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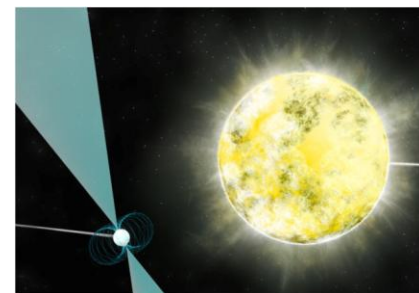
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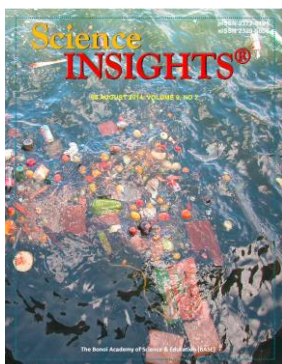
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COVER

When the first plastic bag was used in the supermarket decades ago, people appraised it as a record-broken invention. We must say yes that plastic products truly help us much in each field, but are the benefits of the plastic really outweigh the harmful effect on our daily life and health? See page 237.

Image: BASE illustrating group

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THE BONOI ACADEMY OF SCIENCE & EDUCATION

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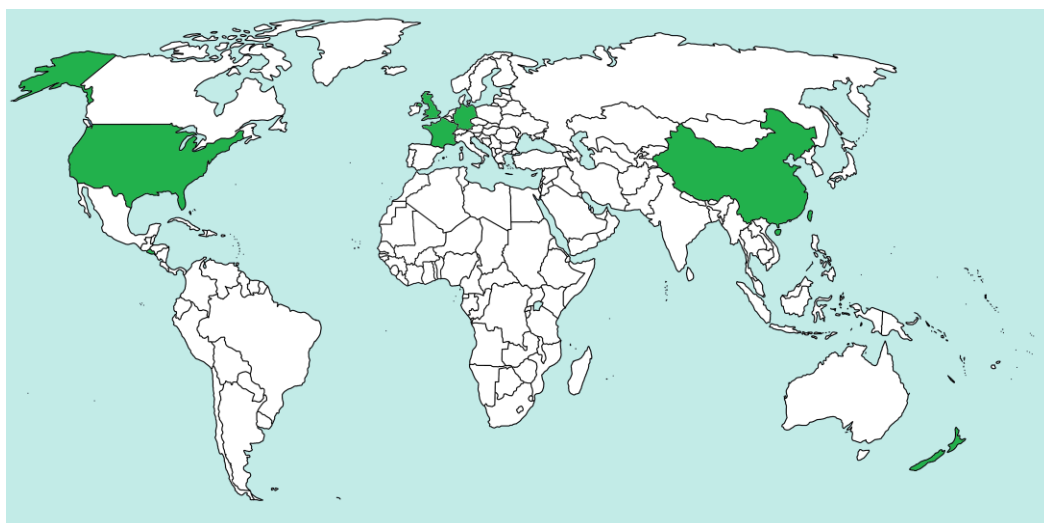
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Yunnan, CHINA

520-Million-Year-Old Sea Monster

A spectacularly well-preserved sea monster that once prowled the oceans during the Cambrian Period has been unearthed in China. The 520-million-year-old creature, one of the first predators of its day, sported compound eyes, body armor and two spiky claws for grabbing prey. The fossils of the new species were so well preserved that the nervous system and parts of the brain were still clearly defined. Before the Cambrian Period, which lasted between 543 million and 493 million years ago, most life resembled simple algae and stationary jellyfishlike creatures, but during the Cambrian explosion, a period of rapid evolution when biodiversity exploded, swimming sea creatures with compound eyes, jointed legs and hard exoskeletons emerged. The period also saw the rise of an iconic group of shrimplike creatures known as anomalocaridids. These ancient sea monsters were the top predators of the Cambrian seas, and sported bladed body armor and a cone-shaped mouth made of concentric plates. Some of the biggest of these bizarre creatures could grow to be up to 6 feet (1.8 meters) long. But most anomalocaridid specimens paleontologists found have been poorly preserved, making it difficult to know precisely where they fit in the tree of life, said study co-author Peiyun Cong, a researcher at Yunnan University in China. Some scientists thought anomalocaridids belonged to a group that split off before the most recent common ancestor of all living arthropods, while others thought the animals were part of a group called chelicerates that includes spiders and scorpions. Still others thought anomalocaridids had converged upon similar features to those of modern arthropods but didn't evolve from the same lineage, Cong said in an email. In the last several years, the researchers unearthed three spectacularly pre-



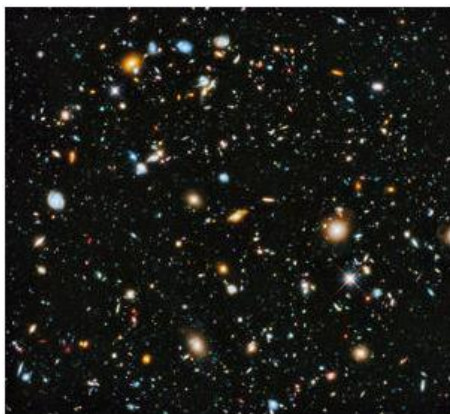
served specimens of a new species of anomalocaridid in fossil sediments in China. The sediments had frozen these creatures in time so perfectly that the entire nervous system, as well as the gut and some muscles, were still visible. The creature, dubbed *Lyrarapax unguispinus*, was about 6 inches (15 centimeters) long. *L. unguispinus* had a tail that looked a bit like that of a lobster, and two giant pincers for grasping prey. As it grew, the creature molted, shedding its outer cuticle. Based on its brain, which lacks some of the characteristic features found in chelicerates, the creature likely shared more similarities with a group known as velvet worms, Cong said. Still, the new results can't pinpoint where on the tree of life these ancient sea monsters go, Cong said. But no matter what group they belonged to, by the end of the Paleozoic Era, about 251 million years ago, the last anomalocaridids went extinct, Cong said. ***Original article on [Live Science](#).*** ■



Mountain View, USA

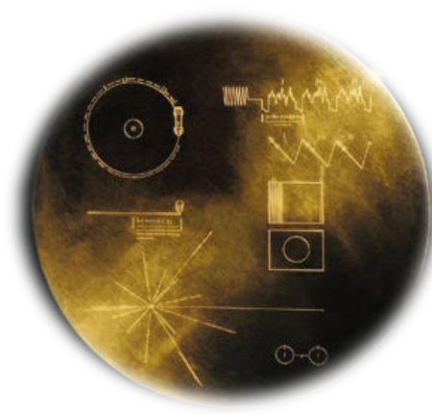
Should Humanity Try to Contact Intelligent Aliens?

