

Off the coast of the Black Sea in the Mykolaiiv region, archeologists have discovered a sunken ancient Greek shipwreck dating back more than 2.5 thousand years.

## Small indoor greenhouses let apartment dwellers grow veggies

You don't need a green thumb to grow vegetables indoors.

On the contrary, there are plenty of indoor greenhouses that take the work out of growing plants, from the amount of water they get to the right dosage of light, [startribune.com](http://startribune.com) reported.

One of these indoor greenhouses — or automated growing systems, as they're referred to — was created by six engineering students at Rice University. Aside from planting the seeds, the greenhouse does pretty much everything. It's about the size of a small bookshelf and operates anywhere indoors.

"We didn't want it to take up too much space in an apartment," said Harrison Lin, a student who worked on the project. He said they wanted to "make it not intrusive, but it could still grow a useful amount of plants."

There are push buttons on the device to designate how much light and water the plants get, and to determine the temperature inside it. If you're feeling extremely hands-off, there are three pre-set options: Leafy greens, roots and

herbs. Select what you're growing and go about your business.

"In the most ideal circumstance, you plant your seeds, put on the correct settings and walk away until it's ready to harvest," said Jack Kaplan, another student on the team.

Most indoor growing systems are hydroponic, meaning plants are planted in water mixed with mineral nutrients, but this one uses a soil trough for planting. LED bulbs provide the plants with the red-blue spectrum of light needed to grow. The only maintenance is refilling the water tank every three weeks.

The students built three of these indoor greenhouses as a senior project. They were installed at the HSB Living Lab., a residential research facility at Chalmers University of Technology in Sweden.

Growing food indoors, often in small spaces like city apartments, has become popular.

In 2017, indoor gardening was listed as a popular trend in a report by Garden Media Group, a marketing group that tracks industry. Apartment dwellers have less room for a traditional garden

but still want fresh veggies.

Businesses are noticing the expanded interest in at-home gardening.

Aerogarden, owned by Scott's Miracle Grow and the Hawthorne Gardening Company, is another automated in-home growing system on the market. It's automated, hydroponic systems range in size and price point — the smallest retails for \$99 and holds four plants, while the largest sells for nearly \$700 and grows 24. Sales have grown over 20 percent year over year since 2013, and last year's sales grew by more than 30 percent, according to company numbers.

Automated systems take the guesswork out of gardening, said Clydette Alsup-Egbers, an associate professor of plant science at Missouri State University. The biggest reason that indoor plants die, she said, is over-watering. If an automated system is used, that risk is eliminated.

"People who are new to growing don't know what they're doing," she said.

"A kit makes them feel more confident."

Automating everything is what commercial greenhouses have done for years, said Julie Bare, an estate gardener at Meadowbrook Farm, located in Jenkintown, Pennsylvania, and owned by the Pennsylvania Horticultural Society.

Bare helps grow some of the hundreds of plants on display in the renowned Philadelphia Flower Show. To do this, greenhouses are necessary; the show is held annually in March, which means short days and cold temperatures.

Still, even the most seasoned gardener can run into problems with indoor vegetables.

A few years ago, George Rebeiro Brooks Jr., a retired mechanical engineer, tried growing lettuce in pots inside at his home in Tewksbury, Massachusetts. Brooks, who owns Green Hollow Orchards, has grown apples, tomatoes and other plants for local farmers markets for more than 45 years. But his indoor lettuce turned out limp, not crispy.

"It's just my guess, but I think it didn't have the right air circulation indoors to make it tougher up," he said.



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A research team including Matthew Sanger, assistant professor of anthropology at Binghamton University, State University at New York, has found a copper band that indicates ancient Native Americans engaged in extensive trade networks spanning far greater distances than what has been previously thought. "Our research shows that Native Americans living roughly 3,500 years ago were engaged in extensive trade networks spanning far greater distances than we had previously assumed (more than 1,500 kilometers) and across various regions that we did not know were connected (the Great Lakes and the coastal Southeast)," said Matthew Sanger, assistant professor of anthropology at Binghamton University. [phys.org](http://phys.org) reported.

"While we still struggle to understand the nature of these trade networks, our findings suggest that they moved not only objects (such as the piece of worked copper we recovered) but may also be a pipeline through which belief systems, cultural values and societal norms were also exchanged. The possibility that information also traveled along trade networks is evidenced by the shared use of cremation found alongside the exchange of copper between the two regions."

Sanger and colleagues found a copper band, slightly wider than a bracelet, alongside the cremated remains of at least seven individuals at a burial site in coastal Georgia. Prior to their discovery, both copper and cremated human remains dating to the Archaic period (around 3,000-8,000 years ago) were rarely, if ever, found in the Southeast United States.

The copper band and burials were located in the center of a Late Archaic shell ring — circular deposits thought to have been used by Native Americans as both residential sites and as places of ritual gatherings and feasting events.

Radiometric dating using an Accelerated Mass Spectrometer indicate that the remains and band are both more than 3,500 years old. This is significant, as it pushes the practice of cremation, as well as the use of copper, in the region more than a millennium older than previously thought.

