

New plant species from the heart of Texas: Wrongly identified since 1974, only three specimens are known

July 9 2014



This spiny and wilted plant -- shown here where it was found in Valentine, Texas in November 2013 -- is only the third specimen of *Solanum cordicitum* ever found. The first specimen was found in 1974 and the second in 1990, but over the years, the plant was wrongly assigned to three different *Solanum species* before a study led by University of Utah botanist Lynn Bohs identified it as an entirely new but likely endangered species. *Solanum* is among the largest genera of flowering plants, and includes tomatoes, potatoes, chili peppers and eggplants.

Credit: Jeffrey Keeling, Sul Ross State University.

Collectors found the first two specimens of the prickly plant in 1974 and 1990 in west Texas. Then, for two decades, the 14-inch-tall plant was identified wrongly as one species, then another and then a third.

Now – after a long search turned up a "pathetic, wilted" third specimen – a University of Utah botanist and her colleagues identified the spiny plant as a new, possibly endangered [species](#) and named it "from the heart" in Latin because it was found in Valentine, Texas, population 134 in 2010.

Most new plant species are found in the tropics, and it is uncommon for a new one – especially a flowering plant – to be found in the United States, says University of Utah biology professor Lynn Bohs, senior author of a new study describing and naming *Solanum cordicitum* (pronounced So-lay-num core-duh-SEE-tum).

"It's a new, unique plant from the United States," she says. "Plus it's from Valentine, which is extremely charming, and that gave rise to its name, *S. cordicitum*."

Bohs' study identifying *S. cordicitum* as a new species was published today in the Aug. 1 issue of the *Journal of the Botanical Research Institute of Texas*.

The three specimens of *S. cordicitum* – all now pressed and mounted in museums – are the only ones known to exist. The new species belongs to the genus *Solanum*, which includes some 1,500 species of mostly poisonous [plants](#), including nightshades, but also three economically important, global food crops: tomatoes, potatoes and eggplants – the last

of which is most closely related to *S. cordicitum*, Bohs says.

Cordicitum is derived from cordicitus, Latin for "from the heart," but is altered to *cordicitum* because it must end with the same syllable as *Solanum* to comply with naming rules. The plant has no common name. The derivation of *Solanum* is unknown, but may be from sol for sun or from solamen for consolation, comforting or quieting.

"Some of them are permanently quieting because they are deadly poisonous," Bohs says. The Solanaceae family, including the genus *Solanum*, is known as the nightshade family, and many of the plants are toxic, hallucinogenic or medicinal, although others – like tomatoes, potatoes and chili peppers – are edible.

The International Union for the Conservation of Nature's Red List of endangered and threatened species categorizes the status of newly identified *S. cordicitum* as "data deficient," but Bohs says it "probably is really endangered."

Bohs conducted the research with two other botanists: Stephen R. Stern, who earned his doctorate at the University of Utah and now is on the faculty of Colorado Mesa University in Grand Junction; and Jeffrey Keeling, who just earned his master's degree at Sul Ross State University in Alpine, Texas.

Three Other Plants Elevated from Varieties to Species

Discovery of the new species was a small part of a five-year, \$4.36-million National Science Foundation-funded study – led by Bohs – to better classify and create a comprehensive online inventory of all 1,500 species in *Solanum*, one of Earth's largest genera of flowering plants.



This pressed specimen of newly identified plant species *Solanum cordicitum* was found in 1990 in Valentine, Texas. Labels on the mounting paper show the plant was incorrectly identified as belonging three different species in 1990, 1997 and 2006 before a new University of Utah-led study showed it is indeed a separate species. It is unusual for new species of flowering plants to be found in the United States, which has been well-explored by plant collectors. Credit: University of Texas Herbarium.

In the same study, the botanists elevate to full species status three other closely related plants that were previously named varieties of other *Solanum* species but that DNA analysis showed to be separate species. Like the new species, they all belong to a group of *Solanum* named

section *Androceras*, which now includes 16 species with the reclassifications by Bohs and colleagues:

— *S. knoblochii* (no-BLOCK-ee-eye) previously was classified as *S. citrullifolium* variety *knoblochii*. Only five plants have been collected from two sites in Mexico's western Chihuahua state. Its status is "data deficient," but Bohs and colleagues write that it "warrants near-threatened status."

