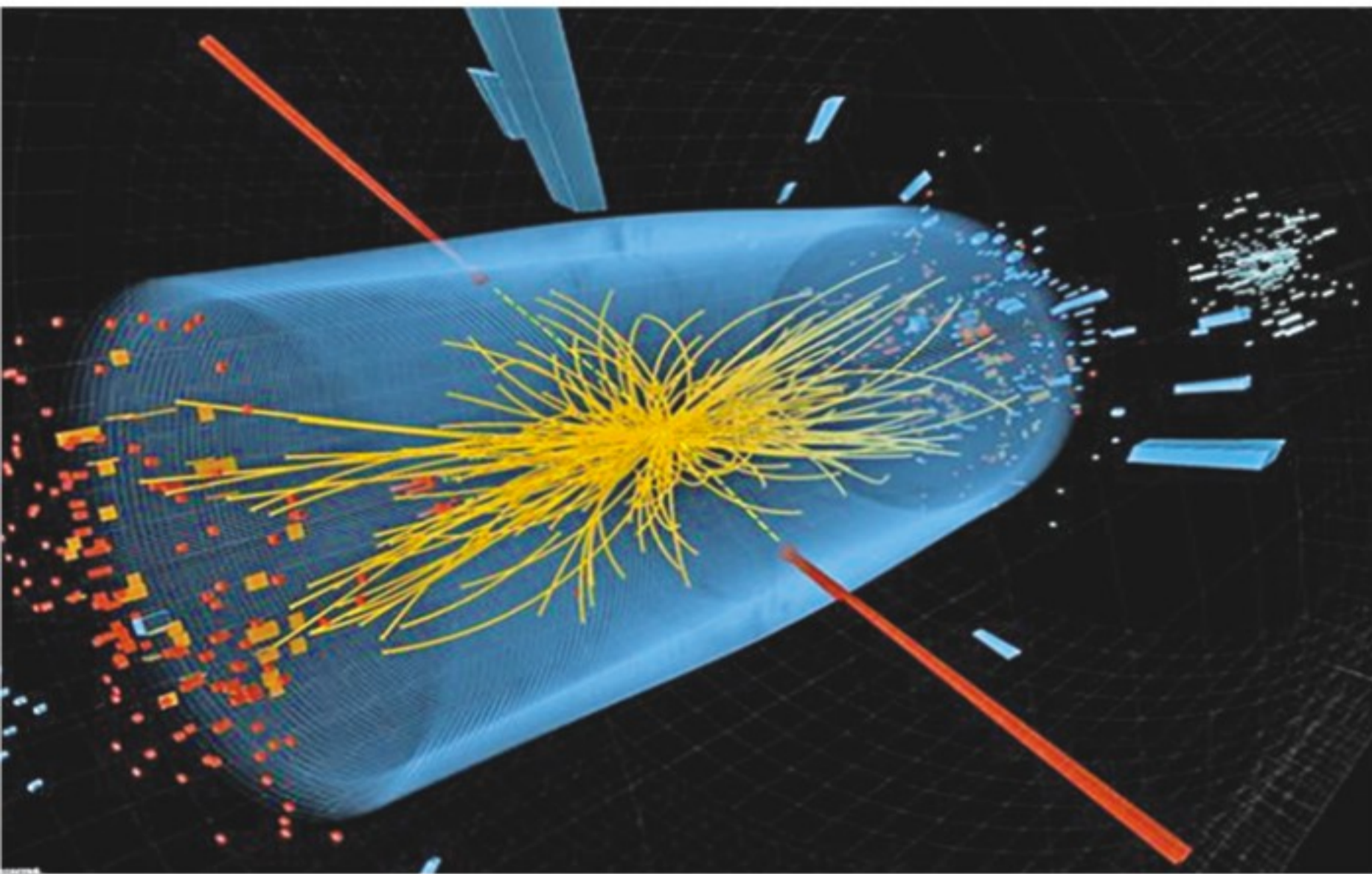
