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Istanbul Opens World's Largest Earthquake-Safe Building

The world's largest seismically isolated building, the new international terminal at Istanbul's Sabiha Gökçen Airport, is now complete and open for business.

Stretching across more than 2 million square feet, the terminal doesn't sit directly on the soil, but rather on more than 300 isolators, bearings that can move side-to-side during an earthquake. The whole building moves as a single unit, which prevents damage from uneven forces acting on the structure.

"What an isolation system does is that it enables the building to move through large displacements in unison, and in doing that, you absorb earthquake energy," said Atila Zekioglu, the engineer at the firm Arup, who designed the building.

Earthquakes accelerate buildings laterally, whipping them back and forth. Isolators (see photo below) slow down the motion of the building. In the case of the new terminal, the building will only have to withstand one-fifth of the acceleration that it would have had to without the earthquake proofing.

A devastating magnitude 7.4 earthquake struck Istanbul on August 17, 1999 killing 17,000 people and causing billions of dollars in property damage. Scientists estimate it's more likely than not that the city will be hit by another large quake in the next 30 years. Istanbul is located near the confluence of the Arabian, African, and Eurasian plates. The North Anatolian Fault runs less than 15 miles south of the city. So, like Los Angeles, San Francisco, and a host of other Pacific Rim cities, Istanbul's builders and planners have to take major earthquake precautions.

Luckily, designing structures for that kind of performance has become cheaper and easier. Increased computing enables better simulations of how buildings will act when an earthquake hits.

Zekioglu and his team ran their building designs through 14 different simulations of earthquakes.

"What we have done over the years is that there are many tests going around the globe in terms of shake tables, testing labs, and what we do is we take that data... test the ability of our seismic simulation software," he said.

This software, called Dyna, was originally developed at Lawrence Livermore National Laboratory in the 1970s. It can be used to model

what will happen to materials under all kinds of conditions from car crashes to earthquakes to bomb blasts.

The software has allowed engineers like Zekioglu to go beyond simply satisfying the building codes to designing buildings that will really meet the objectives of the structure's owners. You don't just want an airport (or a hospital) to stay standing after an earthquake, you want it to be functional.

The Istanbul project is quite similar to what was done with the San Francisco Airport's international terminal, said Michael Constantinou, a seismic isolation expert at State University of New York at Buffalo, but it uses a newer kind of seismic isolation device.

"This is one of the first projects, at the time they started this thing, to use this advancement," Constantinou said.

The new type, triple friction pendulum isolators manufactured by Earthquake Protection Systems in Vallejo, are more compact and can reduce the cost of constructing a building, he said. Many buildings, including three new hospitals in the San Francisco Bay Area, are now incorporating the new isolators.

Constantinou also highlighted a more general advantage that seismically isolated buildings have: They are actually easier to design because it's very difficult to quantify how and why a structure will collapse.

"You are designing so that the structure will remain undamaged, and that's much easier to understand," he said.

The new terminal is designed to withstand an earthquake as strong as 8.0.

Images: 1) The new terminal/ARUP. 2) Seismic situation near Istanbul/USGS. 3) The triple pendulum slider/ARUP.

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- [Massive Fake Quake Shakes 6-Story Condo](#)
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Sushi DNA Tests Reveal Fraud

A biologist walks into a sushi bar and orders some tuna. What does he get? Escolar, a nasty fish with buttery flesh that can cause bizarre episodes of diarrhea, accompanied by a waxy intestinal discharge.

It's not a joke. It happened five times to the same scientists during a brief research project. The results of that study were published Wednesday in *PLOS One*.

"A piece of tuna sushi has the potential to be an endangered species, a fraud or a health hazard," wrote the authors. "All three of these cases were uncovered in this study."

The team of researchers from Columbia University and the American Museum of Natural History ordered tuna from 31 sushi restaurants and then used genetic tests to determine the species of fishes in those dishes. More than half of those eateries misrepresented, or couldn't clarify the type of fish they were mongering. Several were selling endangered southern bluefin tuna.

