

# DNA barcoding exposes fake ferns in international plant trade

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DNA testing of garden ferns sold at plant nurseries in North Carolina, Texas, and California has found that plants marketed as American natives may actually be exotic species from other parts of the globe.

The finding relied on a new technique called "DNA barcoding" that uses small snippets of DNA to distinguish between species, in much the same way that a supermarket scanner uses the black lines in a barcode to identify cans of soup or boxes of cereal.

A team of North Carolina researchers suspected a fern sold in commercial nurseries might not be what the labels said it was, so they took a specimen to the lab to analyze its DNA. When they pasted the DNA sequence of three of the plant's genes into an online database, they discovered that what had been labeled as Wright's lip fern (*Cheilanthes wrightii*), an American native popular in rock gardens and xeriscapes, was in fact a bristle cloak fern (*C. distans*), a distant relative from Australia.

"It was a 100 percent match," said co-author Eric Schuettpelz, a post-doctoral fellow at the National [Evolutionary Synthesis](#) Center (NESCent) in Durham. The team's findings appear online in the April 9 issue of *Molecular Ecology Resources*. "Probably 50 percent of the plants I've collected from botanical gardens and greenhouses were incorrectly identified," said Schuettpelz.

"Nomenclature mix-ups in the nursery industry are frequent in all plants,

ferns included," said co-author Tony Avent of Plant Delights Nursery in Raleigh, a retail nursery that sells plants from all over the world. Most nurseries are run by growers and retailers, not taxonomists, Avent said. Ferns are difficult to monitor because they're tricky to tell apart.

"Ferns don't have flowers or fruits to help with identification, like many other plants," said lead author Kathleen Pryer, associate professor of biology at Duke University. Fern species are particularly hard to contain in the close quarters of a greenhouse, where their spores can drift into neighboring pots. "After a while, who's to know whether a plant is what the label says it is?" said Pryer.

Most mix-ups happen when plants are passed from one grower to the next without good labeling, Avent said. "But some mix-ups occur when nurseries intentionally change the tags to sell a plant, especially when they have requests for a similar species or cultivar."

"Most nurseries don't have the time or interest to find the proper nomenclature," said Avent. "They are more interested in making money, and in this economy, staying in business."

Since DNA barcoding was first proposed in 2003, the technique has caught on more quickly in animals than plants. A standardized botanical barcode remains elusive partly because of the greater complexity of plant genetics, but also due to ongoing debate over which combination of genes will work reliably for the more than 400,000 species of land plants.

But for those in the business of buying and selling exotic plants, [DNA barcoding](#) could help identify harmful or invasive species or prevent the sale of species which are rare or endangered. "This might eventually be able to help prevent people from taking things out of countries illegally," said Pryer.

One of the advantages of the technique is that it can identify species from small amounts of tissue or processed material — a bit of leaf, a plank of wood, or an herbal mix — that are otherwise impossible to match to the plants they came from, said co-author Michael Windham, curator of vascular [plants](#) at the Duke Herbarium.

Some scientists foresee a future in which biologists, customs officials and port inspectors can feed a piece of leaf or root into a handheld DNA scanner, which will then sequence a handful of genetic markers and spit out the species name.

"Just like the tricorder device they used in Star Trek," said Windham. "Spock used it to analyze the mineral content of rocks, or the oxygen content of the atmosphere. Who needs to lug around a copy of 'Flora of North America' when they've got a species tricorder?"

**More information:** Pryer, K., E. Schuettpelz, et al. (2010). "DNA barcoding exposes a case of mistaken identity in the fern horticultural trade." *Molecular Ecology Resources*. [doi: 10.1111/j.1755-0998.2010.02858.x](#)

Provided by Duke University

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