Astronomers have detected nearly 2,000 alien planets to date. As that number continues to rise, so too does the prospect of finding intelligent extraterrestrial life. In terms of the search for extraterrestrial intelligence (SETI), it may no longer be a matter of answering the "are we alone" question, some scientists say. Rather, just how crowded is the universe? And if ET is out there, it may be possible to reach out with direct "radio waving" to potentially habitable exoplanets. This form of cosmic cryptography, called "Active SETI," involves no longer merely listening for a signal but purposefully broadcasting to, and perhaps establishing contact with, other starfolk. Active SETI sounds like science fiction, but some astronomers are discussing it seriously today. The idea is, as it has been in the past, a controversial, hot-button issue, with some researchers wary of sending signals out to touch base with intelligent aliens. "It's a subject of discussion, I'll put it that way," said Seth Shostak, senior astronomer at the SETI Institute in Mountain View, Calif. There have been many workshops and symposia over the years to discuss Active SETI, he said, and because it has a highly emotional component, "it's like a third rail in a way," he said. Shostak told Space.com that he feels the topic is not something to



worry too much about. "But there may not be that perception in the broader public ... that we have discussed this to death. They haven't seen these discussions nor participated in them," he said. But exoplanet detections are making news around the world, Shostak said. "That's putting the whole question of life in space in front of the public in a way that perhaps wasn't true 20 years ago." Still, trying to figure out what's the best thing to do, in terms of Active SETI, is a work in progress, Shostak said. "What is the best way to communicate? What do you do... just ping them with a carrier wave and you encode Wikipedia? If you are going to do it, what's the best way to communicate?" A few years ago, renowned British astrophysicist Stephen Hawking suggested that communicating with ET could be a threat to Earth. While it's likely alien life exists, Hawking said, a visit to Earth by other starfolk might turn ugly, akin to when Christopher Columbus landed in America. That didn't turn out so well for the Native Americans, he said. "Hawking stirred things up a few years ago saying we shouldn't broadcast our existence because the outcome might be bad for us," said Chris Impey, deputy head of the astronomy department at the University of Arizona in Tucson. He co-edited the 2013 book, "Encountering Life in the Universe: Ethical Foundations and Social Implications of Astrobiology." "He's right about our immaturity as a species," Impey told Space.com, "but I think the argument is moot since intelligent civilizations are likely to be so sparsely distributed that communication in either direction

is difficult or unlikely." Active SETI, Impey said, "makes us feel a little more proactive, but I think it's a long shot worse than buying a lottery ticket." For Impey, the "promising approach" is not conventional SETI or broadcasting, but detection of civilizations by their energy or technology imprints, "and that avoids all the issues of intention and communication and the anthropocentric tangle people get into with that." Adding his voice to the Active SETI dialogue is Steven Dick, the Baruch S. Blumberg NASA/Library of Congress Chair in Astrobiology at the Kluge Center in Washington, D.C. "I am for passive SETI programs, and in fact would advocate for renewed government funding after a 20-year lapse," Dick told Space.com. "That's because the existence of extraterrestrial intelligence is one of the great unsolved mysteries of science." Dick said that the current NASA astrobiology hunt is centered on microbes, but surely there should be an effort to go beyond micro-organisms and search for complex life with whatever means are available. "On the other hand, I would not propose government funding for messaging extraterrestrial intelligence. I think we need to find ET first, and then have a period where a team consisting of scientists, social scientists and humanities people consider what the message should be," Dick said. However, Dick is not at all sanguine that communication with ET is possible. He thinks we underestimate how different alien minds can be compared to ours — even their science and mathematics. And that might account for the Fermi paradox, Dick said. That paradox, attributed to physicist Enrico Fermi, is the apparent contradiction between the high probability that extraterrestrial civilizations exist and the lack of contact with such civilizations. Hence, Fermi's 1950 lunchtime query to colleagues: "Where is everybody?" "Having said that, it would be very difficult to regulate individual or institutional projects that wish to attempt messaging extraterrestrial intelligence, and I would not advocate attempting



to regulate," Dick said. In his opinion, there is an equal chance that ET will be good or bad. "We do not yet know enough about the evolution of altruism on Earth, much less among other possible intelligent life forms, to say ETs will all be good," Dick said. "That is a hope rather than a fact." But haven't we already revealed ourselves with TV signals, military radar and other outputs into the cosmos? Even music is wafting across the universe, purposely directed toward a specific star. That is true, Dick said, but it's not the same as sending a directed beam to a habitable exoplanet target. "Still, the idea of planet Earth cowering and afraid to engage the universe is not a planet I would want to live on. SETI attempts are part of our rising cosmic consciousness, and as such cannot be stifled," Dick said. "That this is the subject of such controversy... it's an indication of how seriously the subject of intelligent life in the universe is now taken!" "Yes, the issue should be re-debated," said Michael Michaud, author of the 2007 book, "Contact with Alien Civilizations: Our Hopes and Fears about Encountering Extraterrestrials." Michaud is a former U.S. Foreign Service Officer for the U.S. Department of State and a long-time thinker and writer regarding the probability and consequences of coming into contact with an extraterrestrial civilization. "Active SETI advocates broke with the conventional wisdom of the SETI pioneers, which was to listen but not transmit," Michaud told Space.com. "This change may have been driven by the impatience of younger SETI people after 40 years of unsuccessful

searches." "But Active SETI is not science," said Michaud. "It is an attempt to provoke a response from an alien society whose capabilities and intentions are not known to us." Those most eager to send high-powered messages want their efforts to have consequences, Michaud said, not just for themselves, but for the entire human species. "There is no scientific or historical evidence telling us that the consequences of contact will be those they prefer." Michaud says that an alien society able to detect our signals almost certainly would be more technologically advanced than our own, and might be capable enough and patient enough to send probes across light-years of space. Scientists and engineers have shown that robotic spacecraft able to reach nearby stars would be feasible for a civilization only slightly in advance of our own. Michaud takes issue with the old claim that we already have been detected or that detection is inevitable. Experts have shown that the normal signals emitted by Earth are too weak to be heard at interstellar distances without colossal antennas, he said. "Sending deliberate, unusually powerful signals is a decision that belongs properly with all Humankind," Michaud said. "We should have an open debate about whether or not to call attention to ourselves by making our civilization more detectable than it already is." *Original article on [Space.com](#).* ■

Munich, GERMANY

Pristine Fossil Confirms Archaeopteryx as Original Bird

Though the Archaeopteryx had previously been fingered by paleontologists as the first bird to fly, the inconsistent nature of the fossil record made it difficult for scientists to confirm that the ancient creature could indeed take to the air. But the latest Archaeopteryx fossil, unearthed in 2011, was preserved in fine-grain limestone after succumbing to fate in an ancient la-



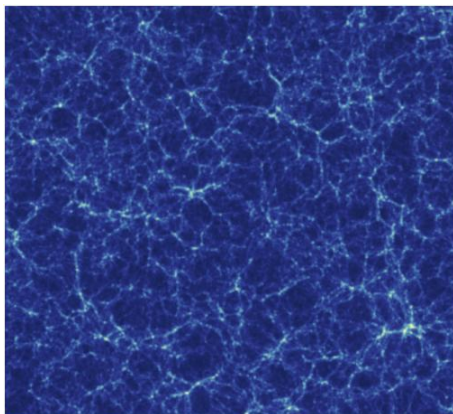
goon in modern day Bavaria, a region of southern Germany -- thus revealing the bird's full plumage in remarkable detail. The details confirm a lightweight suit (including a strange pair of "feather trousers" on the legs) likely capable of lifting Archaeopteryx skyward, researchers say. "Since its first discovery in the 1860s, Archaeopteryx has been the object of many debates in relation to bird evolution, especially flight and feather evolution," explained study co-author Oliver Rauhut, a paleontologist at the Bavarian State Collection for Paleontology and Geology in Munich. "There were debates if it was ground-dwelling or arboreal, if it could fly or not." Archaeopteryx lived 150 million years ago, and though its not the only ancient bird to sport plumage, it is one of the first that used their feathers to take to the air. The new fossil further informs the evolution of ancient bird feathers. "Feathers evolved according to evolutionary pressures related to insulation, display, camouflage, and balance first," the scientists wrote in their latest paper. "And were later co-opted in some lineages to allow dinosaurs like Microraptor and (possibly) Archaeopteryx to fly." Even if other scientists are still skeptical as to the conclusiveness the new specimen provides (to the question of first to

fly), its finder is adamant of the significance. "It retains its status as the Urvogel," study author Christian Foth said. Urvogel is German for "original bird." ■