Although their results were shocking, exposing sloppy sushi joints wasn't their main goal. The scientists were trying to improve on a new species-identification technique, called DNA barcoding. A coalition of labs has been collecting fish, reading their genes and uploading the information to a database called FISH-BOL.

Their goal is to build a catalog of every fish species on earth so that anyone with a handheld DNA reader could definitively identify fish within minutes. Wildlife officials could use that technology to spot-check fish markets, and fine people who are selling protected species.

Right now, the FISH-BOL database is roughly 20 percent complete, but zoologists can't seem to agree upon the best way to condense the genetic information from each fish into a concise signature. That's where this study comes into play. By checking 14 carefully selected spots on a gene called *cox1* and matching them up with the database, the scientists could accurately identify any kind of tuna.

Citation: Lowenstein JH, Amato G, Kolokotronis S-O, "The Real maccoyii: Identifying Tuna Sushi with DNA Barcodes – Contrasting Characteristic Attributes and Genetic Distances." PLoS ONE 4, 11, 2009, e7866.

*Photo: Spicy tuna roll
stuart spivack/Flickr*

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- [ID Error Leaves Fish at Edge of Extinction](#)
- [Tuna Ranch Hormone Cocktail Could Save Bluefin](#)
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Ghostly Bones of Galactic Feast Revealed

A new infrared image of the galaxy Centaurus A reveals the gassy, ghostly bones of a galaxy that it consumed several hundred million years ago.

The parallelogram of stars leftover from the collision had been obscured by dust. But using new processing techniques in the near-infrared part of the spectrum, European Southern Observatory astronomers were able to glimpse the leftovers of the cosmic dinner.

“There is a clear ring of stars and clusters hidden behind the dust lanes, and our images provide an unprecedentedly detailed view toward it,” said Jouni Kainulainen, in a [paper on the new data](#) visualized in the image. “Further analysis of this structure will provide important clues on how the merging process occurred and what has been the role of star formation during it.”

The black hole lurking in the center of Centaurus A, 11 million light-years away, is 50 times as massive as the one at the center of the Milky Way. It’s one of the most active source of radio waves in the universe, which is why astronomers have pointed [all kinds of telescopes](#) at it and eventually revealed the basic features of the galaxy that [Centaurus A had consumed](#).

Image: ESO using the New Technology Telescope at the La Silla Observatory.

See Also:

- [Spectacular New Image of Black Hole Jets](#)
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When Good Rockets Go Bad

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In the grand scheme of human space programs in Russia and the United States, catastrophic failures are relatively rare. But they are often quite spectacular and make a big impression on the public and on the funding for space exploration. The explosions in the videos we've assembled here were very costly, some in terms of life, some in terms of lost equipment and all in terms of progress of the space programs.

Vanguard TV3 Fuel Tanks Explode

Dec. 6, 1957: The United States' first attempt to launch a satellite into orbit was also its first failure. Two seconds after leaving the launch pad at Cape Canaveral, this rocket lost thrust and sank back down, rupturing and exploding its fuel tanks. It had reached a height of about 4 feet.

Though the rocket was destroyed, the Vanguard satellite it was carrying was thrown clear, its transmitters still signaling. The satellite is now on display at the Smithsonian's Air and Space Museum.

Video: NASA

Malaria Gaining Resistance to Best Available Treatment

WASHINGTON — Malaria that is resistant to the best available drug is more widespread in Southeast Asia than previously reported, new research shows. The worrisome finding poses a risk that travelers could carry this strain of the malaria parasite to other parts of the globe and unwittingly spread it, scientists reported Nov. 19 at a meeting of the American Society of Tropical Medicine and Hygiene.

The frontline drug in question is called artemisinin, the most potent medication currently in use against malaria. Signs of malarial resistance to artemisinin have surfaced over the past several years in Cambodia (*SN: 11/22/08, p. 9*). The new findings confirm that resistant malaria has now cropped up beyond a spot on the border of Thailand and Cambodia where it was initially detected. Now it has appeared in Vietnam and in two spots along the Burma border with Thailand and China.

