ERIC RIBBENS & VERÓNICA FLORES L

Opuntia fragilis in Iowa

Dictionaries tell us that passion is an intense feeling or ardent affection. My dictionary reads "see *Opuntia fragilis*," and my daughters' dictionary says "Beware: ouchy plant."

As a plant ecologist I've found my passion in *Opuntia fragilis*, especially its Midwestern populations—eastward extensions from the center of its range. I've studied this tiny plant in scores of habitats in Illinois, Michigan, and Minnesota, and I've visited others in Iowa and Wisconsin, all the while wondering about the entire region. How many populations are there? Where are they? How are they doing? And what makes for a good, or even marginal, *Opuntia fragilis* habitat, anyway? So at the risk of slipping from passion into obsession, I have found myself trying to locate and visit every one of its populations in these five states.

Iowa, once largely prairie, but now hardly more than a giant corn field, has only a few populations of *Opuntia fragilis*. I had already visited two Iowan populations, and was vaguely aware there might be several more. So during my recent sabbatical, from a snow-cov-

▼ *1* At the site in Buchanan County, Iowa, *O. fragilis* plants are located along this ditch, from mid-slope, up and to the left to where Verónica is standing. *2* **ALIVE** The plants here are small and face heavy competition from the surrounding grass. *3* **DAMAGED** Many pads show damage, probably from repeated freeze-thaw cycles over winter. *4* **DEAD** A surprising 20% of pads, and 17 entire plants, were found dead.

▲ **LEFT** As we collect data at the Hardin County Site, pieces of paper are used to mark clusters of prickly pears along the ground. **TOP RIGHT** Unlike the Buchanan population, the plants here, just 70 miles east, look healthy, although the pads are still slightly wrinkled from their winter dormancy. **BOTTOM RIGHT** Nestled in the grass, *O. fragilis* is not easy to find! Verónica is brushing dead grass away from a plant so she can count the pads.

ered cabin deep in Michigan's Upper Peninsula, I contacted several Iowan herbaria (plant museums), looked up *Opuntia fragilis* in Eilers and Roosa's 1994 flora of Iowa, and contacted the Iowa Department of Natural Resources (DNR), where eventually I was put in touch with John Pearson, who tracks rare plants in the state.

From these sources I compiled a short list—six populations in five counties: Buchanan, Hardin, Johnson, Louisa, and Lyon. (I'm going to be deliberately vague about their locations and simply refer to them by county, because some of the populations are quite small and thus vulnerable to decimation.) The dates of these records ranged from 1954 (an herbarium specimen from Louisa County) to 2004 (the year I visited the Buchanan County site). Of course, locality information more precise than a county is essential, and fortunately we had good locality data for every site except the one in Hardin County, which Eilers and Roosa mentioned without further comment. I labeled this site on my list "not enough evidence, may not exist."

VISITING OPUNTIA FRAGILIS IN IOWA

Opuntia fragilis is on the Iowa State Endangered Species list. We only know of four sites in the state. The two eastern sites are especially endangered, with small vulnerable populations that are struggling to survive. Gitchie Manitou State Preserve is by far the best place to find them. Walk west along the lane until you see rock outcrops to the northwest. Explore them and you should find clumps of prickly pear. Please remember that it is illegal to take anything but pictures or leave anything but footprints.

John, following up on my request for more information, visited the herbaria holding the Louisa County and Johnson County specimens, where he discovered that these were not *O. fragilis* records at all. They had been annotated (re-identified by a subsequent botanist) as really belonging to *O. compressa* (now usually considered a synonym of *O. humifusa*). So John and I immediately scratched those two locations from our list. On the other hand, John hadn't known about the second site in Lyon County. So the database was adjusted to three records. Two populations were in Lyon County and one in Buchanan County, populations I wanted to relocate.

In late April John e-mailed me. He had just visited the herbarium at the University of Northern Iowa and had found an herbarium specimen from Hardin County! Collected by Dr Roosa in 1985, this specimen was undoubtedly the evidence for his claim that the species was found there. Even more interesting was that John had been along on that collecting trip, although he didn't remember the *O. fragilis* collection. But the really good news was that he knew the site and wanted to help the crew I was assembling to find it.

Buchanan County

It's the first day of May in Illinois, and spring is well underway. Trees are beginning to leaf out. The redbuds are in bloom, the early magnolias are almost finished flowering, and a risk-taking lilac is struggling to perfume the neighborhood. I'm assembling my crew of helpers, and four *O. fragilis* habitats in Iowa are at the top of our to-do list. We've had a lot of rain, but today

is sunny and warm enough that we wish we'd worn shorts.