Paris, FRANCE Columbus and Urbana, USA

Computer Simulation of Dark Matter Using an Empirical Function

Three physicists affiliated with several universities in the U.S. and France have built a computer simulation of the bubble-like voids that exist in dark matter which offers better density information. In their paper published in the journal *Physical Review Letters*, the researchers describe how their simulation showed that such voids have a wide range of sizes and ages with highest densities occurring in boundary areas. Scientists still don't know much about dark matter—it's believed to make up most of the known universe (as evidenced by gravitational studies) and doesn't interact much with parts of the universe we can see, which of course, includes light. To gain a better understanding of it, researchers have been creating computer simulations based on what



is observable. Such simulations in the past have shown that dark matter is not uniform, in fact, if we could see it, it would look a lot like the inside of bones—lots of air pockets (voids) with boundary material between them. The simulations indicate that the voids in dark matter form as dark matter akin to a gas, collapses under its own gravity into sheets or filaments that form the boundary between the voids. They also have shown that there appears to be more void, than boundary. Some theories suggest that such structures gave rise to the parts of the universe we are able to see. In this new effort, the research trio has created a new simulation that provides a better perspective on the size and shapes of the voids—focusing specifically on density profiles. Their simulation excluded matter that can be seen but did include dark energy. The new simulation showed voids of various sizes and shapes as has been seen with other simulations—what was new with this simulation was that the team showed that the average density of dark matter reached its maximum in the walls that formed the borders between the voids. They also found that the spherical densities believed to exist at the center of the voids, applies not only to voids of all shapes and sizes, but to those that existed in earlier cosmic history. Interestingly, the researchers found they could fit the profiles empirically using just two parameters in a single formula. ■

San Salvador, EL SALVADOR

Skeletons Found In El Salvador Shed Light on Pre-Hispanic Life

Archaeologists they have found three human skeletons in El Salvador from more than 1,600 years ago that could shed new light on early human settlements in the region. The three nearly complete human skeletons, preserved in volcanic ash, were found near the Pacific coast at a dig called "Nueva Esperanza," about 90 kilometers (55 miles) southeast of the capital. The area was buried in ash from gigantic eruptions between the 5th and 6th centuries, which has helped preserve evidence of the pre-Hispanic coastal settlement, possibly dedicated to salt production and fishing. The new find "opens a new door for Salvadoran archaeological investigations, which had (previously) focused only on ceremonial centers," project director Akira Ichikawa told AFP. He expects more finds at the site, saying the two-meter (seven-foot) layer of volcanic ash hides an "archaeological wealth of evidence about the daily life and livelihood of these ancient coastal residents." The three bodies are those of two adults, aged between 25 and 35 years old, and a child, between seven and nine years old, with two clay beads around the neck, archaeologist Oscar Camacho said, based on preliminary analysis. They had been buried; two of them in a cross-legged position,

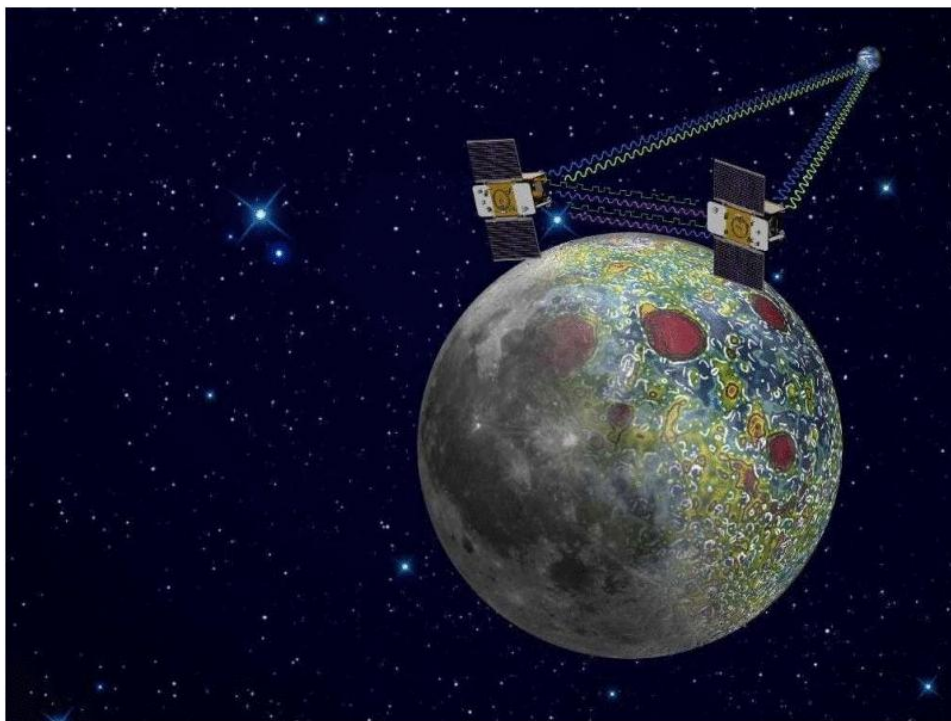
along with offerings including clay pots and jars bearing dark brown and red stripes. The remains are being cleaned for study by the Archeology Department at the National Museum of Anthropology in San Salvador. A tooth and a portion of the ribs will be used for chemical analysis aimed at determining their sex, specific ages, as well as details of lifestyle, diet and illnesses suffered. ■

Washington DC, USA

New Understanding of the Moon

In 2012, NASA rang in the New Year with a fresh mission — sending the Gravity Recovery And Interior Laboratory, also known as GRAIL, spacecraft to the moon. As the first endeavor intended to study lunar gravity, its findings would help scientists better understand how rocky planets, like Earth, formed. That's especially true since many theories suggest the moon was created when a cosmic collision lopped off a portion of the Earth. And they're both made of the same rocky materials. Since then, GRAIL has brought back some significant — and colorful — information. New findings are still being published, including recent details about the moon's topography published in the May 2014 issue of *Geophysical Research Letters*. Twin spacecraft, named Ebb and Flow





— about the size of washing machines — chased each other around the moon for three months, from March to May 2012. Because different geographical formations, like mountains and valleys, exert stronger or weaker gravitational pulls, their distance apart varied as they traveled. For example, if the first craft flew over a mountain — which has more gravitational pull because it has more mass — the first satellite would speed up, as shown (in exaggerated form) in the GIF to the left. For a year after, data on the moon's composition and gravity was collected from GRAIL. By analyzing the two crafts' distance apart, scientists could determine the moon's gravity field, as well the topography and the makeup of the rocks under the surface. In this way, GRAIL was vital to understanding how rocky planets, like Earth, Venus, Mercury, and Mars, formed. And when Ebb and Flow had fulfilled their duties, NASA crashed them into a rocky hillside on the moon. These "psychedelic" maps and an ash crater are all that remain. NASA's Scientific Visualization Studio published the first map created using GRAIL's data, shown below, in December 2012. The intense coloring, present in most gravity maps, indicates variations in gravitational pull across the moon's surface. Published

in three papers in the journal *Science* in 2012, the detailed data reveals many never-before-seen features of the moon, such as tectonic structures and even dead volcanoes. The data also helped determine the moon's crust is much thinner than previously imagined — between 21 and 27 miles thick, making it similar to Earth. "This supports models where the moon is derived from Earth materials that were ejected during a giant impact event early in solar system history," said Mark Wieczorek, GRAIL co-investigator at the Institut de Physique du Globe de Paris. The map below also shows the moon's gravity field but using a different calculation method. If the moon were a perfectly smooth sphere of uniform density, like a pool ball, its gravity map would show uniform color. But like any terrestrial body, the moon's surface has craters and mountains as well as variations under the surface that change its gravitational pull. This creates a Bouguer gravity map, seen below, which subtracts the effect of the bumpy surface to show the lumpiness of the moon's gravity underneath the surface, essentially, the gravity field created by the moon's interior. NASA also created a moon map based on GRAIL data to show the Moon's surface topography, known as a Lunar