“Things are changing. There’s no doubt the signs are concerning,” said Robert Newman, director of the Global Malaria Programme at the World Health Organization in Geneva. But he added that these signals are early and need further verification.

Patients in these areas take longer on average to overcome a malaria infection when given a standard combination of artemisinin and another antimalarial. This lag results from slower clearance of the malaria parasites from the blood, said WHO’s Pascal Ringwald, a medical officer who presented the update.

Patients who remain ill for longer stretches despite treatment need extra medication to recover from malaria and are also more likely to have severe or fatal cases, Ringwald said.

Malaria is caused by a single-celled parasite that infects the blood. Symptoms include fever, headache, chills, anemia and a swollen spleen. Of the more than 350 million people who come down with malaria worldwide each year, up to 1 million die. Mosquitoes spread the parasite from person to person.

Malaria has a history of becoming resistant to drugs, and artemisinin now risks becoming the most recent addition to that list. The new reports are disheartening to doctors because artemisinin normally packs a considerable wallop. Although artemisinin is a short-acting drug that gets cleared from the body in a few hours, it makes the most of its time — driving down parasite levels dramatically.

Using artemisinin alone invites resistance. So the standard therapy teams it with one of the longer-acting drugs, which perform mop-up duty on the remaining parasites, said Christopher King, a physician and epidemiologist at Case Western Reserve University in Cleveland.

The new flashes of resistance may have arisen because combination treatment isn't always available. And since artemisinin can be bought over the counter in many parts of Asia, people seeking relief don't always follow the WHO guidelines of pairing artemisinin with another drug, King said.

Also, taking artemisinin for a fever that isn't caused by malaria can allow resistant strains of the parasite to take hold, Newman said.

In the past, malaria's resistance to other drugs has been linked to specific genetic changes in the parasite. The precise mechanism underlying resistance to artemisinin is still unsolved, King said.

Artemisinin is derived from extracts of the sweet wormwood bush. The bush's leaves have been used as a folk remedy against fevers for roughly 2,000 years in Asia but fell out of use in the 20th century with the introduction of modern antimalarial drugs such as chloroquine.

During the Vietnam War, North Vietnamese leader Ho Chi Minh appealed to China for traditional remedies for soldiers who had malaria. Tea made from sweet wormwood leaves worked and ultimately became the basis for artemisinin drugs. It's not clear whether parasites in Southeast Asia are the first to become resistant because they have had a long history with artemisinin, or if other factors are involved, Newman said.

Image: Malaria from Plasmodium falciparum. Flickr/Got Jenna

See Also:

- [Malaria Jumped to Humans From Chimpanzees](#)
- [New Hope for Anti-Malaria Mosquito](#)
- [Bush Triples Funding for AIDS, Malaria and Tuberculosis](#)
- [A Better Mouse Model for Malaria — and Maybe a Vaccine](#)
- [GM Mosquitoes Nearing Widespread Release in Malaysia](#)

Dung Fungus Provides New Evidence in Mammoth Extinction

The latest evidence in the disappearance of the mammoths, and nine other North American species weighing over a ton, comes from fossilized dung fungus. But despite their lowly origin, if the new findings hold, they point away from human causes and could rule out an asteroid impact altogether.

By studying the abundance over time of a fungus that lived only in the dung of these animals, scientists have revealed that the animals began to decline in numbers earlier than previously believed.

Much of the uncertainty surrounding the extinction of the North American megafauna, which includes mastodons, saber-tooth tigers and giant ground sloths, is due to a scarcity of evidence and difficulty pinning down the timing of events. Several major events occurred around the same time the animals disappeared: Major environmental upheaval associated with the end of the Ice Age; an asteroid explosion over North America; and the arrival of man.

Because the youngest megafauna fossils found are around 13,300 to 12,900 years old, the asteroid which is hypothesized to have impacted Earth's atmosphere around 12,900 years ago seemed like a good bet for the cause of the extinctions. But, the short-lived Clovis culture inhabited North America around the same time.

Now the new study, led by scientists at the University of Wisconsin-Madison and published Thursday in *Science*, fills some holes with a different type of data. By studying the abundance over time of a particular fungus that produces spores in the dung of big herbivores, a team of scientists determined that the animals' major decline occurred much earlier.