We're a rather motley bunch. I don't own a car, because I no longer drive (due to a genetic eye disease), so I've borrowed my brother's F150 pickup truck. My nephew Lars, peering at the world out of a mop of long blonde hair, has just finished his high-school-sophomore year of homeschooling and has volunteered to man the wheel. Verónica Flores, a Bolivian college student who came to the United States to spend five months doing a biology internship with me, climbs into the back seat.

I'm excited, since I've just learned about a possible new *O. fragilis* habitat. Verónica's excited, because she's never been to Iowa and likes just about every aspect of biology. And Lars is excited because he gets to drive a truck for hundreds of miles. And endless driving is, after all, every teenage boy's dream.

We head north towards Burlington, only to be rerouted. High water has caused a shutdown of the bridge crossing the Mississippi River, so we detour north through the Quad Cities, ramble northwest to Buchanan County, and discover that my middle-aged memory and failing eyesight are still good enough to get us to the first locale on our itinerary.

▲ **TOP** The Gitchie Manitou site is a long, low Sioux quartzite outcrop topped by a mosaic of rock, moss, and grass. **BOTTOM** Here several plants, still slightly dormant, compete with adjacent grasses for space. Larger clusters inhabit basins that have accumulated enough organic debris and water to grow moss, and prickly pears are often the only vascular plants in such situations.

The Buchanan County site is a prairie remnant of rather sandy soil. We walk down a lane through a wet forested area to get to a spot where the woods give way to prairie. An old lane, bordered on its right side by a shallow drainage ditch, skirts along the prairie's edge. The shoulder of the ditch climbs toward a flat area several feet higher than the road itself, implying that sand might once have been removed from this area, and it is here, in an area no bigger than 18 × 5 m, that we find our little prickly pears. The plants are mostly located on the mid-slope of the drainage–ditch shoulder, spilling out over its top into the adjacent prairie flat. There are no plants at the base of the ditch, nor are there any plants where the ditch holds standing water and a nice crop of raspberry canes.

The opuntias are still somewhat dormant. Slightly reddened, a bit wrinkled, and bristling with pale spines, they look like suspicious senior citizens roused too quickly from an afternoon nap. It had been suggested that the plants at this population were really just juvenile Eastern prickly pears, *Opuntia compressa*, so I check them over carefully. They are definitely the fragile prickly pear. The pads are uniformly small and spherical, the spines are distinctive, and there are no adult eastern prickly pears to be seen.

We spread out, carefully searching for plants in and under the tangled stems of dead grass. At first we only discover a few, but gradually we find more and more, and eventually we identify 270 individuals. We count the pads on each plant, and also record appearances, classifying pads as alive, sick, dead, or etiolated (long and skinny). This population has had a hard winter. More than 20% of the pads, and 17 entire plants, have died. There are only 2.1 pads per plant (on average), and we don't find any of the large clusters I've come to

know from other *O. fragilis* habitats.

I think this population is struggling with winter damage. Heavy wet snows keep pads wet, and midwinter thaws cause repeated freezing. And it doesn't help that there is intense competition here. The grasses are thick, and woody shrubs are scattered here and there. I'm going to recommend to the site manager that every shrub in the prickly pear area be hand-pulled, all wheeled equipment be kept away, and controlled burning be used to keep the grasses down. We'll come back in a year or two to census the population again, and then we'll know whether it is growing or not. We're on the edge of the range for *O. fragilis* here; there are no populations to the southeast of this site, so this is an important population. In fact, it's probably the most distinctive and unusual plant growing in this prairie remnant.

Hardin County

We meet John Pearson for breakfast at a local Hy-Vee in Hardin County. John is blessed with skinny blonde Scandinavian genes. People like this don't get old and round. They simply look more and more preserved, weathered by time and experience. Tall and lanky, he's the Iowa DNR botanist in charge of monitoring rare plant species in the state. As we chat over breakfast we learn that John's PhD advisor was also my master's advisor. Apparently I attended the University of Wyoming a year or two after John left, and we'd both studied lodgepole pine forests with Dennis Knight. This makes us intellectual siblings, so we waste some time reminiscing about our advisor and the forests of the Medicine Bow Mountains.