Orbiter Laser Altimeter, or LOLA, map. It's measured in kilometers, instead of mGALS. Red marks the tallest formations, while blue shows the lowest. Finally, crustal thickness, shown below, can be inferred from the Bouguer map. Assuming the crust's density is uniform, any variations in gravity visible on the Bouguer map can be explained by variations in the crust's thickness, measured in kilometers, as well. Under the crust, also like Earth, lies a mantle, molten outer core and solid inner core, possibly made of iron. In the May 2014 issue of *Geophysical Research Letters*, a publication of the American Geophysical Union, the Scientific Visualization Studio created the image below to correlate topographical formations with the gravity field, which previous maps had separated. It shows the moon's surface in much greater detail than previous versions. The paper adds more information to what we already know about the Moon's interior and its thermal history. ■

Auckland, NEW ZEALAND

The Sixth Taste of the Human Tongue

The human tongue may have a sixth sense - and no, it doesn't have anything to do with seeing ghosts. Researchers have found that in addition to recognizing sweet, sour, salty, savory, and bitter tastes, our tongues can also pick up on carbohydrates, the nutrients that break down into sugar and form our main source of energy. Past studies have shown that some rodents can distinguish between sugars of different energy densities, while others can still tell carbohydrate and protein solutions apart even when their ability to taste sweetness is lost. A similar ability has been proposed in humans, with research showing that merely having carbohydrates in your mouth can improve physical performance. How this works, however, has been unclear. In the new study, to be published in *Appetite*, the researchers

asked participants to squeeze a sensor held between their right index finger and thumb when shown a visual cue. At the same time, the participants' tongues were rinsed with one of three different fluids. The first two were artificially sweetened—to identical tastes—but with only one containing carbohydrate; the third, a control, was neither sweet nor carb-loaded. When the carbohydrate solution was used, the researchers observed a 30% increase in activity for the brain areas that control movement and vision. This reaction, they propose, is caused by our mouths reporting that additional energy in the form of carbs is coming. The finding may explain both why diet products are often viewed as not being as satisfying as their real counterparts and why carbohydrate-loaded drinks seem to immediately perk up athletes—even before their bodies can convert the carbs to energy. Learning more about how this “carbohydrate sense” works could lead to the development of artificially sweetened foods, the researchers propose, “as hedonistically rewarding as the real thing.” ■

London, UK

How Extinct Undersea Volcanoes Trigger Rare “Tsunami Earthquakes”

How unusual slow earthquakes can spawn powerful tsunamis is a long-standing mystery that researchers may have finally solved. Called “tsunami earthquakes,” these slow quakes are capable of creating huge waves that can cause serious damage to coastal cities. Tsunami earthquakes are not like typical earthquakes. They happen slowly and don't generate the same kind of violent shaking as typical earthquakes — the tell-tale sign that it's time to evacuate. Scientists first discovered tsunami earthquakes 35 years ago and they happen so rarely there has been little opportunity to study them since. Now, a new study suggests that tsunami earthquakes happen when two sections of Earth's



crust, called tectonic plates, get hung up on extinct volcanoes on the ocean floor, called seamounts. The seamounts act like tread on a tire and make tectonic plates stick. The research team realized these extinct volcanoes sometimes get squashed in subduction zones. A subduction zone is where one tectonic plate is sliding under the other plate. The researchers propose that two tsunamis that struck New Zealand in 1947 were caused by tsunami earthquakes that struck in a zone near two sunken volcanoes off the country's northern coast. The earthquake happened when the Pacific tectonic plate slid under the New Zealand tectonic plate, releasing a massive buildup of energy. However, the actual rupture of tsunami earthquakes is slow compared with regular earthquakes. The rupture happens at 335 to 670 mph (539 to 1,078 km/h). In regular earthquakes that rupturing can happen two or three times faster. The slow rupture allows time for huge waves to swell. Bell and the team estimate the tsunamis might have reached 43 feet (13 meters). Since the New Zealand tsunami earthquake, scientists think there have been nine other tsunami earthquakes. In 1992, a magnitude-7.2 earthquake off the coast of Nicaragua created a wave 26 feet (8 m) tall that killed 170 people. In 2006, an earthquake off the coast of Indonesia with the same magnitude created a wave 23 feet (7 m) tall that drowned 637 people. Researchers arrived at this conclusion by studying eyewitness accounts from the earthquakes. Witnesses did not report any violent shaking associated with regular earthquakes. Instead they reported feeling the ground “rolling” and feelings of seasickness. After analyzing

data originally collected for oil and gas deposit searches, the researchers were able to locate two extinct volcanoes off the coast that likely caused the tsunamis. By understanding the geologic causes of tsunami earthquakes, scientists hope to pinpoint the areas most at risk for the mysterious slow earthquakes. The scientists hope the new research will help raise awareness among people living in coastal regions who are at risk for tsunami earthquakes. “The best warning for residents living close by is that if they feel a very prolonged earthquake, even if the shaking is gentle, they should evacuate to high ground. New tsunami warning signs in New Zealand now use the tag line ‘Long, strong, gone!’” Despite a network of seismometers (instruments that measure ground motion, which is then used to measure earthquake size) across the globe that allows geologists to detect very low magnitude underwater quakes, scientists are unsure which quakes have the potential to generate tsunami waves. For now, the researchers think teaching people living in tsunami-risk areas to watch for prolonged shaking will be the most effective way to keep people safe. *Original article on [Live Science](#).* ■

San Francisco, USA

Tiny Elephant Shrew Is Smallest of Its Kind

A new, tiny species of elephant shrew, also called a round-eared sengi, has been discovered in the Namib Desert in Africa, scientists say. The newbie, now called *Macroscelides micus*, is the smallest member of the scientific order Macroscelidea, which now includes 19 known sengis. Like other sengi, the creature sports a narrow, trunk-like snout. One of the study researchers, Michael Griffin of the Namibia Ministry of Environment and Tourism, collected the first representative of this newfound species around the ancient Etendeka volcanic formation, which is an arid area inland from the coastal Namib Desert



between the Ugab and Hoanib rivers. At first, the researchers thought the creature was a known species from Namibia, *Macroscelides flavicaudatus*. "We knew that it looked a little odd, but it was the genetic analyses that suggested that it was really very different," researcher John Dumbacher, curator of ornithology and mammalogy at the California Academy of Sciences in San Francisco, told Live Science in an email. "Once we got back to the field and saw several live individuals, it was clear that they differed from *M. flavicaudatus* in many ways, and that this wasn't just an 'odd' individual." For instance, not only is the newbie smaller than any other sengi — at just 7.5 inches, or 190 millimeters, from nose-tip to tail-tip — it also has redder fur and lighter skin, particularly noticeable on the ears and feet, Dumbacher said. "They also have a very large scent gland on their tail, which is probably important in signaling other members of their species in order to find mates and mark territories," Dumbacher added. Subsequent trips taken by the team revealed the newfound sengi lives throughout this ancient volcanic region, which is about 136 miles (220 kilometers) long and about 62 miles (100 km) wide, Dumbacher said. The creature likely evolved its red fur as an adaptation to blend into the region's red soil. "We hope to learn more about this in coming field seasons, where we plan to radio-collar some of these small sengis and study their activities and

