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## First New Species of Temperate Conifer Tree Discovered in More Than a Decade

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The Ulleungdo hemlock, found on a small Korean island, is likely already endangered, but it may hold the key to fighting invasive species.



*The Ulleungdo hemlock (*Tsuga ulleungensis*) has been found to be a new species, with some potentially valuable attributes. PHOTOGRAPH BY PETER DEL TREDICI*

It's not every day—or even every decade—that a new species of conifer is found in the world's temperate forests. But late last year, researchers announced a new species of hemlock tree from Korea, proving that even our best-studied forests still hold surprises.

The new tree could help save one of its better-known cousins—a North American hemlock species being annihilated by a voracious insect. But the new find is so rare that it's already being considered for an endangered-species listing itself.

“It’s probably the rarest woody plant in Korea, if not the world,” says [Peter Del Tredici](#), a botanist at Harvard University’s Arnold Arboretum in Boston, who was on the team that discovered the tree.

Hemlocks—no relation to the carrot-family plant that killed Socrates—are large evergreen trees native to North America and eastern Asia. Their small, soft needles grow thick and lush, creating a sort of waterfall of green. In the rain-soaked forests of Oregon and Washington they can grow to 270 feet tall, but in most other places they top out well below 200.

Hemlocks often play critical ecological roles in the forest, harboring insects, spiders, and birds that don’t live on other trees. But in the eastern U.S., native hemlocks are succumbing to a Japanese insect called the [hemlock woolly adelgid](#), which kills trees by sucking out their sap. The insect has mowed down stands of trees from Georgia to Massachusetts, and it is rapidly moving west and north into new areas. ([Learn about Europe’s dangerous Christmas tree harvest.](#))

## HIDDEN IN PLAIN SIGHT

Around a decade ago, [Nathan Havill](#), then a Yale graduate student and now a U.S. Forest Service biologist, was studying Asian hemlocks’ genetics to understand why they can resist the adelgid when the Eastern hemlock can’t. He realized that DNA from a small group of hemlock trees at the Arnold Arboretum didn’t seem to match that of any known species. The trees had been labeled as southern Japanese hemlocks, but Havill was skeptical.

The arboretum’s records stated that the trees came from an island called Ulleungdo, about 80 miles east of the Korean peninsula. So Del Tredici traveled there in 2008 to collect leaves for further study. The tiny island, less than half the size of Washington, D.C., is basically the cone of a steep volcano rising out of the Sea of Japan.

“Everything is uphill on this island,” Del Tredici says. The hemlocks grow only in a few patches on the cone’s north slope, amid dense, humid forests of pine, maple, and beech trees.

To nail down whether the Ulleungdo hemlock really deserved to be its own species, Del Tredici gave his samples to Garth Holman, a botanist at the University of Maine. Holman found that DNA in the nuclei of the tree’s cells—where most genetic material is contained—puts it closest to southern Japanese hemlock. But DNA from the tree’s chloroplasts—tiny organs in plant leaves that produce chlorophyll—more closely resembles that of a different hemlock species, also from Japan. The Ulleungdo tree also has wider needles and differently shaped cone scales than either Japanese species, and it sends out new leaves several weeks earlier in the spring. Putting all the data together, [the team announced the new species](#)—*Tsuga ulleungensis*—in late 2017 in *Systematic Botany*. It’s likely the first temperate conifer discovered since 2002, when a new kind of cypress was found in Vietnam.

The Ulleungdo hemlock probably once grew widely in what is now Korea and China, but it was likely beaten back by glaciers during an ice age, Holman speculates. It may have survived on the island—along with dozens of other unique plant species—because the surrounding ocean kept temperatures milder than on the frozen mainland. “You could describe it as Korea got run over by a glacier, but Ulleungdo got missed,” says Holman. ([Meet the teenager on track to plant a trillion trees.](#))

## **ENDANGERED ALREADY?**

Because it is so rare, the Ulleungdo hemlock is probably critically endangered, the authors write, though the International Union for the Conservation of Nature—the body that makes such determinations—has yet to formally evaluate it. The good news, says study coauthor Nam Sook Lee, a botanist from Ewha Womans University in Seoul, is that the forests where the hemlock grows on Ulleungdo were declared a natural monument in 1962, protected from logging or development. Still, small populations are always vulnerable to pests and disease, genetic problems due to inbreeding, and human threats such as climate change and war.

The tree now grows in arboreta in Philadelphia, Chicago, Boston, and D.C., increasing its chances of survival. It could get a further assist from the American horticulture industry, which needs a replacement for the once-popular Eastern hemlock. Korea and the eastern U.S. have similar climates, so plants from one country often grow well in the other, says Richard Olsen, director of the U.S. National Arboretum in Washington, D.C. He is considering the tree for a breeding program. The fact that the Ulleungdo hemlock sprouts new needles early in spring could make it especially popular for landscaping, Holman speculates.

## **BEATING THE BUG?**

Scientists who hope to someday restore hemlocks to devastated forests are also excited about the new find. Either conventional breeding or genetic engineering could introduce adelgid-resistance genes to trees that are still mostly native, says [Fred Hain](#), a retired entomologist at North Carolina State University in Raleigh who runs a nonprofit organization called the Forest Restoration Alliance.

“Any hemlock species anywhere in the world, we are certainly interested in evaluating,” says Hain.

Whether or not the new tree helps save American hemlocks, it shows that mega-diverse tropical forests aren’t the only places that still need to be explored, adds [Robert Jetton](#), a forestry expert also at North Carolina State. “Temperate forests are very well studied,” he says.

“We spend all this time trying to catalog everything on our planet, and just when we think we’ve got a good handle on it, nature throws something like this at us.”