"Megafaunal populations collapsed from 14,800 to 13,700 years ago, well before the final extinctions," the authors wrote.

This effectively exculpates the asteroid impact, and makes the case for human causes thinner.

"If people were responsible for the decline, they must have been pre-Clovis settlers," Christopher Johnson, who studies the extinction of the Australian megafauna at James Cook University in Queensland, wrote in a commentary in *Science*.

Though the Clovis people were long believed to be the first North American settlers, new evidence of earlier settlers that arrived around the time that the fungus shows the decline beginning has begun popping up.

The idea of a pre-Clovis peopling is still hotly debated, but even if it didn't exist or wasn't robust enough to have a major effect on the animals, the Clovis people could have dealt the final blow or contributed to the ultimate demise of the megafauna.

The scientists also studied pollen from the time period and discovered that as the large herbivores declined, a new set of broad-leaved trees began flourishing. This woodland could have arisen because the animals that fed on those plants and kept them in check weren't around anymore. And because these major changes in the environment occurred after the animals were in decline, this is a strike against the idea that climate caused the changes which then caused the extinctions.

The new research adds much needed information to a spotty fossil record and scattered clues. But the question of whether or not humans caused the demise of North America's giant beasts has always provoked strong feelings and intense debate, and this latest evidence is likely to stir things up more than it helps settle them.

Image: Mastodons, giant ground sloths and camels./Barry Roal Carlsen, University of Wisconsin-Madison

Citation: "Pleistocene Megafaunal Collapse, Novel Plant Communities, and Enhanced Fire Regimes in North America," by J.L. Gill; J.W. Williams; K.B. Lininger at University of Wisconsin-Madison, WI; S.T. Jackson at University of Wyoming, Laramie, WY; G.S. Robinson at Fordham University. Science Vol. 326, Nov. 20, 2009.

See Also:

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Farmer Ants Fertilize Their Gardens With Bacteria

Thanks to their vast underground fungus farms, leafcutter ants are one of Earth's most successful species — and one secret of their agricultural success is bacteria, which the ants use like fertilizer.

By farming with microbes that pull nitrogen from the air, the ants thrive in nitrogen-poor rain forest soil. Researchers say their bug-harnessing tricks might point people toward better ways of turning plants to fuel, or boosting our own crop yields.

“The reason we're able to produce such massive crops is by the massive fertilization of nitrogen in our fields,” said University of Wisconsin bacteriologist Cameron Currie, co-author of a paper published Thursday in *Science*. “Ants supplement their crops through symbiotic associations with bacteria.”

A star of rain forest documentaries, leafcutter ants are one of about 250 ant species that subsist on farmed fungus. Most of these species live in colonies of a few thousand individuals, with tiny garden plots.

Leafcutter colonies have millions of members, with leaf-fed farms yielding more than a ton of fungus every year. Some scientists estimate they account for a full four-fifths of all living, nonplant rain forest matter.

Fascinated by their success, researchers have studied leafcutter gardening, but something wasn't adding up. Though Earth's atmosphere is nitrogen-rich, animals get their nitrogen by eating plants, or eating animals that eat plants. But rain forest foliage is nitrogen poor, as are the soils colonized by the ants.

“Nitrogen is one of the elements that ultimately determines productivity,” said Currie. “The nitrogen balance in ants is way off, based on what's predicted from their diet.”

Currie's team investigated the mystery of where the ants were getting their extra nitrogen by raising leafcutter colonies in airtight boxes. The soil in the boxes contained normal nitrogen. But the nitrogen in the air was replaced with a nitrogen atom with a different number of neutrons, called an isotope. By measuring the levels of the isotope in fungus and ant bodies, the researchers could track whether nitrogen was coming from the soil or the air.

They found that the fungus was getting nitrogen from the air. They then studied bacteria growing on the fungus, and found microbes from a

genus called *Klebsiella*, which pulls nitrogen from the air at rates comparable to microbes that live on the roots of some plants.