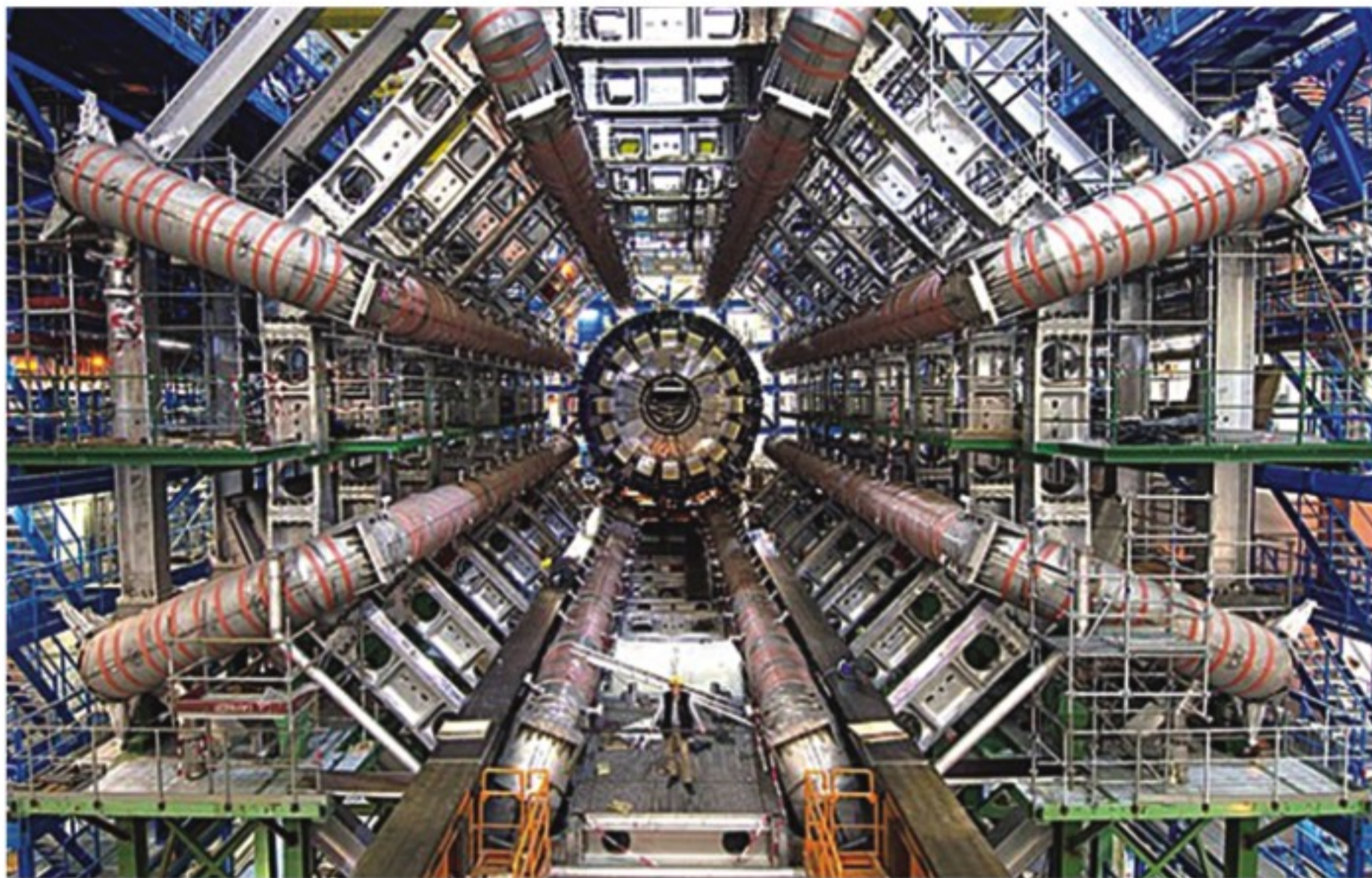