Remarkably, the copper band was not manufactured from local materials, but rather originated in the Great Lakes region, more than 1,500 kilometers away. Copper sources each have their own unique chemical makeup, including very small amounts of trace elements. As such, archeologists can match manufactured



Native Americans engaged in trade more extensively than thought

phys.org

objects to their sources by comparing their chemical signatures, or 'fingerprints'.

Using Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICPMS), researchers at Ball State, the Field Museum and the New Jersey State Museum determined the chemical makeup of the copper band was most similar to sources found near the Great Lakes. While archeologists had long known copper was exchanged out of the Great Lakes region, the discovery made by Sanger and his colleagues extended previously documented boundaries of Archaic Period copper exchange by nearly 1,000 kilometers.

## Ancient Roman library discovered during parking lot construction

Archeologists have identified Germany's oldest public library, which may also be the oldest library in the Roman Empire's northwest provinces. Niches in the walls appear to have stored up to 20,000 scrolls.

According to [euronews.com](http://euronews.com), the library's remains were unearthed in the middle of Cologne. The Romans founded the city in 50 CE back when Germany was a Roman province called 'Germania'.

Researchers think the library dates to the middle of the second century, around the same time Romans built the Ephesus library in 117 CE (Ephesus is located in modern-day Turkey).

The ancient library's walls emerged during construction for a parking lot (in Europe, discovering relics during construction is very common). At first, researchers thought the building — which archeologists estimate was 65 feet long and 30 feet high — might be a community hall. But they weren't sure what all the little nooks in the walls were for.

"It took us some time to match up the parallels — we could see the niches were too small to bear statues inside. But what they are kind of cupboards for the scrolls," said Dirk Schmitz from the Roman-Germanic Museum of Cologne, according to [The Guardian](http://TheGuardian).

"They are very particular to libraries —

you can see the same ones in the library at Ephesus."

It's difficult to determine literacy rates in ancient times, let alone how many people would've made use of Cologne's library. And in fact, the idea that the Roman Empire had 'public' libraries at all is a little contro-



ROMAN-GERMANIC MUSEUM OF COLOGNE

versial. T. Keith Dix, a classics professor at the University of Georgia, has suggested Roman state libraries may have been for well-connected authors in the empire.

"[A]uthors in the Roman world, almost by definition, were members of the upper classes," he wrote in a 1994 issue of the

Journal Libraries and Culture.

"Those authors who praise 'public access' to books most likely had in mind a 'public' made up of others like themselves. Given the high level of illiteracy in the ancient world, they had no reason to imagine great hordes of readers scurrying to the libraries."

The library's discovery has not stopped the construction of the parking lot, but it has changed the lot's design. Now, where two extra parking spaces would have been, The Washington Post reports there'll be a glass window in the ground that visitors can look through to see the library's remains.

## Forests must be preserved to meet climate change targets

Sucking carbon from the atmosphere using new technologies will be vital to protect the planet from climate change, but a new study suggests looking after forests is more important.

Trees store huge amounts of carbon to function as an essential shield against rising temperatures but, surprisingly, some climate experts have said forests should be removed to make way for carbon capture technologies, [independent.co.uk](http://independent.co.uk) wrote.

Such methods are considered essential if the planet's warming is to stay below the most ambitious targets set by international climate agreements.

Bioenergy with carbon capture and storage (BECCS) is widely regarded as the most cost-effective and viable negative emissions technology on offer.

Power stations using BECCS could grow crops to use as biomass, that could in turn be burned to generate power with the resulting carbon dioxide stored deep underground.

Most future predictions in which warming is limited to 1.5°C — the target set by the Paris climate agreement — include this technology.

But there is a problem. The land required to grow enough crops would be twice the size of India, and most scenarios therefore involve chopping down trees to make way for it.

"If you want to avoid replacing agriculture crops with bioenergy crops, there is only so much land available — that's why in these scenarios there

was some deforestation for bioenergy crops, but we found that didn't pay off in terms of carbon in the end," Dr. Anna Harper from the University of Exeter, who led the new study, told [The Independent](http://TheIndependent).

"It's not that it's bad or won't work, but we probably shouldn't be cutting down forest to put these crops in."

Instead, Dr. Harper and her team found that simply planting more trees and preserving the ones we have would be a more effective way of combating climate change.

"In some places, BECCS will be effective, but we've found that in many places, protecting or regenerating forests is much more sensible," said co-author Dr. Tom Powell.

The findings, published in the journal [Nature Communications](http://NatureCommunications), come after scientists raised the alarm about a potential 'hothouse Earth' future, in which destructive feedback loops accelerate global warming out of control.

Though the probability of such a catastrophic outcome is uncertain, the only way to prevent it happening, according to scientists, is to stop the planet getting too much hotter than it already is.

Forests were highlighted as a major component in achieving this goal and preserving Earth's stability.

"If we limit climate change then we are less likely to have these runaway feedback loops that occur," said Harper.