“It’s entirely possible that nitrogen-fixing bacteria played a critical role in the evolution of this very different group of ants, with their giant colonies and massive effects on the environment,” said Ted Schultz, a Smithsonian Institute entomologist who was not involved in the study. He and Currie both noted that leafcutters are uniquely complex among fungus-growing ants, but evolved just 10 million years ago, or 40 million years after other fungus growers.

“What humans do for nitrogen is mine it from other sources, and dump it on our crops,” said Schultz. But this leads to waste and pollution, “and the ants accomplish it through microbes. Who knows? Maybe humans could do something similar, and cultivate microbial communities in the soil around our crops.”

And this isn’t the only trick farmers might learn from the ants. In March 2008, Schultz showed that leafcutters also use antibiotic-producing microbes to keep their gardens pest-free.

Currie is studying whether nitrogen-fixing bacteria help break down the ants’ leaf cuttings into a fungally-digestible form. If so, the bacteria may suggest better ways of turning plants into biofuels. “We need to discover new enzymes, new processes, to convert plant cell walls into simple sugars that can be converted into ethanol,” he said. “Ants have been converting plant biomass into energy for millions of years.”

Currie added that leafcutter ants are the subject of thousands of papers authored over the last century, “yet this critical aspect of their success was completely unknown.”

“This is a well-studied natural system, and we’re still learning who the players are,” he said. “What does that say about most of the natural world, where mutualisms and associations haven’t been studied?”

Images: 1) A leafcutter ant tending fungus, from Cameron Currie. 2) The nitrogen-tracking test apparatus, from Science. 3) An excavated leafcutter colony, from Science. 4) Leafcutters returning to their colony with freshly cut leaves, from Jarrod Scott.

See Also:

- [Could Ants Hold the Key to Sustainable Agriculture?](#)
- [Taking Traffic Control Lessons — From Ants](#)
- [A Brief History of the Superorganism, Part One](#)
- [A Brief History of the Superorganism, Part Two](#)

- Cockroach Superpower No. 42: On-Board Nitrogen Recycling
- Future of Fertilizer

Citation: "Symbiotic Nitrogen Fixation in the Fungus Gardens of Leaf-Cutter Ants," by Adrián A. Pinto-Tomás, Mark A. Anderson, Garret Suen, David M. Stevenson, Fiona S. T. Chu, W. Wallace Cleland, Paul J. Weimer, Cameron R. Currie. Science, Vol. 326, No. 5956, Dec. 20, 2009.

Brandon Keim's Twitter stream and reportorial outtakes; Wired Science on Twitter. Brandon is currently working on a book about ecosystem and planetary tipping points.

ID Error Leaves Fish at Edge of Extinction

In an extinction scenario that might have been concocted by Douglas Adams or a taxonomically minded Kafka, a classification error has allowed fishermen to drive a species of skate to near oblivion.

If it vanishes, the flapper skate will be the first fish officially exterminated by commercial pressures — and for the last 83 years, it wasn't even considered a species.

Biologist R.S. Clark declared in 1926 that the flapper skate, formally known as *Dipturis intermedia*, and the blue skate, or *Dipturus flossada*, were actually the same animal. His classification was widely accepted, and the two species were lumped together as the common skate.

But when French Museum of Natural History biologist Samuel Iglesias decided to review Clark's assessment, he noticed that common skates often look quite different. Genetic analysis backed up his suspicions: Clark was wrong.

The flapper skate and blue skate really are different species. And that means trouble, because overfishing had already pushed the common skate to critically endangered status — a prognosis that now seems optimistic.

Instead, continued reports of rare common-skate catches have obscured the flapper skate's even-nearer-total collapse. According to Iglesias, whose analysis will be published in an upcoming issue of *Aquatic Conservation: Marine and Freshwater Ecosystems*, immediate action is necessary to save the flapper skate.

Otherwise it will go extinct, soon — and if it weren't for Iglesias, nobody would have known.