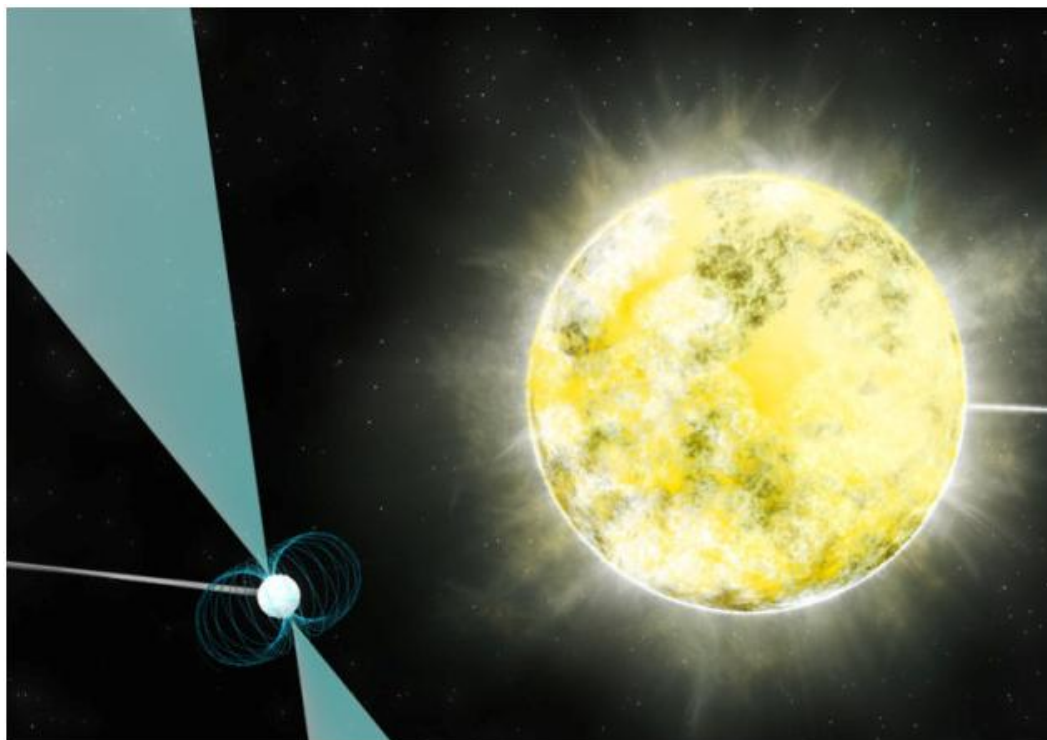
spatial movements," Dumbacher said. *Original article on LiveScience.* ■

Milwaukee, USA

Scientists Find a Diamond the Size of Earth

Scientists have found an 11 billion year-old diamond 900 light-years away from our home planet—one of the oldest found by astronomers. But this isn't an ordinary diamond: researchers claim the space rock is the size of Earth, making it one of the largest diamonds in existence (that we know of). That's one massive diamond, but sadly it'll never be cut. Scientists have never even seen it. Described in a study published in *The Astrophysical Journal*, the massive diamond is said to be among the coldest white dwarfs we've ever found. And that's exactly why we're unable to see it; the nameless diamond-star is so cool and dim that the light is unable to be seen in the overwhelming vastness of space. Even if

we were able to get closer, researchers still say we wouldn't be able to see it. Researchers were able to deduce the massive diamond's presence by the way its gravity disturbs steady radio pulses coming from a spinning companion star. This isn't the first time scientists have found a large space diamond. In 2012, researchers discovered a planet roughly the size of two Earths that was made primarily of diamond. This one, however, is pure cut—a gleaming crystallized white dwarf just sitting out there in space. Scientists say the diamond-star formed like this: after ending its life in a supernova, a small clump about the size of Earth was leftover, which eventually cooled and faded to what it is now. *National Geographic* points out that if you were to look toward the constellation Aquarius you'd be looking in the right direction. But you'll never be able to see it; nobody will. Researchers say there are probably similar diamond stars out there in the universe, though they're too dim for us to see them. Still, imagining the night sky filled with thousands of diamonds is certainly a romantic thought. ■



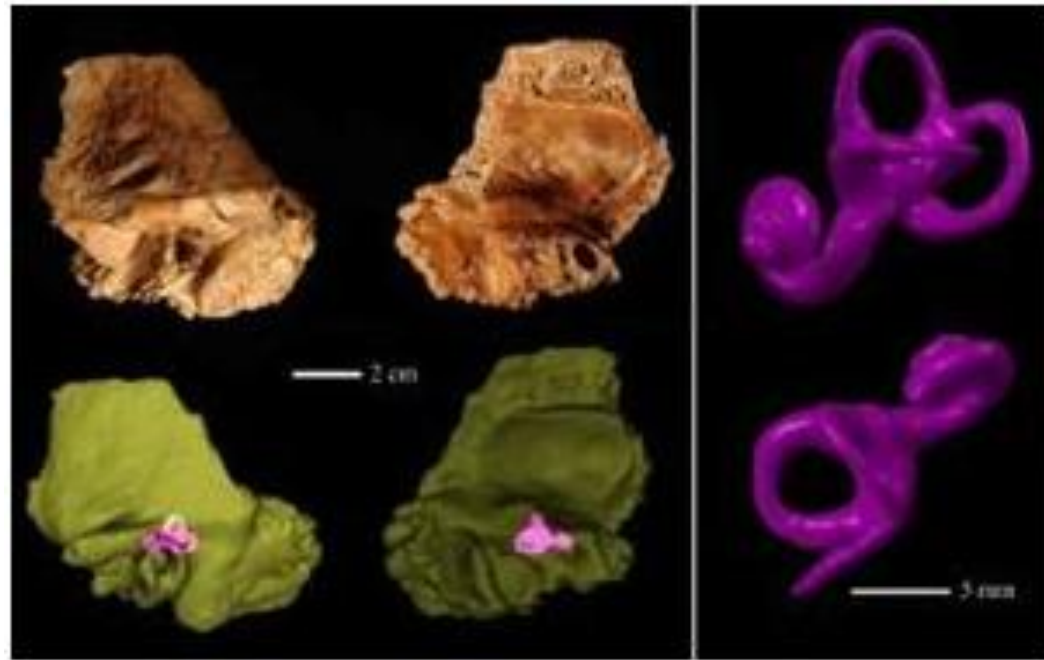


Who feeds us?

