

Limited resources and unlimited usage.
How can we save it?

Newsletter



**Conserve the energy,
Save our climate!**

February - 2021

Origin of Life

Issue : 38

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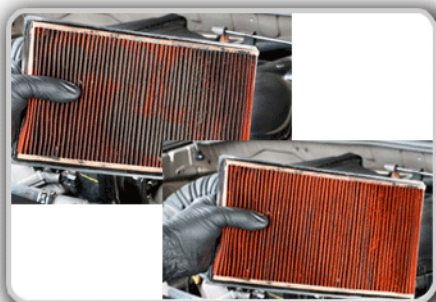
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Why ???

We the people on the earth are gifted with wonderful energy sources by the nature, which has made our routine much more smother & easier... However, this gift of the nature is ' limited '. What we have done is, with the growth of science & technology, we have started using it extremely, because of which the energy resources are going to finish in near future. Hence, let us take the pledge to conserve the energy - save the energy!!!

Tips of the Month



Replace air filters

Clean or replace air filters as recommended. Energy is lost when air conditioners and hot-air furnaces have to work harder to draw air through dirty filters.

Article - 1 : A billion years missing from geologic record: Where it may have gone

The geologic record is exactly that: a record. The strata of rock tell scientists about past environments, much like pages in an encyclopedia. Except this reference book has more pages missing than it has remaining. So geologists are tasked not only with understanding what is there, but also with figuring out what's not, and where it went. One omission in particular has puzzled scientists for well over a century. First noticed by John Wesley Powell in 1869 in the layers of the Grand Canyon, the Great Unconformity, as its known, accounts for more than one billion years of missing rock in certain places.

Scientists have developed several hypotheses to explain how, and when, this staggering amount of material may have been eroded. Now, UC Santa Barbara geologist Francis Macdonald and his colleagues at the University of Colorado, Boulder and at Colorado College believe they may have ruled out one of the more popular of these. Their study appears in the *Proceedings of the National Academy of Sciences*. A leading thought is that glaciers scoured away kilometers of rock around 720 to 635 million years ago, during a time known as Snowball Earth, when the planet was completely covered by ice. This hypothesis even has the benefit of helping to explain the rapid emergence of complex organisms shortly thereafter, in the Cambrian explosion, since all this eroded material could have seeded the oceans with tremendous amounts of nutrients. Macdonald was skeptical of this reasoning. Although analogues of the Great Unconformity appear throughout the world -- with similar amounts of rock missing from similar stretches of time -- they don't line up perfectly. This casts doubt as to whether they were truly eroded by a global event like Snowball Earth.

Part of the challenge of investigating the Great Unconformity is that it happened so long ago, and the Earth is a messy system. "These rocks have been buried and eroded multiple times through their history," Macdonald said. Fortunately, the team was able to test this hypothesis using a technique called thermo chronology. A few kilometers below the

Earth's surface, the temperature begins to rise as you get closer to the planet's hot mantle. This creates a temperature gradient of roughly 50 degrees Celsius for every kilometer of depth. And this temperature regime can become imprinted in certain minerals. As certain radioactive elements in rocks break down, Helium-4 is produced. In fact helium is constantly being generated, but the fraction retained in different minerals is a function of temperature. As a result, scientists can use the ratio of helium to thorium and uranium in certain minerals as a paleo-



**Image Source:*

<https://www.sciencedaily.com/releases/2020/05/200507130704.htm>

thermometer. This phenomenon enabled Macdonald and his coauthors to track how rock moved in the crust as it was buried and eroded through the ages.