Image: Flickr/DanCentury

See Also:

- [Saving Fish is Possible, Unless They're Past the Tipping Point](#)
- [Hacking Salmon's Mental Compass to Save Endangered Fish](#)
- [Climate Change Caused Radical North Sea Shift](#)

Citation: "Taxonomic confusion and market mislabeling of threatened skates: important consequences for their conservation status." By Iglésias S.P., Toulhoat L., Sellos D.Y. Aquatic Conservation: Marine and Freshwater Ecosystems, in press.

Brandon Keim's Twitter stream and reportorial outtakes; Wired Science on Twitter. Brandon is currently working on a book about ecosystem and planetary tipping points.

Plants Have a Social Life, Too

After decades of seeing plants as passive recipients of fate, scientists have found them capable of behaviors once thought unique to animals. Some plants even appear to be social, favoring family while pushing strangers from the neighborhood.

Research into plant sociality is still young, with many questions unanswered. But it may change how people conceive of the floral world, and provide new ways of raising productivity on Earth's maxed-out farmlands.

"When I was in school, researchers assumed that some plants were better or worse than others at getting resources, but they were blind to the whole social situation," said Susan Dudley, a McMaster University biologist. "I went looking for it, and to my shock, found it. And we've found more of it since."

In a paper published in the November *American Journal of Botany*, Dudley describes how *Impatiens pallida*, a common flowering plant, devotes less energy than usual to growing roots when surrounded by relatives. In the presence of genetically unrelated *Impatiens*, individuals grow their roots as fast as they can.

Acknowledging relatives in this way is an example of kin recognition. It's common in the animal world, and is a precursor to kin selection, in which animals help their familial group, not just themselves. Dudley thinks plants have kin selection, too. It's a controversial idea, but that it's even being debated shows how far research into plant sociality has come.

When Dudley was in school in the 1980s, the very idea of plant sociality was practically taboo among scientists. It had burst into popular consciousness a decade earlier with the publication of *The Secret Life of Plants*, a New Age classic which also discussed orgones and dowsing. Later studies on "talking trees" went unreplicated, and the idea fell into disrepute.

But even if full-blown sentience was a silly idea, research on plant communication gathered. Much of it described how plants defended themselves, producing toxins and concentrating resources on their immune systems when unrelated neighboring plants were eaten. That clearly involved some sort of chemical signaling. Further studies conclusively showed plants were able to recognize themselves. Whether plants might respond to their relatives became a legitimate and intriguing question.

The answer isn't only of concern to people with imaginations stirred by thoughts of chatting flora. It could provide a whole new perspective on plant behavior and evolution. By providing insights that improve agricultural productivity, studies of kin recognition could literally bear fruit.

"We know that in the animal world, kin recognition and selection plays a very important role for family structure, altruistic behavior and those kinds of things," said Hans de Kroon, a plant ecologist at Radboud University in the Netherlands. "It's so prominent in the animal literature. Once we start to discover that plants can recognize their kin, there's a whole set of hypotheses we can apply to studying plants, that nobody ever thought to."

The field's landmark paper came from Dudley's laboratory in 2007, when she showed how American searocket plants accelerated their root growth when placed in pots of strangers, but slowed it down when potted with siblings. Were they animals, they'd be described as sharing water and food.

In a *Communicative and Integrative Biology* paper published in October, University of Delaware biologists Harsh Bais and Meredith Biedrzycki tried to isolate the means of recognition by exposing *Arabidopsis thaliana* seedlings, each in its own pot, to root secretions from other *Arabidopsis* plants. The signal indeed proved to be in the roots — and just as Dudley had seen, growth patterns varied according to whether secretions came from genetically unrelated plants, or family.

Intriguingly, the plants in Dudley's latest study were potted separately and unexposed to each others' secretions, suggesting that their leaves emit chemical signals, as well as their roots. That's supported by the research of University of California, Davis ecologist Richard Karban, who in a June *Ecology Letters* study showed that sagebrush boosts its immune system when exposed to the damaged cuttings of a related plant [pdf]. It seems to hear warnings from its kin.

More studies are needed to show exactly what sort of benefits are provided by these signaling and response systems. De Kroon said kin recognition doesn't necessarily mean kin selection: maybe the plants are communicating, but it doesn't do them much good in practice.