ARCHEOLOGY

Ancient Human Had Neanderthal-Like Ear: New Questions Raised about Human Evolution

Re-examination of a circa 100,000-year-old archaic early human skull found 35 years ago in Northern China has revealed the surprising presence of an inner-ear formation long thought to occur only in Neanderthals. These new findings could be evidence of interbreeding between Neanderthals and other species of archaic humans in China; however, the researchers say human evolution could be more complicated than is often thought, and the implications of the new discovery remain unclear. Although modern humans are the only living members of the human family tree, a number of other human lineages once lived alongside the ancestors of modern humans. These so-called archaic humans included Neanderthals, the closest extinct relatives of modern humans, who lived in Eurasia roughly between 200,000 and 30,000 years ago. To learn more about human evolution, scientists investigated a 100,000-year-old human skull known as Xujiayao 15, found 35 years ago in northern China alongside human teeth and bone fragments. At first, the researchers thought that the skull belonged to an archaic human. But they discovered that, anatomically, the skull — and the fossils discovered alongside it — had characteristics typical of a non-Neanderthal form of archaic human. "It's clearly not modern human," said study co-author Erik Trinkaus, an anthropologist at Washington University in St. Louis. However, micro-CT scans of the skull revealed an inner ear much like those seen in Neanderthals. "We were very surprised," Trinkaus told Live Science. "I said,



"My God, it looks like a Neanderthal." The inner ear, also known as the labyrinth, is located within the skull's temporal bone. It contains the cochlea, which converts sound waves into electrical signals that are transmitted via nerves to the brain, and the semicircular canals, which help people keep their balance as they move. These semicircular canals are often well-preserved in mammal skull fossils, the researchers said. In the mid-1990s, CT scans revealed that nearly all Neanderthals possessed a specific arrangement of their semicircular canals. The pattern of semicircular canal sizes and positions seen in Neanderthals was often used to set them apart from both earlier and modern humans. "We fully expected the scan to reveal a temporal labyrinth that looked much like a modern human one, but what we saw was clearly typical of a Neanderthal," Trinkaus said in a statement. In comparison, none of the three other archaic human skulls they analyzed from different parts of China had this type of inner ear. But while it is tempting to conclude that these findings demonstrate interbreeding between Neanderthals and archaic humans in China, Trinkaus and his

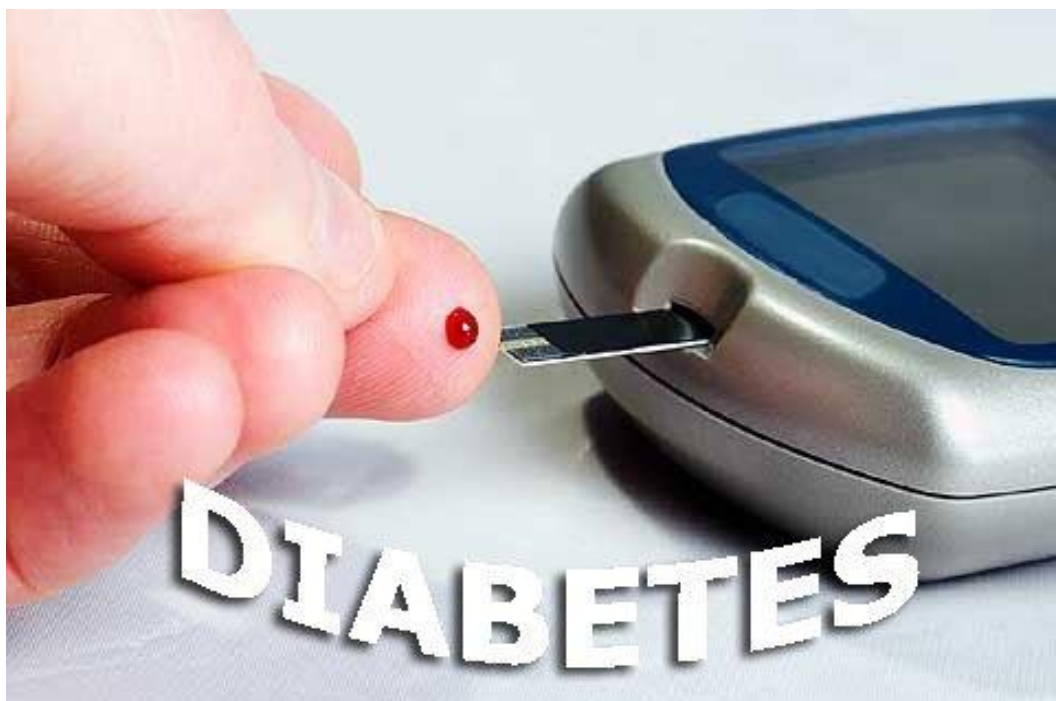
colleagues suggested that the implications of the Xujiayao's discovery remain unclear. "You can't rely on one anatomical feature or one piece of DNA as the basis for sweeping assumptions about the migrations of hominid species from one place to another," Trinkaus said in a statement. Instead, "what these findings say to me are that characteristics were probably more varied in ancient human populations than we think," Trinkaus said. "We see characteristics mix and match in populations across the world nowadays, and I believe that characteristics shuffled back and forth in ancient human populations across the landscape over centuries and millennia. The idea of distinct, separate lineages in this time period in human evolution is meaningless — it was much more of a labyrinth than that." It remains uncertain whether these differences in the inner ear would have led to any differences in balance or agility between modern humans and other human groups. "Eventually, someone might sort out the biological implications of these differences, if there are any," Trinkaus said.

PNAS 2014, 111(29):10509

ENDOCRINOLOGY

Scientists Restore Normal Blood Sugar Levels in Diabetic Mice

Scientists have discovered a novel protein-based treatment that restores normal blood-sugar levels in diabetic mice for a period of seven days. The study, published in *Nature* today, reveals a possible new therapeutic pathway for people who suffer from type 2 diabetes. "We had no idea that this molecule would have this effect," says Michael Downes, a diabetes researcher at the Salk Institute for Biological Studies in California and a co-author of the study. "But it appears that the molecule restores insulin sensitivity in diabetic mice." In the study, researchers injected mice with a protein called fibroblast growth factor 1 (FGF1). This procedure allowed the animals to use insulin normally for a period of about seven days, without experiencing the kinds of side effects — weight gain and bone loss — typically associated with other drugs that restore insulin function, Downes says. "And it worked fine at repeated injections, over a period of about a month." These results are preliminary, however, and it remains to be seen if FGF1 would have the same effect in humans. It's also unclear exactly how FGF1 was able to achieve this result, so the researchers will need more time to determine the mechanism that underlies the treatment — and whether or not it alters oth-



er processes in the body. "The findings described in the article are very interesting and valuable," says Carles Lerin Martinez, a diabetes researcher at Hospital Sant Joan de Déu in Barcelona who did not participate in the study. "Much effort is being devoted to finding novel strategies to treat type 2 diabetes, and insulin-sensitizers hold big promise," adding that "in my opinion there are enough data to support their conclusions." But Marc Prentki, director of the Montreal Diabetes Research Center, isn't as enthusiastic about the therapy. "A very important effect they see with FGF1 is a dramatic reduction in appetite that is transient... and lasts about two weeks," he wrote in an email to *The Verge*. The pharmaceutical "industry would be very worried by that," he says, because of fears that appe-

tite suppressors can lead to depression. "Overall I think they have an insulin sensitizing effect independent of appetite, but [reduced] appetite explains much of their beneficial effect independently of insulin action." But Downes says that the feeding effect isn't much of a concern because it isn't permanent. "It's only a temporary effect." The researchers have a lot of work ahead of them, but Downes says he hopes to test FGF1 on humans within the next five years. "This represents another possible therapeutic pathways for pharmaceutical companies to look at," he says. "We feel that this has unique properties that need to be investigated."

