

Discovering the builders of Stonehenge

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In 2007, archeologists uncovered a small village in Great Britain that dated back to the Neolithic era (7000 to 4000 B.C.). It was found near the ancient World Heritage Site known as Stonehenge.

Two miles northeast of the ancient post and lintel monolith, Mike Parker Pearson and the Stonehenge Riverside Project discovered a site known as Durrington Walls. Constructed primarily of wood, this village was carbon dated to have been built between 2600 and 2500 B.C. Despite its age, the dwellings were found to still be in remarkable condition.

Since Stonehenge has been dated to approximately the same era, experts are considering whether the unearthed village was the place of residence for its constructors.

Beginning in 2003, the investigation—financed by National Geographic—excavated homes, beds, and other wooden furniture items, a stone pathway, as well as footprints embedded in clay. In addition to the relics of daily life, archeologists uncovered a structure consisting of timber posts placed in concentric circles. Researchers



ANCIENT OBSERVATORY: Who was responsible for building Stonehenge? PHOTOS.COM

believe this to be a wooden replica of nearby Stonehenge.

Another curious discovery at the site has been the large amount

of broken pottery and animal remains strewn throughout the village. Researchers point out that the village's inhabitants weren't

merely untidy; instead, they claim that these artifacts are the products of religious ceremonies. Some also believe that the site was not a

permanent dwelling but a temporary residence for a semi-annual gathering.

Stonehenge is one of the most enigmatic architectural structures on the planet and perhaps the most popular tourist destination in Great Britain. The mystery of this multi-megalith is partly due to the lack of rational explanation for how such primitive technology could have moved the gigantic blocks of rock. Some of the stones of this ancient monument weigh between 25 and 45 tons—carried from a quarry many miles away—and they are placed in such a way that defies even modern technology.

There is still not a single, conclusive theory about the motives behind the construction of Stonehenge. Even though the majority of investigators accept that it was a place of worship and used for honoring the dead, it has also been proposed that the site was meant for other religious rituals or astronomical observation. It is known that the constructors of the monument had knowledge of astronomy, since it has been discovered that the rising sun shine directly through the structure's axis on the equinoxes and solstices.

While Stonehenge looks quite

primitive at first glance, researchers continue to discover just how sophisticated it is. In his book "Stonehenge Decoded," astronomy professor Gerald Hawkins describes how the monument can actually predict eclipses. Likewise, in "Stonehenge: Sun, Moon, Wandering Stars," M. W. Postins reveals how Stonehenge (in relation to various point in the surrounding area, such as the nearby Aubrey Holes) correlates to the entire solar system.

While the Stonehenge Riverside Project offers the latest possibility of the builders of the monument, it is by no means the first. Many researchers believe that the megalithic structure actually had different groups add to it over thousands of years. Twelfth century historian Giraldus Cambrensis even suggested that the Arthurian legend's Merlin himself was behind the construction of the monolithic structure!

Whoever was responsible for Stonehenge, how did they move and strategically place such enormous stones? Furthermore, what methods did they use to obtain such detailed astronomical knowledge thousands of years before the invention of the telescope?

French physicist d'Espagnat wins prestigious templeton prize

PARIS (Reuters)—French physicist and philosopher Bernard d'Espagnat has won the 2009 Templeton Prize, billed as the world's largest annual award to an individual, for his work affirming the spiritual dimension of life.

The Templeton Foundation announced the \$1.42 million prize at the United Nations Educational, Scientific and Cultural Organization (UNESCO) in Paris last week.

Award organizers said his work in quantum physics revealed a reality beyond science that spirituality and art could help to partly grasp.

John Templeton Jr., president of the foundation launched by his late father, said at the ceremony that d'Espagnat, 87, had "explored the unlimited, the openings that new scientific discoveries offer in pure knowledge and in questions that go

to the very heart of our existence and humanity."

Previous winners include Russian writer Alexander Solzhenitsyn, United States evangelist Billy Graham, and Albanian-born Mother Teresa.

D'Espagnat, a former senior physicist at the CERN particle physics laboratory in Geneva and professor at French and United States universities, argues in his books that modern quantum physics shows that ultimate reality cannot be described.

Classical physics developed by Isaac Newton believes it can describe the world through laws of nature that it knows or will discover. But quantum physics shows that tiny particles defy this logic and can act in indeterminate ways.

D'Espagnat says that this points toward a reality beyond the reach of empirical science. The human in-

tuitions in art, music, and spirituality can bring us closer to this ultimate reality, but it is so mysterious we cannot know or even imagine it.

