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Friday 14 January 2011

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You are here: [Home](#) » [Supplements](#) » [Science & Technology](#) » Moments of truth

A decade in science

## Moments of truth

*We look back at the key moments for science (in no particular order) in the decade gone by; from the search for the God particle, to the genome project to finding water on the moon.*

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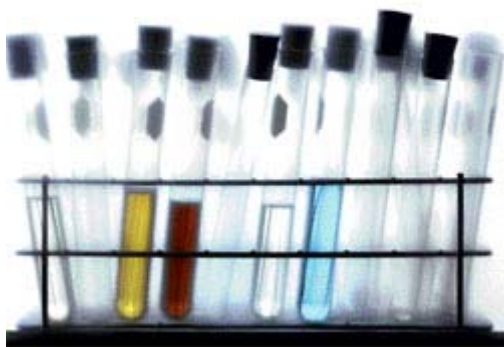


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### Large Hadron Collider:

Scientists are preparing to run the world's largest particle accelerator for an extra year in a bold bid to find the Higgs particle, part of the mechanism that is thought to endow other particles with mass. After 16 years and \$10 billion, on March 30, 2010, the collider finally began its work of smashing subatomic particles.

### Human Genome

In announcing on June 26, 2000, that the first draft of the human genome had been achieved, the then US President Clinton said it would "revolutionise the diagnosis, prevention and treatment of most, if not all, human diseases." Francis Collins, then the director of the genome agency at the National Institutes of Health, said that genetic diagnosis of diseases would be accomplished in 10 years and that treatments would start to roll out perhaps five years after that. The Human Genome Project was started in 1989 with the goal of sequencing, or identifying, all three billion chemical units in the human genetic instruction set, finding the genetic roots of disease and then developing treatments.

### Stem cell research

The field came to life in 1998 when scientists found very versatile cells, stem cells in embryos that could turn into any cell in the body. In 2007, two groups of scientists discovered they did not have to start by plucking stem cells from embryos. Instead, they could turn an already developed cell, like a skin cell, into a stem cell by adding four genes. Then other researchers learned that they did not need to add the genes — they could add instructions from genes instead.

## Water on Mars

More than four years after they were gathered, hard-to-interpret data from the Mars rover Spirit were finally cracked in 2010. They reveal carbonate minerals to be a major component of a rock formation known as Comanche in the Columbia Hills region of the Gusev Crater. "The discovery is significant," says Oded Aharonson, a planetary scientist at the California Institute of Technology in Pasadena who was not directly involved in the find, "because of the intimate connection between the formation of carbonates and persistent liquid water." That connection helps to solidify the view that Mars was once warm, wet and perhaps capable of supporting life.

## Exoplanets

Spectroscopic observations of a distant planet swooping across the face of its sun have given astronomers a first-ever look at the atmosphere of an Earth-like planet lying beyond our Solar System. The new data don't provide a precise list of gaseous constituents, but they do indicate that the atmosphere is not one of cloud-free hydrogen. The planet, dubbed GJ 1214b when it was discovered late 2009, tightly orbits a red-dwarf star about 13 parsecs from Earth. With a mass about 6.5 times that of Earth, it is one of the smallest exoplanets yet discovered.

## Invisibility cloak

If young Harry and friends had not cruised around Hogwarts unseen, hidden by an "invisibility cloak," much of the hype surrounding metamaterials might itself never have seen the light of day. But when, researchers made tentative steps toward what had been considered a theoretical possibility – using an artificially structured "meta" material to manipulate light or other electromagnetic waves in ways not achievable in nature – it did not take more than a clever headline or two to make the connection to the stuff of J K Rowling's wildly popular novels. Great strides have been made in the field of metamaterials, and there are some applications of the concept that may come into use in the next few years.

## Water on the moon

There are oases of water-rich soil that could sustain astronauts on the moon, according to NASA. Scientists studied the full results of an experiment that smashed a rocket and a probe into a lunar crater in 2009. The impacts kicked up large amounts of rock and dust, revealing a suite of fascinating chemical compounds and far more water than anyone had imagined.

## Pluto, planet or not?

In 2006, the world's astronomers approved a new definition of the word "planet" that would drop tiny Pluto from the club and relegate it instead to a lesser realm of "dwarf planets." It was a welcome step away from a proposal that would have kept Pluto as a planet but simultaneously opened the door for dozens of small, icy bodies on the fringes of the solar system.

## Ardi: Breakthrough of 2009

The fossil skeleton known as Ardi, hailed in some quarters as the scientific breakthrough of 2009, has now drawn critics who dispute claims that the species lived in dense woodlands rather than grassy plains, which have been long considered the favoured habitat of early prehumans and perhaps account for their transition to upright walking. Another scientist has stepped forward to challenge Ardi's classification as a member of the human lineage after the divergence from African apes. An international team led by Tim D White of the University of California, Berkeley, discovered the fossil in 1992.


## Alpha magnetic spectrometer

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The device, named the Alpha magnetic spectrometer, is designed to sift the high-energy particles flying through space known as cosmic rays.

Though technically, the spectrometer will only be on the space shuttle next year, the idea of the spectrometer already belongs to this decade. On February 27, the space shuttle Endeavour will ferry the spectrometer to a permanent berth on the space station. But the real destination is the shadow universe.

*(Compiled from The New York Times)*

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