**Nature 2014,
doi:10.1038/nature13540**



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From Science to Science: Lessons Learned from the Disappearing Plastic Gyres
Haibo Wu, Wei Wang, Shiqin Xu

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From Science to Science: Lessons Learned from the Disappearing Plastic Gyres

Haibo Wu,^{*,1} Wei Wang,^{*,1} Shiqin Xu^{*,Δ}

SUMMARY In scientific age we are experiencing daily changes with unbelievable speed, yet we are also paying back for the sequence that science caused. It is may be a joke for our human being. When the first plastic bag was used in the supermarket decades ago, people appraised it as a record-broken invention. We must say yes that plastic products truly help us much in each field, but are the benefits of the plastic really outweigh the harmful effect on our daily life and health? The newly reported report said it was hard to give an in-depth evaluation of the long-term impact of plastic debris consumed by marine creatures on our ecosystems. It is only an example, but the real thing we today should consider is that what the potential effect of the science development on us, and on the whole biological system. If we need pay two dollars back to solve the problems arose from the one-dollar original cost, is it reasonable? The fact we now facing is exactly as this. Today's scientific work potentiates us far more spending on the science-related acts. ■

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Keywords: Plastics - Lesson - Science - Cost

THE appearance of the plastics makes our daily life be convenient at the expense of the environment “white pollution”. The modern period has been dubbed the “Plastic Age”. People use it, but they do not know how to treat it at the earlier period of time the hard-to-be-decomposed material was made. Today, you can hear word “recyclable” everywhere, and also more and more nations recognize the potential hazard of plastic prod-

ucts on our health and the surrounding settings and consequently various regulations and laws were released for controlling the use of plastic, at least it should be made of recyclable material and labeled apparently on the products with the “Recyclable Logo”.

In the early time of the usage of the plastics, tones and tones of different plastic waste were discarded and eventually piled up or streamed down into ocean; some of the detritus were

carried by the storm water runoff. Ocean currents, acting as giant conveyor belts, then carry the plastic into several subtropical regions, such as the infamous vast midocean “gyres” – Pacific Ocean Garbage Patch. In the 1970s, the National Academy of Sciences of America estimated that about 45,000 tons of plastic reaches the oceans every year. Since then, the world's production of plastic has quintupled.

When people do not know what should be done on these giant floating mass, one interesting thing happened as reported by the scientists from the University of Cadiz in Spain and University of Western Australia in Australia: the plastic garbage littering the surface of the ocean may be disappearing. Decades ago, it was scientists made it – the plastic; decades later, it was also scientist said that it is disappearing. Exactly what is happening to this ocean debris is a mystery, though the researchers hypothesize that the trash could be breaking down into tiny, undetectable pieces. Alternatively, the garbage may be traveling deep into the ocean's interior.

Most of the ocean's floating plastic is expected to be microscopic in size due to broken down by the action of waves and radiation from the sun, but the scientists behind the study used very fine mesh nets that should have been able to pick up even these minuscule fragments. Instead, scientists considered the missing millions of tons could be entering the stomachs of marine animals. It is believable that the small sized were consumed by the ocean biological systems even they don't want to swallow the debris. One ascertained thing is that the plastic pollution in surface waters can more easily interact with the ocean life, because the surface layer of the ocean hosts most of the marine organisms as the researcher pointed out. In addition, small fish



like lanternfishes may be eating some of the small plastic pieces, dubbed microplastics, and breaking them down even more. However, as the important ecological link between plankton and small vertebrates, small fish are eaten by the bigger commercial fish such as swordfish and tuna. Therefore, it is of importance to understand whether the absorption of toxins from the plastic will impact these animals' health.

Scientists noted that the potential impact of the plastic is on us because we human being also are the part of the food web when the tiny plastic enter the global ocean food web. Given the suck-up property of plastic on the pollutants in the water, so it is hard to predict the possible damaging effect on our health when they consumed by parts of the living marine life of the food chain. This effect may be short-term or may be long-term. No matter what happened on the missing plastic, on ascertained fact is that fish and other marine creatures are eating the plastic waste is “indisputable”. With millions of tons of plastic going unaccounted for in our oceans, and the uncertain consequences of animals ingesting such material.

Researchers drew their conclusion about the disappearing trash by analyzing the amount of plastic debris floating in the ocean, as well as global plastic production and disposal rates. The study outlines the findings of scientists who trawled the waters around five large ocean gyres in 2010 and 2011. The data they obtained put them far short of the expected amount of plastic in the ocean – rather than millions of tons, the global load of ocean plastic was calculated at 40,000 tons at most. Because each large piece of plastic can break down



into many additional, smaller pieces of plastic, the researchers expected to find more tiny pieces of debris. But the vast majority of the small plastic pieces, measuring less than 0.2 inches (5 millimeters) in size, were missing, as the researchers said.

Even though the deep ocean is a great unknown, one thing needs to be assured is that our people is changing it using our so-called “scientific way”. When plastic materials were synthesized and different plastic products were slide out from the assembly line, and tons of used were thrown away into ocean, who considered the potential impact of such behavior on our life today? Scientists spent time and money to make them, but in turn scientists spent much more time and money to find their impact on our daily health. However, the worst thing is that it has been being deeply invaded into our life. Sadly, the chronic accumulation of plastic particles would be modifying our surrounding mysterious ecosystem, not only the ocean system, but also the whole biological system before we totally know it. ■

Conflict of Interests

None

Acknowledgements

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Working like a worker bee?
Relax yourself.....

Bird with Largest Wingspan

By Bruce Museum, FRANCE



Researchers have discovered the remains of an absolutely enormous bird that lived over three million years ago. With a wingspan of 20 to 24 feet — well over the length of a car — the researchers believe that it likely had the largest wingspan of any bird to have ever lived. The current wingspan record is held by the wandering albatross, at about 12 feet, and this fossil nearly doubles that. For the researchers, it's a surprising discovery because this new bird's wingspan exceeds what they believed to be a theoretical maximum for length. The fossil was discovered back in 1983, but it's now being described by a researcher from the Bruce Museum in a paper published in the Proceedings of the National Academy of Sciences. The bird has been named *Pelagornis sandersi*, and it's said to be one of a number of giant birds that lived across the globe for around 10 million years before vanishing. "Pelagornithids were like creatures out of a fantasy novel," Daniel Ksepka, the paper's author, says in a statement, "there is simply nothing like them around today." ■



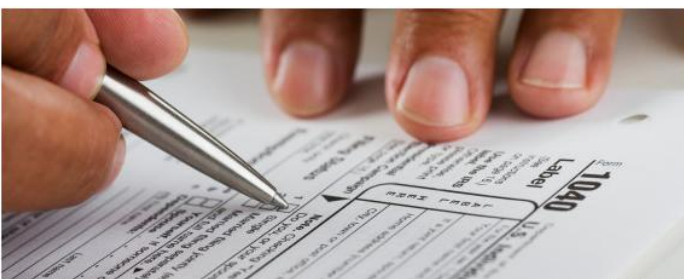
**When you face the eruption
Do you feel the ending of the world?**

Are These Laws That Really Could Be Ignored Now by Christians?

WHEN The Lord created man and built up the decrees and commandments with Moses, the ancient Israelites followed them strictly. After Jesus died and resurrected from dead three days later, and his apostles acted for spreading God's savior to others including gentiles, the word "Christian" formed that time. Today's science does not say yes to all of these events, but they really exist in this world. We have too much mystery lacking reasonable explanation, and we have too much thing without reliable answer, and we have too much difficulty facing everyday that cannot be solved using our human manners. What, therefore, is the real hand controlling all of these? When Christians worship in church and prayer in heart, they believe in that their words can reach to The Lord. They have many decrees and commandments with the holy God, but whether they all obey them or need to do so?

Taxes

Jesus told his people gave to Caesar what was Caesar's, and to God what is God's. We need follow this as The Lord gave this to us. Why should religious pacifists be compelled to pay taxes that subsidize war? Why should the bible for dorm-room free-market evangelists be forced to support the evil that is government? For the Christians, they really need weigh these before doing.



Stoning

In Old Testament, stoning was used for those considered as the impure in their words and the Bible

is packed with tales of impure women meeting a just end under a pile of stones. Today, in certain countries, they are known as honor killings. Will the court make an exception to murder for the deeply religious? However, these crazy religious followers are not the real believers of God because God loves all of us.