One of Dudley's students, Amanda File, is now studying whether some trees favor their own progeny, which might grow best near their parents. Dudley and graduate student Guillermo Murphy, a co-author of

the *American Journal of Botany* paper, are looking for for kin selection in invasive plants.

“We’re testing the hypothesis that invasive plants evolve greater altruism within their populations, allowing them to be better invaders of their new habitats,” said Dudley.

For plants used in agriculture, Dudley recommends kin recognition studies to see whether certain arrangements of relatives and strangers would be especially productive. De Kroon is looking at multi-species mixes. Karban hopes to use communication insights to engineer natural defense systems against pests.

“Maybe we thought before that only humans could do certain things, or vertebrates, or animals,” said Karban. “Plants are capable of much more sophisticated behavior than we assumed.”

Images: 1) Mustard seedlings exposed to root secretions/Harsh Bais. 2) Impatiens seedlings grown next to relatives and strangers/Susan Dudley.

See Also:

- [Plants Know Their Relatives — And Like Them!](#)
- [Crowdsourcing for Plants](#)
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Mummy Scans Show Heart Disease Was Rampant

ORLANDO, Florida — The curse of the mummy may truly be fatal. An examination of mummified bodies has revealed that ancient Egyptians suffered from hardening of the arteries in surprising frequency, suggesting that blame for heart disease extends beyond the modern culprits of smoking, fast food and the remote control.

Among 22 mummies who received full-body computed tomography scans, 16 had hearts or arteries preserved enough to study. Of those, nine had evidence of blockage from atherosclerosis. “This disease has been around since before the time of Moses,” said Randall Thompson of the St. Luke’s Mid America Heart Institute in Kansas City. Thompson and colleagues presented their findings Nov. 17 at the American Heart Association’s Scientific Sessions 2009. The data were also published in the Nov. 18 *Journal of the American Medical Association*.

Although researchers have previously taken X-rays and other images of famous mummies, “no one has ever put a series of ancient people through modern CT scans,” Thompson said. The mummies, from the Museum of Antiquities in Cairo, ranged from 2,000 to 3,500 years old. All were selected by museum staff, who chose the most intact bodies from different spans of time. On a CT scan, the buildup of fat, cholesterol, calcium and other substances inside artery walls looks as distinct for the dead as the living.

The scientists decided to conduct the study after two of the research team members — Gregory Thomas of the University of California, Irvine and Adel Allam of the Al Azhar Medical School in Cairo — visited the museum in 2008. They noticed that the nameplate for Merenptah, who ruled around 1200 B.C., claimed the pharaoh had suffered from atherosclerosis. Curious to know whether this was true, the doctors gathered a research team to determine the prevalence of heart disease among the preserved representatives of an ancient, upper-class civilization. Funding came from Siemens, the National Bank of Egypt and the Mid America Heart Institute.

In Orlando, the scientists reported the consequences of all those fatted calves: Among the eight people in the sample who had lived past the age of 45, seven had signs of clogged arteries. The most ancient mummy to have suffered from heart disease was Lady Rai, a nursemaid to Queen Amrose Nefertari. She died around 1530 B.C. while she was in her 30s, though her cause of death is not known.

“We would have thought this was a disease of modern man,” said Samuel Wann of the Wisconsin Heart Hospital in Wauwatosa and a study team member. The results, he said, are bound to stoke an ongoing controversy among cardiologists. “We have a debate among our colleagues whether atherosclerosis is inevitable if you live long enough,” he said.

The findings should not be taken to mean that modern risk factors have no bearing on heart disease, said Robert Bonow, chief of cardiology at Northwestern University’s Feinberg School of Medicine. The mummies studied would have had diets high in salt (for food preservation) and would have enjoyed the pampered lifestyle of the wealthy, so even these ancient people may have had risk factors like those of modern people, said Bonow, who was not part of the research team.

“This does not tell you what the true incidence was,” he said at the meeting. “Patients should not take this as evidence that they shouldn’t worry about preventing heart disease because it’s been around a long time.”

Image: Michael Miyamoto/UC San Diego

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