Glimpse of 'god particle'



A typical "candidate event" in the Higgs-hunting CMS experiment. Red lines represent high-energy proton beams while yellow lines show the tracks of particles produced in the collision.



Scientists at the Large Hadron Collider are expected to see the "first glimpse" of the Higgs boson - the so-called "God particle".

MOFIZ UDDIN AHMED

ON Tuesday 13 December 2011, Scientists at CERN (European Organization for Nuclear Research) announced the promising signs of existence of Higgs boson. The experiment was done at the Large Hadron Collider (LHC) near Geneva, Switzerland. If the Higgs boson is discovered, it will be one of the greatest triumphs of human intellect as it will explain the origin of mass after the big bang.

For the last two years, nearly 8000 scientists and scientific staff are working inside an underground tunnel of 27 kilometers

along the border of France and Switzerland to find the Higgs boson. They are hoping to get it within a few days. If Higgs boson is discovered it will explain the creation of galaxy with stars and planets.

Higgs boson is a particular type of boson. Boson is a fundamental particle named after Satyendra Nath Bose - a physics teacher of Dhaka University. S. N. Bose worked on particle statistics during 1922 at Curzon hall while he was a teacher at the Department of Physics of Dhaka University. He worked in collaboration with Albert Einstein on gaslike properties of electromagnetic radiation which is known as Bose-Einstein Statistics. The

developed theory is called Bose-Einstein condensate. It opened the door for new ideas for quantum microsystems. The 2001 Nobel Prize went on for Bose-Einstein condensation.

Bosons are identified as Higgs boson after Peter Higgs, an Edinburgh University physicist. Higgs boson is crucial to understanding the origin of mass. As per Standard Model, the universe is made from 12 basic building blocks called fundamental particles and governed by four fundamental forces. The prediction of Higgs boson is predicted by standard Model. Some fundamental particles have mass, but some have no masses. Scientists believe that universe was cre-

ated through a big bang out of nothing. The question is how the mass was originated? Shortly after the big bang, it is thought that many particles have no masses.

They became heavy later on due to Higgs boson. A theoretical invisible energy stretches everything in the universe. It clings to fundamental particles and making them heavy. So, in theory, particle can weigh nothing. But as soon as Higgs field stretched on, they became heavy, got the masses. That's why Higgs boson is called the 'god particle', as it creates the mass and the present universe.

The Author is a Plasma Physicist and Professor at BRAC University



PEEPHOLE

'Heartbeat' of a black hole

AN international team of astronomers has identified a candidate for the smallest-known black hole using data from NASA's Rossi X-ray Timing Explorer (RXTE). The evidence comes from a specific type of X-ray pattern, nicknamed a "heartbeat" because of its resemblance to an electrocardiogram. The pattern until now has been recorded in only one other black hole system.

Named IGR J17091-3624 after the astronomical coordinates of its sky position, the binary system combines a normal star with a black hole that may weigh less than three times the sun's mass. That is near the theoretical mass boundary where black holes become possible.

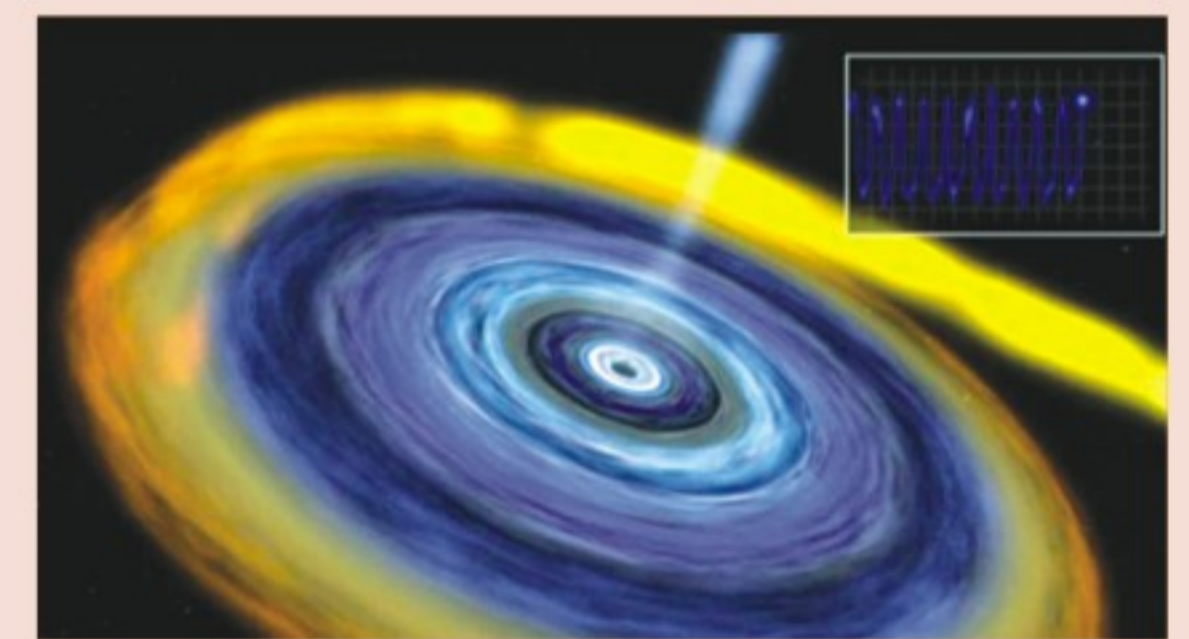
Gas from the normal star streams toward the black hole and forms a disk around it. Friction within the disk heats the gas to millions of degrees, which is hot enough to emit X-rays. Cyclical variations in the intensity of the X-rays observed reflect processes taking place within the gas disk. Scientists think that the most rapid changes occur near the black hole's event horizon, the point beyond which nothing, not even light, can escape.