"Mystery is not something negative that has to be eliminated," he said. "On the contrary, it is one of the constitutive elements of being."

On Physics and Philosophy

In a recent interview, d'Espagnat said he was brought up a Roman Catholic but did not practice any religion and considered himself a spiritualist.

Some baffling discoveries of quantum physics led him to believe that all creation has a wholeness and interrelatedness that many scientists miss by trying to break problems down into their component parts rather than understand them in larger contexts.

One of these is entanglement, the way that paired subatomic particles remain linked even if they move far apart, so that experimenting with one automatically affects the other without any apparent communication between them.

This view clashes with the materialist outlook widespread among scientists.

"Materialists consider that we are explained entirely by combinations of small uninteresting things like atoms or quarks," said d'Espagnat, whose latest book in English—"On Physics and Philosophy"—was published in 2006.

"I believe we ultimately come from a superior entity to which awe and respect is due and which we shouldn't try to approach by trying to conceptualize too much," he said. "It's more a question of feeling."

Although they cannot be tested, the intuitions people have when they are moved by great art or by spiritual beliefs help them grasp a bit more of ultimate reality, d'Espagnat said.

"When they hear very good music, people who like classical music have the impression they get at some reality that way. Why not?" he asked.



INJURED ECOLOGY: Stray dogs run in front of the Chernobyl nuclear power plant. Researchers have discovered a large number of deformed animals living near the site. SERGEI SUPINSKY/AF/GETTY IMAGES 72451246

Earth's crust melts easier than thought

National Science Foundation

In a paper published in last week's issue of the journal *Nature*, geologists report results of a study of how well rocks conduct heat at different temperatures. They found that as rocks get hotter in Earth's crust,

'We found that strain heating, caused by tectonic movements during mountain belt formation, easily triggers crustal melting.'

—Sonia Esperanca, NSF program director

they become better insulators and poorer conductors.

The findings provide insights into how magmas are formed, the scientists say, and will lead to better models of continental collision and the formation of mountain belts.

"These results shed important

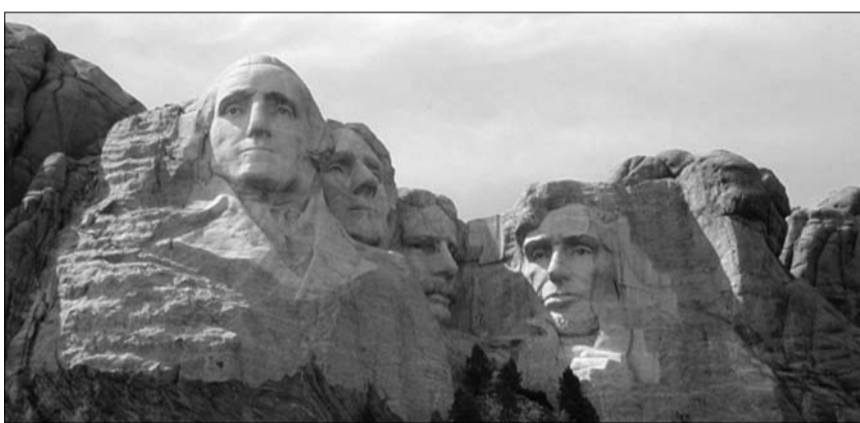
light on a geologic question: how large bodies of granite magma can be formed in Earth's crust," said Sonia Esperanca, a program director in the National Science Foundation's (NSF) Division of Earth Sciences, which funded the research.

"In the presence of external heat sources, rocks heat up more efficiently than previously thought," said geologist Alan Whittington of the University of Missouri. "We applied our findings to computer models that predict what happens to rocks when they get buried and heat up in mountain belts, such as the Himalayas today or the Black Hills in South Dakota in the geologic past."

"We found that strain heating, caused by tectonic movements during mountain belt formation, easily triggers crustal melting."

In the study, the researchers used a laser-based technique to determine how long it took heat to conduct through different rock samples. In all their samples, thermal diffusivity, or how well a material conducts heat, decreased rapidly with increasing temperatures.

The thermal diffusivity of hot rocks and magmas was half that of



HOT ROCKS: Mt. Rushmore granite crystallized from magma that formed 1.7 billion years ago. PETER NABELEK/UNIVERSITY OF MISSOURI

what had been previously assumed.

"Most crustal melting on Earth comes from intrusions of hot basaltic magma from the Earth's mantle," said Peter Nabelek, also a geologist at the University of Missouri. "The problem is that during continental collisions, we don't see intrusions of basaltic magma into continental crust."