**Source:* <https://www.sciencedaily.com/releases/2020/05/200507130704.htm>

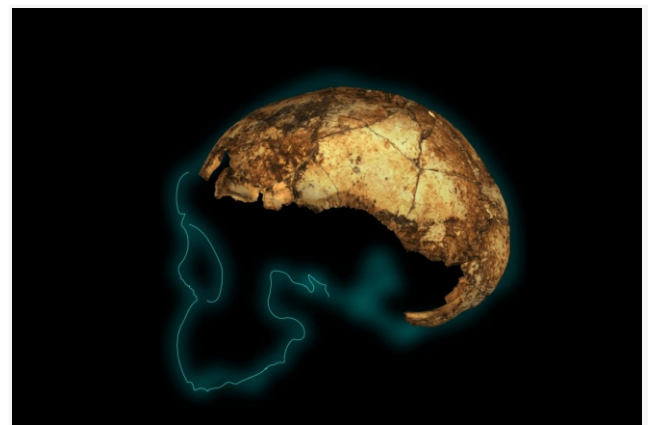
Article - 2 : When three species of human ancestor walked the Earth

An international team, including Arizona State University researcher Gary Schwartz, have unearthed the earliest known skull of *Homo erectus*, the first of our ancestors to be nearly human-like in their anatomy and aspects of their behavior. Years of painstaking excavation at the fossil-rich site of Drimolen, nestled within the Cradle of Humankind (a UNESCO World Heritage site located just 40 kilometers or around 25 miles northwest of Johannesburg in South Africa), has resulted in the recovery of several new and important fossils. The skull, attributed to *Homo erectus*, is securely dated to be two million years old.

Published this week in *Science*, the international team of nearly 30 scientists from five countries shared details of this skull -- the most ancient fossil *Homo erectus* known -- and other fossils from this site and discuss how these new finds are forcing us to rewrite a part of our species' evolutionary history. The high-resolution dating of Drimolen's fossil deposits demonstrates the age of the new skull to pre-date *Homo erectus* specimens from other sites within and outside of Africa by at least 100,000 to 200,000 years and thus confirms an African origin for the species.

The skull, reconstructed from more than 150 separate fragments, is of an individual likely aged between three and six years old, giving scientists a rare glimpse into childhood growth and development in these early human ancestors. Additional fossils recovered from Drimolen belong to a different species -- in fact, a different genus of ancient human altogether -- the more heavily built, robust human ancestor *Paranthropus robustus*, known to also occur at several nearby cave sites preserving fossils of the same geological age. A third, distinctive species, *Australopithecus sediba*, is known from

two-million-year old deposits of an ancient cave site virtually down the road from Drimolen. The ability to date Drimolen's ancient cave deposits



**Image Source:* <https://www.heritagedaily.com/2020/04/when-three-species-of-human-ancestor-walked-the-earth/127172>

with such a high degree of precision, using a range of different dating techniques, allowed the team to address important broader. "The discovery of the earliest *Homo erectus* marks a milestone for South African fossil heritage," says project co director and University of Johannesburg doctoral student Stephanie Baker. Fieldwork will continue at Drimolen, expanding the excavations to include even more ancient components of the cave and to provide a more in-depth glimpse at the forces shaping human evolution in this part of the African continent.

**Source:* <https://www.sciencedaily.com/releases/2020/04/200402155736.htm>

Article - 3 : How birds evolved big brains

An international team of evolutionary biologists and paleontologists have reconstructed the evolution of the avian brain using a massive dataset of brain volumes from dinosaurs, extinct birds like Archaeopteryx and the Great Auk, and modern birds. The study, published online today in the journal *Current Biology*, reveals that prior to the mass extinction at the end of the Cretaceous Period, birds and non-avian dinosaurs had similar relative brain sizes. After the extinction, the brain-body scaling relationship shifted dramatically as some types of birds underwent an explosive radiation to re-occupy ecological space vacated by extinct groups. "One of the big surprises was that selection for small body size turns out to be a major factor in the evolution of large-brained birds," says Dr. Daniel Ksepka, Curator of Science at the Bruce Museum and lead author of the study. "Many successful bird families evolved proportionally large brains by shrinking down to smaller body sizes while their brain sizes stayed close to those of their larger-bodied ancestors."

