that we just can't see because it isn't bright enough to more exotic particles that have yet to be discovered. There are some fairly strong arguments based on the production of the light elements in the Big Bang indicating that the majority of the dark matter cannot be ordinary matter or anti-matter, and thus that the majority of the mass of the Universe is in a form very different from the matter that makes up us and the world around us. If that is true, then the matter that we are made of is but a small impurity compared to the dominant matter in the universe as someone has put it, "not only are we not the center of the Universe, we aren't even made of the right stuff!" The nature of the dark matter is perhaps the most fundamental unsolved problem in modern astronomy.

SAY-IT-ALL LABEL

Printed stickers could monitor food and vaccines

DAVID TALBOT

A plastic temperature-recording sticker that could provide detailed histories of crates of food or bottles of vaccine would be the first to use all-printed electronics componentsincluding memory, logic, and even the battery. The cost per sticker could be only 30 cents or less.

Thin Film Electronics, based in Oslo, Norway, aims to marry the company's printed memory with printed transistors from PARC in Palo Alto, California; a printed temperature sensor from PST Sensors, a spin-off from the University of Cape Town in South Africa; and a printed battery from Imprint Energy, a spin-off from the University of California, Berkeley. The first prototype using all the components is expected later this year.

"There are lots of efforts in academia and research where they play with printing electronics," says Janos Veres, who manages the printed electronics team at PARC. What's new is "somebody trying to do it commercially and figuring out what are the first things you can make with 10 or 20 bits of memory and a simple battery," he says. "We need a library of different building blocks that are made by the same standard manufacturing process to get this ecosystem working."

The envisioned product will be designed to work either with a printed display or a contact readout, and include a battery that can last six to nine months, allowing the sticker to make a continuous record of temperature. Existing temperature sensor stickers that cost just pennies offer a crude measurementusing a chemical reaction to change color when they hit certain thresholds, alerting to possible spoilage.

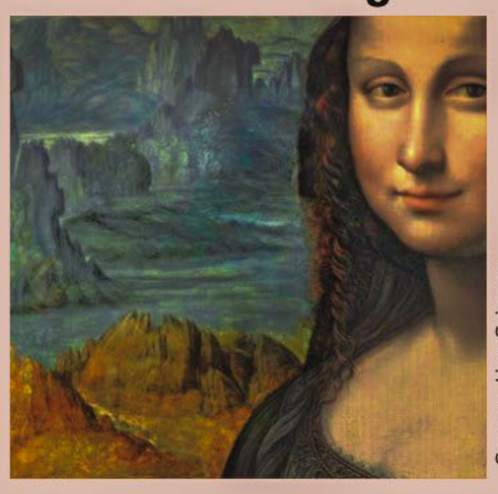
At the higher end, systems that can record exact temperatures over long periods of time, and store this data for either display or retrieval, cost $15 to $25 or more, and are limited to high-value items or pallet-sized shipments.

Jennifer Ernst, a Thin Film Electronics vice president, says the mix of materials, substrates, and printing technologies is still in development. "To the best of my knowledge, it's the first time a set of companies have announced a plan to put a fully integrated system together," she says. If it all works out and the performance is reliable, "we can achieve cost targets that silicon systems just can't touch," she adds.

A temperature-sensitive level

THE SHADOW

Born with the orginal



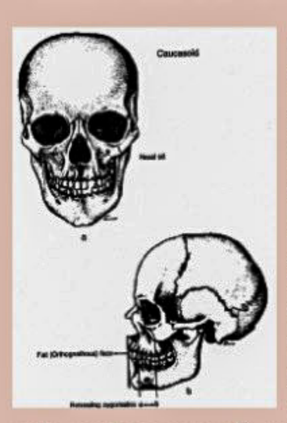
Source: Live Science

A copy of Leonardo da Vinci's "Mona Lisa" was painted by a pupil or follower of the artist at about the same time as the original was created, and is now considered the oldest known copy of the enigmatic piece of work, scientists announced this week.

The painting was previously held in the Spanish royal collections, before it was sent to Madrid in 1819 when the Museo del Prado there was founded. Researchers studying the artwork think it is the painting referred to in 1666 in an inventory of the palace Alcázar in Seville as a female portrait associated with da Vinci. They suspect the copy may have reached Spain in the early part of the 17th century, according to Miguel Falomir Faus, the Prado's curator of Italian Painting up to 1700.

DID YOU KNOW?

What does skull say?



One of the best indicators of race is cranial morphology, or skull shape. Hawaiians, for example, have a characteristic jaw that rocks back and forth if pushed (known as Rocker Jaw). The shape of the skull can also tell investigators a victim's gender. Males have slightly sloping foreheads, whereas females' foreheads are vertical. Details such as these help investigators analyze and identify remains. This information can be used for a variety of purposes, such as gaining insight into the criminal's modus operandi, and to notifying an identified victim's relatives of the unfortunate circumstances.