Astronomers first became aware of the binary system during an outburst in 2003. Archival data from various space missions show it becomes active every few years. Its most recent outburst started in February and is ongoing. The system is located in the direction of the constellation Scorpius, but its distance is not well established. It could be as close as 16,000 light-years or more than 65,000 light-years away.

The record-holder for wide-ranging X-ray variability is another black hole binary system named GRS 1915+105. This system is unique in displaying more than a dozen highly structured patterns, typically lasting between seconds and hours.

"We think that most of these patterns represent cycles of accumulation and ejection in an unstable disk, and we now see seven of them in IGR J17091," said Tomaso Belloni at Brera Observatory in Merate, Italy. "Identifying these signatures in a second black hole system is very exciting."

Source: Science Daily



An international team of astronomers has identified a candidate for the smallest-known black hole

BACK TO CIVILISATION



Transitioning back to civilian life

AS U.S. troops are expected to be home from Iraq by Dec. 31, a new report from the Pew Research Center suggests they may have a tough time readjusting to civilian life, though religion seems to help buffer the struggle.

The survey included 1,853 veterans, finding that 27 percent said that re-entering the civilian world was difficult for them; that proportion swelled to 44 percent among veterans who served in the 10 years since 9/11.

College graduation, being an officer (rather than an enlistee) and understanding missions made the transition smoother, the researchers found, with college graduates being 5-percent-more likely to face an easy transition. Officers and those who understood their missions, compared with those who didn't, were 10-percent-more likely to revert to civilian life with ease. And religion increased the likelihood of a smooth transition by 24 percentage points.

The researchers also found that being married during service made the re-entry into civilian life more difficult, possibly because of the stresses that military life puts on family.

Source: Live Science

SACRED WISDOM

Treasure of the ancients

DEBASHISH CHAKRABARTY

IT'S ironic that most of the men who participated in the "scientific revolution", whose contributions seem so original and innovative, were themselves convinced that they were merely re-discovering the vast body of pristine knowledge that had been possessed by the ancients, but somehow lost and forgotten during the centuries that came to be called the "dark ages" of western civilization. This was not an entirely unreasonable belief, because the great works, both material and intellectual, of the classical civilizations were very imposing. The intellectual culture of Western Europe really did decline during the fall of Rome, and the institutions for preserving and passing along knowledge, as well as the inclination to do so, were severely diminished. Then, after so long an absence, when the ancient texts were re-discovered, the scholars of the Renaissance and later periods were acutely aware of their intellectual inferiority vis-à-vis "the ancients". Also, the fact that many of the ancient texts were now available only in fragmentary form, often in third-hand translations, and many of the references were to works totally unknown and presumably lost, contributed to the impression that the ancients had known far more, if we could only find it out.