In order to understand how bird brains changed, a team of 37 scientists used CT scan data to create endocasts (models of the brain based on the shape of the skull cavity) of hundreds of birds and dinosaurs, which they combined with a large existing database of brain measurements from modern birds. They then analyzed brain-body allometry: the way brain size scales with body size. "There is no clear line between the brains of advanced dinosaurs and primitive birds," notes co-author Dr. Amy Balanoff of Johns Hopkins University. "Birds like emus and pigeons have the same brains sizes you would expect for a theropod dinosaur of the same body size, and in fact some species like moa have smaller-than-expected brains." The two groups of birds with truly exceptional brain sizes evolved relatively recently: parrots and corvids (crows, ravens, and kin). These birds show tremendous cognitive capacity, including the ability to use tools and language, and to remember human faces. The new study finds that parrots and crows exhibited very high rates of brain evolution that

may have helped them achieve such high proportional brain sizes.

"Several groups of birds show above average rates of brain and body size evolution," remarks co-author Dr. N. Adam Smith of the Campbell Geology Museum at Clemson University. "But crows are really off the charts -- they outpaced all other birds. Our results



**Image Source:*

<https://www.sciencedaily.com/releases/2020/04/200423130506.htm>

suggest that calling someone 'bird-brained' is actually quite a compliment!" "Crows are the hominins of the bird kingdom," says co-author Dr. Jeroen Smaers of Stony Brook University. "Like our own ancestors, they evolved proportionally massive brains by increasing both their body size and brain size at the same time, with the brain size increase happening even more rapidly."

**Source:*

<https://www.sciencedaily.com/releases/2020/04/200423130506.htm>

Article - 4 : Modern humans, Neanderthals share a tangled genetic history, study affirms

In recent years, scientists have uncovered evidence that modern humans and Neanderthals share a tangled past. In the course of human history, these two species of hominins interbred not just once, but at multiple times, the thinking goes. A new study supports this notion, finding that people in Eurasia today have genetic material linked to Neanderthals from the Altai mountains in modern-day Siberia. This is noteworthy because past research has shown that Neanderthals connected to a different, distant location -- the Vindija Cave in modern-day Croatia -- have also contributed DNA to modern-day Eurasian populations. The results reinforce the concept that Neanderthal DNA has been woven into the modern human genome on multiple occasions as our ancestors met Neanderthals time and again in different parts of the world.

The study was published on March 31 in the journal *Genetics*. "It's not a single introgression of genetic material from Neanderthals," says lead researcher Omer Gokcumen, a University at Buffalo biologist. "It's just this spider web of interactions that happen over and over again, where different ancient hominins are interacting with each other, and our paper is adding to this picture. This project will now add to an emerging chorus -- we've been looking into this phenomenon for a couple of years, and there are a couple of papers that came out recently that deal with similar concepts." "The picture in my mind now is we have all these archaic hominin populations in Europe, in Asia, in Siberia, in Africa. For one reason or another, the ancestors of modern humans in Africa start expanding in population, and as they expand their range, they meet with these other hominins and absorb their DNA, if you will," Gokcumen says. "We probably met different Neanderthal populations at different times in our expansion into other parts of the globe."

To complete the project, scientists analyzed the DNA of hundreds of people of Eurasian ancestry. The goal was to hunt for fragments of

genetic material that may have been inherited from Neanderthals. This research found that the Eurasian populations studied could trace some genetic material back to two different Neanderthal lineages: one represented by a Neanderthal whose remains were discovered in the Vindija cave in Croatia, and another represented by a Neanderthal