We drive to an area where an old railroad grade splits off from a private gravel road nearby. The area is gravelly and has obviously been mined for gravel in the past. The sky's been threatening to rain all day, and it's drizzling now, so we're all getting damp—except for John, who sensibly dons his rain gear. We split up and slowly file through the site, ducking under red cedars, avoiding scrubby patches of ashes and oaks, and pushing through clumps of sumac. The more open grasslands that form the background to this

◀ **TOP, MIDDLE** Carl Palmberg guides us to a Sioux quartzite outcrop on his property. We are only a few hundred meters from the South Dakota border in this *O. fragilis* habitat—a complex mosaic of lichen-encrusted rocks, moss, spike moss, and grass. The plants at this site seem to have smaller pads than in other populations. **BOTTOM** Verónica Flores, Carl Palmberg, and Eric Ribbens. Three different backgrounds, but sharing the same love for this interesting little cactus.

complex matrix are dominated by little bluestem. We see an occasional birdsfoot violet, a plant I've only seen once or twice before, and we also spot poison ivy, dandelions, and sprouting ragweeds.

About 40 minutes later, we are running out of land to search when John calls me over to a gentle south-facing slope where he's found one clump! A fourth *O. fragilis* site for Iowa! We are wildly excited, and as if to celebrate with us, the rain stops and the sun peeks out. We only find nine clusters in an area about 3×15 m, and Verónica finds another scatter of plants under a stunted black walnut about 10 meters away. There are 54 plants altogether, including one large clump with 15 pads.

This population is very different from the Buchanan County site just 70 miles east. The pads look bigger, greener, and less wrinkly. But most intriguingly, there are no dead pads and only one pad that's sick. Even though the grass competition is quite heavy, these plants appear to be surviving quite nicely. We wish they were more spread out; one dirt-biker could wipe this population out with a few passes back and forth. But it's definitely a population, and our search has been a success.

A NOTE FROM VERÓNICA

Three people began this adventure in the first week of May: Dr Ribbens (the boss), his nephew Lars, and me. It is wonderful to begin something when you don't know what to expect. This research brought us to many places that I had never seen, and gave us an opportunity to meet some great people along the way. We traveled to many places where the prickly pear has been found, so in a way this trip was like going into the past—a hunt for remnant populations… searches guided only by old data. The things that we did were simple: we recorded GPS data, took some pictures, and gathered samples. I was really happy to do all of these things.

Eric said that I'm making him obsolete, but the only thing that I wanted to do was make myself useful, and I think I did, or at least I hope so. He also says that the key to success is to surround yourself with people that are better than you. But one of the things that I learned from seeing him work is that the real key to success is doing what you love.

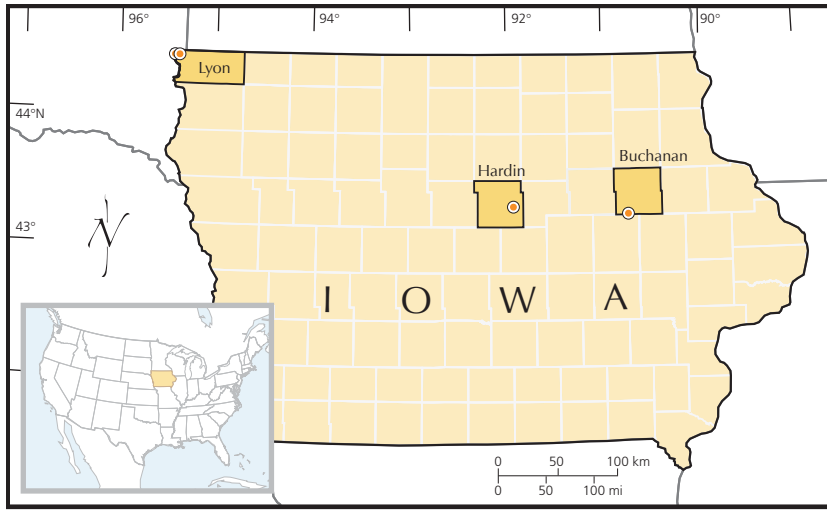
In many places we found people that think the way we do, and it's a great feeling to know that you are not the only one in the world that cares about these beautiful living things. So, while our adventure in Iowa is over, our quest has left me with memories of landscapes that I'll always treasure, knowledge that I'll always keep in my mind, and experiences to hold in my heart.

Lyon County

My crew confidently erupts from the truck when we park at Gitchie Manitou Preserve in the northwest corner of Iowa. Seasoned after a week of cactus hunting in Minnesota, they are slightly grubby and a little cocky. Ace prickly-pear detectives, they charge up rocky cliffs and spot the low spiny clumps before I even manage to get out of the truck and get organized. Verónica has sweetly and efficiently taken over, collecting specimens, running the GPS tool, and picking up after me when I leave field notebooks, cameras, glasses, and other equipment scattered in my wake. I've been relegated to taking pictures and writing notes. It's wonderful… every teacher's dream.