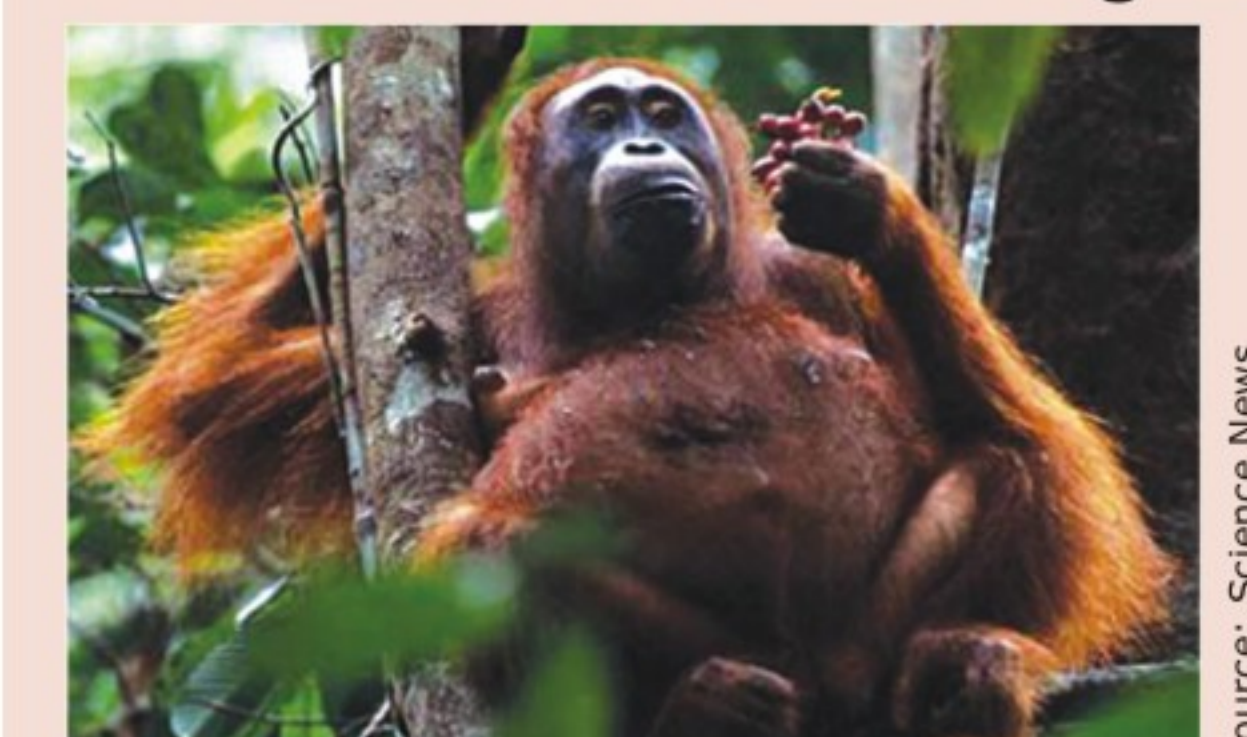
This attitude toward the past is, in some ways, the exact opposite of our usual view today, which is of a totally ordered sequence of eras progressing from less knowledge in the past to more knowledge in the future. It's hard for us to imagine, today, the intellectual climate among people who believed they were scientifically and mathematically inferior to their ancestors in the distant past. Interestingly, this peculiar historical circumstance undoubtedly contributed to the unique flourishing of intellectual affairs in Western civilization that occurred soon after the ancients had been re-discovered. Part of the psychological impetus came from the great appreciation they felt for recorded knowledge, and the esteem they had for the great thinkers of antiquity. Also, the enduring value of the recorded knowledge and the kind of immortality it gave to the authors, surviving a millennium of neglect only to be more wondered at when finally re-discovered, was a source of immense fascination, and inevitably tempted men to participate in the process, even if only (at first) by translating and copying the great works.