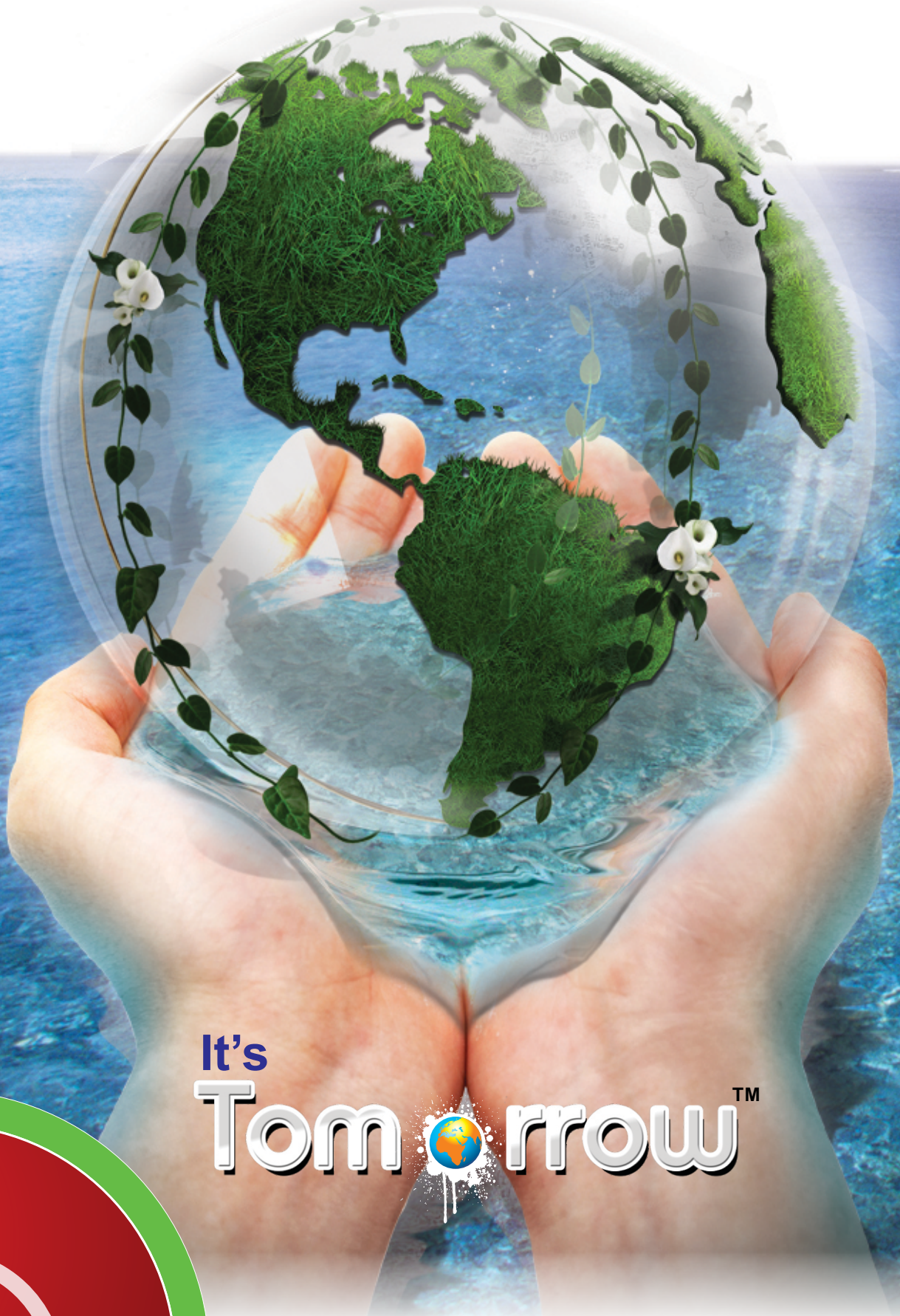
**Image Source:* <https://phys.org/news/2020-04-modern-humans-neanderthals-tangled-genetic.html>

whose remains were discovered in the Altai mountains in Russia. Scientists also discovered that the modern-day populations they studied also share genetic deletions -- areas of DNA that are missing -- with both the Vindija and Altai Neanderthal lineages. The DNA of the Vindija and Altai Neanderthals, along with the modern human populations studied, were previously sequenced by different research teams.

**Source:* <https://www.sciencedaily.com/releases/2020/04/200401150821.htm>

Conserve the Energy,
Save our Climate!

Conserve™
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It's
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