We walk west along an old lane. Skimming the edge of the Big Sioux River, which divides Iowa from South Dakota, we pass clumps of wild plum that are just tentatively beginning to bloom. After a fifteen-minute hike we approach a long, low outcrop of Sioux quartzite, and suddenly there are little prickly pear clumps everywhere, tucked into crevices and snuggled into that thin zone where grass meets rock. The wind blows endlessly, tugging at our clothes and hair, and if you squint a bit it's easy to imagine a group of weary pioneers camping there against the rock face, sheltering from the breeze. This population of prickly pears is large and healthy, an eastward extension of the many populations that occupy similar habitats in southwestern Minnesota and eastern South Dakota.

▼ *Opuntia fragilis* in Iowa. There are four populations of the fragile prickly pear in Iowa. Two are found in the extreme northwest corner of the state in Lyon Country (including one within Gitchie Manitou State Preserve, the easiest place to find this species in the state). Two others are found in Hardin and Buchanan countries and are the southeasternmost populations of the species.



After lunch we fire up the GPS and commence the hunt for our final site in Iowa. We drive in a slow circle along graveled farm roads, slowly zeroing in on our goal, eyes peeled for telltale rocky outcrops. Even-

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Sulcorebutia rauschii

Here we have three photos. One shows a regular-colored *S. rauschii* (it isn't possible to show its hot pink petals using a normal 4-color printing process, so it looks a bit too red here). The other two show consecutive days for flowers of a more white-flowered form of the species. I have seen these flowers open four days in a row, each day more faded than



on the previous. By the fourth day they are almost entirely white. The white-flowering plant has smaller heads than most other *S. rauschii* varieties. The largest head is only 3 cm across, where on most other *S. rauschii* clones I have, the heads are 4–5 cm. My largest clump of the white-flowered plant is 11 cm in diameter and slowly growing. The flowers are to 4.5 cm across. The plants can do fine in a soil mix that is a bit more rich in humus than my 50/50 mix, but I keep mine in my regular soil mix anyway. These plants are susceptible to spider mite damage, so a close eye needs to be kept on the plants, especially during the dry winter rest, when you might not be paying as much attention, and spider mites are having a heyday.

► **Opuntia Fragilis** continued from **page 13**

tually we pull into a typical, neatly organized Iowan farm. The house is connected to the garage by a breezeway, and the barn and endless outbuildings are surrounded by trees, which shade the buildings and provide some shelter from the wind. As I get out of the truck, a slightly stooped figure emerges from one of the structures. Carl is a retired farmer who has loved this land for over 70 years. His face is reddened, seamed with wrinkles from years of staring into the prairie sun, and set in a permanent smile. Ohyah, he knows of the prickly pears. They're down on the west farm—his boys have sat on them a time or two when they weren't being careful. We swing past the house to tell Carl's wife he's going out to show us the west farm and those cacti. They've been married for 47 years, and June is one of those serenely beautiful grandmothers who must somewhere have some cookies that taste really good. I half expect her to tell me to wear a hat because it's cold out, or to scold me for the mud on my jeans.

A mile or two west we bump over a pasture that has been thoroughly mined by pocket gophers, park near a low, wet area with a small rivulet of water running through it, and get out to walk. Almost immediately we're jumping from rock to rock to keep our feet dry. Carl tells me this is one of the only privately owned quartzite outcrops in Iowa. They've always known there were cacti here, and they've left them to grow in peace. Carl confides, "You know, I pay the taxes on this land, but I don't really own it." I know what he means. He feels his land is a treasure to protect, not just a resource to exploit.

Again, we quickly find our prize. These quartzite outcrops are different from the sandy sites further east. The cacti living among these rocks delicately choose little patches that collect enough organic debris and water for them to survive, yet are too nutrient-scarce to support grasses. If we could see the cacti from an aerial photo, they would look like a lace doily spread out to dry, thin bands tracing here and there along the transitional areas where there is neither bare rock nor grass. Carl wants to show us around and has endless stories about his beloved land. I tell him he should be proud of this site, that it is an Iowan treasure.

As we walk back to the truck Carl turns to me, his face suddenly troubled. He has been approached by a developer who wants his land to build a casino and a golf course. "I don't hold with gambling, or smoking, or drinking." He shakes his head. "I don't know what we'll do." Clearly it's not his vision for the land, but every Iowa farmer knows the value of a dollar. I look back once more to fix the site in my memory, hoping that the rocks and the dancing little stream will always belong to the spiny clumps of cacti and the endless blowing wind.