The early 16th century discovery of the general solution of cubic polynomials is regarded by some people as a significant turning point in scientific history, because this was the first time a "modern" man made a significant discovery that went beyond the ancient knowledge. Needless to say, there were acrimonious disputes between Cardano, Ferro, Tartaglia about who deserved to be credited with this discovery. The tantalizing prospect of "bettering" the ancients was thus raised, and was an incredibly powerful incentive for making intellectual discoveries. Of course, far more important for convincing Europeans that it was possible to know more than the ancients was the discovery of The New World, beginning with Columbus's voyage in 1492, a world of which the ancients had not even dreamed.

Nevertheless, the belief that the ancients had possessed a vast body of knowledge, of which we have only fragments and scattered hints, persisted. As late as the 1600's men like Fermat were developing their original ideas in the form of speculative "reconstructions" of lost works from antiquity. For example, Fermat completed a re-construction of Apollonius' lost work on "Plane Loci", and Fermat himself said that this effort led directly to his development of what we now call analytic geometry.

BORNEO ORANGUTANS

Hard times for island vegans



Fluctuations in the fruit supply in Borneo often leave wild orangutans deficient in protein

The near-vegan lifestyle of wild orangutans in Borneo's forests means the apes face recurring protein droughts severe enough that their body tissues start to waste away. "They're living on the margin," says biological anthropologist Nathaniel Dominy of Dartmouth College. Borneo, one of only two natural habitats for wild orangutans, is predominantly forested with trees that produce abundant fruit only about every five years. In bad years, the animals make do with a smaller volume of leaves and bark. During tough times, the apes average only about 1.4 grams of protein per kilogram of body mass per day.

DO YOU KNOW?

Is Moon moving away from us?



The Earth. Similarly, the part of the Earth facing away from the Moon feels less gravity than the center of the Earth. This effect stretches the Earth a bit, making it a little bit oblong. It is expected that in 15 billion years, the orbit will stabilize at 1.6 times its present size, and the Earth day will be 55 days long equal to the time it will take the Moon to orbit the Earth.

The Moon's orbit (its circular path around the Earth) is indeed getting larger, at a rate of about 3.8 centimeters per year. (The Moon's orbit has a radius of 384,000 km.) The reason for the increase is that the Moon raises tides on the Earth. Because the side of the Earth that faces the Moon is closer, it feels a stronger pull of gravity than the center of the Earth. Similarly, the part of the Earth facing away from the Moon feels less gravity than the center of the Earth. This effect stretches the Earth a bit, making it a little bit oblong. It is expected that in 15 billion years, the orbit will stabilize at 1.6 times its present size, and the Earth day will be 55 days long equal to the time it will take the Moon to orbit the Earth.

ODD OPENER

Hot electrons boost solar cell

XIAOYANG Zhu and his team at the University of Texas at Austin have discovered that it's possible to double the number of electrons harvested from one photon of sunlight using an organic plastic semiconductor material.

"Plastic semiconductor solar cell production has great advantages, one of which is low cost," said Zhu, a professor of chemistry. "Combined with the vast capabilities for molecular design and synthesis, our discovery opens the door to an exciting new approach for solar energy conversion, leading to much higher efficiencies."

Zhu and his team published their groundbreaking discovery Dec. 16 in Science.

The maximum theoretical efficiency of the silicon solar cell in use today is approximately 31 percent, because much of the sun's energy hitting the cell is too high to be turned into usable electricity. That energy, in the form of "hot electrons," is instead lost as heat. Capturing hot electrons could potentially increase the efficiency of solar-to-electric power conversion to as high as 66 percent.

Zhu and his team previously demonstrated that those hot electrons could be captured using semiconductor nanocrystals. They published that research in Science in 2010, but Zhu says the actual implementation of a viable technology based on that research is very challenging.

"For one thing," said Zhu, "that 66 percent efficiency can only be achieved when highly focused sunlight is used, not just the raw sunlight that typically hits a solar panel. This creates problems when considering engineering a new material or device."

To circumvent that problem, Zhu and his team have found an alternative. They discovered that a photon produces a dark quantum "shadow state" from which two electrons can then be efficiently captured to generate more energy in the semiconductor pentacene.

Source: Science Daily



The efficiency of conventional solar cells could be significantly increased, according to new research.