Genital Mutilation

The Lord gives the Christians they need, but The Lord does not tell people do crazy thing even for the circumcision. Female circumcision – more commonly and accurately known as genital mutilation – is central to the practice of some religions, according to some people who have strong beliefs. What is a democracy to tell people otherwise? In fact, the same could go for domestic violence, polygamy and whatever else.



Nudity Laws

When Adam and Eve ate from the tree of knowledge, they then knew they were naked, and The Lord made garments of skin for them and clothed them. Today's freedom idea makes feel no free. Some

colonies of people are dedicated to the belief that being compelled to wear clothes is wrong. Others even don't believe they should be compelled to make love only indoors. Wish God's words can reach their heart that this law should not be broken.



Growing Hemp

The worldly thing is against the laws of the God. When the marihuana became legal in some states and increasingly accepted by some religious people, they have forgotten God's words. If you have ever talked to a hemp evangelist, you know belief in the crop borders on the religious.



Domestic Violence

Love you wife as yourself. As Deuteronomy 25:11-12 testifies, "If two men are fighting and the wife of one

of them comes to rescue her husband from his assailant, and she reaches out and seizes him by his private parts, you shall cut off her hand. Show her no pity."



Pasteurized Milk

God gives us the milk for drinking and for health. God also does not want to see you are sick due to the unpasteurized milk. For some Amish folk, following a strict religious interpretation of "Do unto others what you would have others do unto you" means selling raw, unpasteurized milk, a practice banned under U.S. law for its potential to carry dangerous bacteria such as salmonella, Escherichia Coli and Listeria monocytogenes.■



help those in need...



Stop wasting foods



Pancreatic Cancers Could Be Prevented by Lifestyle Changes

ALMOST 40 per cent of pancreatic cancers – one of the deadliest forms of cancer – could be avoided in the UK through maintaining a healthy weight and not smoking according to Cancer Research UK, in a call to arms against the disease. Every year 8,800 people are diagnosed with the disease in the UK but survival rates remain very low, with only three per cent of people diagnosed with pancreatic cancer surviving their disease for five years or more after their diagnosis. Cancer Research UK has made pancreatic cancer research a priority, and has the bold ambition to more than double its annual spend of £6million on research into the disease over the next five years. The charity is investing in fundamental biology investigating how the cancer spreads as well as trials looking at boosting the effectiveness of the standard chemotherapy treatments in pancreatic cancer patients.

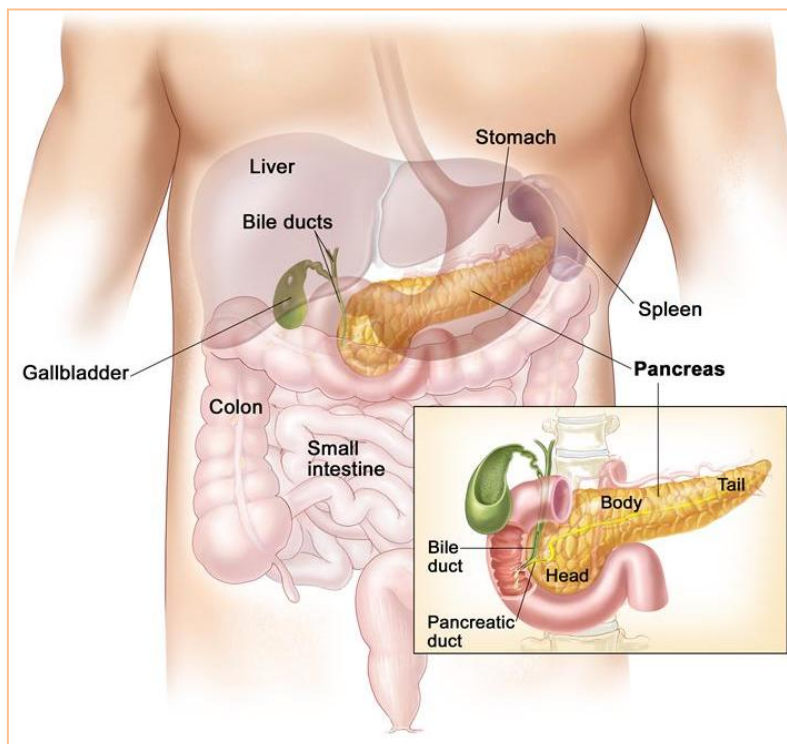
While more research is needed to find better ways of diagnosing and treating the disease, there is evidence to suggest that some pancreatic cancers are linked to being overweight and to smoking – and almost four in 10 could be prevented by lifestyle changes to address this. Sara Hiom, Cancer Research UK's

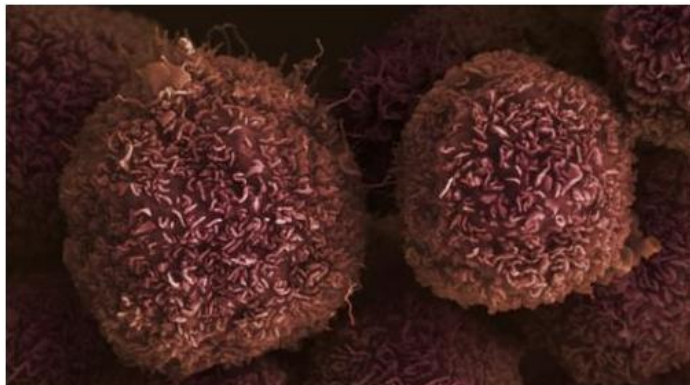
director of early diagnosis, said: "Cancer is a complex set of diseases. For some, lifestyle can play an important role, and is one aspect of the disease that we have some control over. Pancreatic cancer is a disease with poor outcomes and is less well understood, so it's important that we talk about the things people can do to stack the odds in their favour and reduce their risk."

Professor Jeff Evans, a clinician and researcher at Cancer Research UK's Beatson Institute in Glasgow, said: "As a clinician it's devastating when I have to tell a patient with advanced pancreatic cancer that there are limited treatment options that can help them. "Survival for this disease remains shockingly low and this has to change. There's an urgent need to tackle pancreatic cancer head on by building up an armoury of effective new treatments – and developing ways to diagnose this disease

sooner, when surgery is more effective.

"At the same time it's important to remember that people can take steps to reduce their risk of developing pancreatic and other cancers, by not smoking and by keeping a healthy weight – especially if you are prone to carrying too much around your middle. "Keeping physically





active and cutting down on red meat may also help reduce the risk." Richie Birch, 55, from North Wales said: "I'm one of the lucky ones. This disease claimed my mother's life but I'm still here five years after I was diagnosed with pancreatic cancer. Most people are not so lucky, which is why we need to shine a spotlight on pancreatic cancer research. "My mother smoked until the day she died and I used to smoke too, but we don't know if it was the cause. Now, I

would definitely urge people not to smoke and to be more healthy with their diet and exercise. It's so important to be aware and do everything you can."

Harpal Kumar, Cancer Research UK's chief executive, said: "Pancreatic cancer is rarely in the spotlight. Unlike most other cancers where we've seen survival rates climb, outcomes for pancreatic cancer remain desperately poor. This is why Cancer Research UK has made this terrible disease a research priority in our recent strategy, and we plan to more than double the amount we spend on pancreatic cancer research over the next few years. "There is a long way to go, so we intend to move quickly to ensure that we make as rapid progress as possible in fighting this devastating disease."■



RIOT

TODAY'S WORLD

who should pay for this...



FREEDOM



AUTHOR GUIDE

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