These experiments suggest that because of low thermal diffusivity, strain heating is much faster and more efficient. Once rocks get heated, they stay hotter for much longer,

Nabelek said.

The processes take millions of years to happen, and scientists can only simulate them on a computer. The new data will allow them to create computer models that more accurately represent processes that occur during continental collisions.

The *Nature* paper, "Temperature-dependent thermal diffusivity of the Earth's crust and implications for magmatism," was co-authored by Whittington, Nabelek, and Anne Hofmeister, a scientist at Washington University.

Chernobyl animals worse affected than thought, study finds

LONDON (Reuters)—According to a recent study, radiation has affected animals living near the site of Ukraine's Chernobyl nuclear disaster far more than was previously thought, challenging beliefs that local wildlife was on the rebound.

The study showed that numbers of bumble-bees, butterflies, spiders, grasshoppers, and other invertebrates were lower in contaminated sites than other areas because of high levels of radiation left over from the blast more than 20 years ago.

The findings challenge earlier research that suggested animal populations were rebounding around the site of the Chernobyl explosion in Ukraine, which forced thousands to abandon their homes and evacuate the area.

Estimates of the number of deaths directly related to the accident vary. The World Health Organization estimates the figure at 9,000 while the environmental group Greenpeace predicts an eventual death toll of 93,000.

"We were amazed to see that there had been no studies on this subject," Anders Moller, a researcher at the National Center for Scientific Research in France, who led the study, said.

"Ours was the first study to focus on the abundance of animal populations."

Researchers said they had compared animal populations in radioactive areas with less contaminated plots and found that some were nearly completely depleted of animal life.

"There are areas with an abundance of 100 animals per square

meter [3.3 feet]," Moller said. "And then there are areas with less than one specimen per square meter on average; the same goes for all groups of species."

The researchers also found that animals living near the Chernobyl reactor—which was covered in a protective shell after it exploded in April 1986—had more deformities, including discoloration and stunted limbs, than normal.

"Usually [deformed] animals get eaten quickly, as it's hard to escape if your wings are not the same length," Moller said. "In this case we found a high incidence of deformed animals."

The findings challenge the view of Chernobyl as ecologically sound, despite the fact that Ukrainian officials have turned it into a nature reserve, with wolves, bison, and bears.

Earlier research into the area ignored the fact that animal populations had grown unimpeded in the absence of humans for many years after the blast, Moller said.

"We wanted to ask the question: Are there more or fewer animals in the contaminated areas? Clearly there were fewer," said Moller, who has worked on Chernobyl since 1991.

While researchers focused on a nearly 20 miles radius around the Chernobyl reactor, the fallout from the explosion covered a vast swath of Eastern Europe, including parts of Russia, Ukraine, and Belarus.

The findings probably apply to those areas as well, Moller said, adding that any decontamination effort was unlikely due to the extent of the fallout.

Researchers ID North America's smallest dinosaur

CALGARY, Alberta (Reuters)—Canadian researchers said they have discovered North America's smallest known dinosaur, a pint-sized predator half the size of a house cat and cousin to the ferocious Velociraptor, which roamed in what is now Alberta 75 million years ago.

Hesperonychus, whose name means "western claw," prowled southeastern Alberta in Western Canada during the late Cretaceous period, running on two legs and eating insects, small mammals, or whatever else it could find.

Researchers said the dinosaur

resembled its cousin Velociraptor, a hunter with a fierce reputation and a killer claw similar to that of Hesperonychus.

"It was only about half the size of a Velociraptor," said Nick Longrich, a researcher at the University of Calgary, and co-author of a paper on Hesperonychus with University of Alberta paleontologist Philip Currie.

"Presumably Velociraptors could take down large animals but in this one the blade-like claw on the foot is not that big. My guess is that it was a small-game hunter, taking down mammals and birds and baby dino-

saurs."

Hesperonychus fossils have been collected since 1982 but paleontologists had assumed that because of their small size, they must have come from juvenile animals.

However Longrich concluded that the dinosaur was full grown at a height of 20 inches after studying a fossilized pelvis and seeing that the hip bones were fused—a sign it was an adult.

The 4.4-pound creature supplants the chicken-size insectivore Albertonykus Borealis as the smallest known dinosaur in North America, though smaller species

have been found in China.

Longrich suspects, however, that there are more fossils of tiny meat-eating dinosaurs waiting to be found, especially since today small carnivores outnumber bigger predators.

"My gut says that when we take a good close look at the fossil record we'll start to see this kind of animal in a lot of different places," he said.

Longrich and Currie's paper was published in the advanced online edition of the *Proceedings of the National Academy of Sciences* at www.pnas.org