— *S. setigeroides* (seh-tidge-ger-OID-ees) and *S. novomexicanum* (novo-Mexi-can-um) both were classified previously as varieties of *S. heterodoxum*. The first species is a widespread weed from northern Chihuahua and west Texas to central Arizona and New Mexico. The other is found only in northern New Mexico. The Red List categorizes both as species of "least concern," meaning they are neither threatened nor endangered.

Hunting for a Suspected New and Endangered Species

Newly identified *S. cordicitum* grows only about 14 inches tall. The stems and leaf stalks have very short hairs as well as prickles or spines about one-fifth-inch long, "but that's still long enough to stick you," Bohs says. The leaves have three or four lobes on each side. Prickles also cover the flower clusters, which have five to eight flowers.

"Prickles are all over this sucker," Bohs says.

The first specimen of *S. cordicitum* was collected in October 1974 on U.S. 166 about 30 miles west of Fort Davis, Texas. Then in September 1990, a Valentine resident named Howard Elder found the plant on his property. A botanist wrongly identified the plant as *S. heterodoxum*. It

later was wrongly re-identified two more times: as *S. davisense* in 1997 and as a variety of *S. grayi* in 2006.

But Bohs and colleagues believed it was none of those species because its flower petals are white instead of yellow, and its flower stalks are longer and flowers are larger than closely related species. There also are differences from other species in leaf shape and in stem hairs.

Also, a study published in 2010 by Stern, Bohs and Utah postdoctoral researcher Terri Weese showed the plant's DNA differed from known species. And the plant is an annual, while related species are perennials.

So Bohs and colleagues decided to try to find more specimens. In 2010, Stern – then a Utah grad student – spent days looking for the plant in Texas without success.

In November 2013, Keeling searched the Valentine area for days before finding the third specimen on the Elder property – near where the 1990 specimen was found.

"He looked everywhere and finally found one horrible, wilted plant specimen," Bohs says. "It looked awful. It was wilted and brown and had some seeds we thought we'd be able to germinate, but they weren't any good. It was totally pathetic, and we were sad because we wanted a beautiful picture of the flowers to put in a publication."

"It's probably not extinct because Keeling found one plant that had been living in 2013," she adds. "Whether that was the last one or not, we don't know. We're hoping that by publicizing this, more people will look for it and more plants will be found." Stern believes more are out there.

Keeling collected the specimen of *S. cordicitum*, pressed and mounted it, then sent it to Stern in Grand Junction. The specimen found in 1974 now

is at the University of Texas at El Paso. The 1990 specimen is stored at the University of Texas at Austin.

Weedy but Not a Weed

S. cordicitum and the varieties that are newly elevated to species belong to section *Androceras*, which is a group of weedy *Solanum* plants native to the central and southwestern U.S. and Mexico. That is unusual because most *Solanum* groups are tropical, Bohs says. The most widespread *Androceras* species is *S. rostratum*, known as buffalo bur, prickly nightshade and Kansas thistle.

In all *Androceras* species, the calyx, or outer envelope of the flower and fruit "is really spiny," Bohs says. A larger group of 350 to 400 *Solanum* species are known as "spiny solanums" because they have prickles. The group includes wild eggplant. Spines have been bred out of domestic eggplant.

While *S. cordicitum* belongs to a weedy group within the spiny solanums, technically it isn't a weed because weeds are more common and spread easily, Bohs says.

Like other plants in *Androceras*, the [new species](#) and its five-petaled flowers are "bilaterally symmetrical" (like a mirror image down a vertical line) but not symmetrical in all directions because the five petals vary in size. Four of its yellow anthers – pollen organs within the flower – are the same size, but the fifth is bigger.

"It's got a beautiful, interesting flower form unique in *Solanum*," Bohs says.

Provided by University of Utah

Citation: New plant species from the heart of Texas: Wrongly identified since 1974, only three specimens are known (2014, July 9) retrieved 9 April 2024 from

<https://phys.org/news/2014-07-species-heart-texas-wrongly-specimens.html>

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