



Sego Lily

Newsletter of the Utah Native Plant Society

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Cover: Beckwith's violet (Viola beckwithii) is the only native Utah violet with ternately compound leaves (with the main divisions further divided into narrow segments) and white and purple petals. The species occurs widely across the Great Basin but is rare and declining in northern Utah as its foothills habitat is displaced by urban growth. Photo by Steve Hegji.

Beckwith's Violet Fever

By Steve Hegji

This year, *Viola beckwithii* fever hit the Wasatch Front. No doubt this was triggered by Tony Frates's excellent presentation on *V. beckwithii* at a Salt Lake Chapter meeting in early March. I caught the fever and have concentrated on visiting a Utah county population near Spanish Fork that

had been discovered in 2004 by Robert Fitts. Two members of the Weber State University Botany department, Blake Wellard and Margaret Harris, following up on a Weber State College Herbarium specimen label, rediscovered a population in northern Weber county. A number of other UNPS members have been trying to locate other populations this Spring.

Only the small population in Red Butte Garden (discovered in 2008) is known for sure in Salt Lake County.

Beckwith's violet is primarily a Great Basin plant, found in California, Idaho, Nevada, Oregon, and Utah. Development along the Wasatch Front in Utah has eliminated most of the violet's natural habitat. The known Utah populations are vulnerable and could disappear at any time. Blake [continued pg 5]

Utah Native Plant Society



Utah Native Plant Society

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For more information on UNPS: Contact Bill King (582-0432) or Susan Fitts (801-756-6177), or write to UNPS, PO Box 520041, Salt Lake City, UT, 84152-0041 or email unps@unps.org

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Chapter News

Cache: Maguire Primrose Walk (date TBD, dependent on flower bloom). Our annual walk to view the federally listed Maguire's primrose will begin at the First Dam parking lot at 6:30 PM, where we will car pool to the turn off for an easy walk to the plants. Contact Michael Piep to find out the exact date.

Our yearly chapter business meeting is tentatively scheduled for Thursday, May 13, at 7 PM at the Cache Learning Center. Our speaker will be announced at a later date.

The Richard J. Shaw Memorial Wildflower Walk will be on Tuesday, May 18 at 6:30 PM. We will meet at the parking lot in Green Canyon, wander up the trail, and have local botanists discuss the plants found in bloom.

The Bear River Celebration will be on Saturday, June 5 on the west side of Willow Park. Bring your kids and visit our booth and others for



this under 12-centered activity.

More activities and workshops will be taking place through the Intermountain Herbarium. Contact Michael Piep for more information (michael.piep@usu.edu) - Michael Piep

Cedar City: The public is invited to the chapter's Native Plant Sale from 9 AM to 12 noon on Saturday

May 15 at the Cedar City Visitors Center parking lot at 581 N. Main Street. Four Utah nurseries specializing in native plants and landscaping will be participating.

The Cedar Breaks Wildflower Festival will be July 2nd thru 18th this year. Two hikes per day are planned at 10 AM and 1 PM. Volunteers are needed to help with hikes. To find out about volunteer opportunities, contact Peg Simons at 435-677-3900 or peg.simons@gmail.com.—Alice Maas

Escalante (Garfield County): May 11, Paleobotanist Dr. Ian Miller of the Denver Museum of Nature and Science will speak about his work on the fossil flora of the Kaiparowits Formation on the Grand Staircase-Escalante NM near Henrieville and Escalante. The meeting will be a 7 PM at the Interagency Office visitor center in Escalante.

May 29, Janett Warner of Wildland Nursery will be selling native plants during the Heritage Festival

in Escalante.

June 26—Dr. Jim Bowns will lead a field trip along the Mossy Cave Trail in Bryce Canyon National Park. —*Adam Hutchins*

Fremont (Richfield area): Come join the Fremont Chapter for a night of camping and fun in the new Sam Stowe Group Site at Fremont Indian State Park on Friday, June 11th. Potluck dinner starts at 6 PM with hotdogs provided by the chapter; bring a side to share, drinks, and roasting sticks. Take Exit 17 off I-70 to reach the park. Saturday morning, June 12, we will caravan down the Three Creeks Road (FS road #106) to see the flowers on the Devil's Dance Floor on the Fishlake National Forest. The road is dirt but usually in good condition for two wheel drive. Meet at the Sam Stowe group site by 10:30 AM and bring a camera and lunch if desired. Camping on June 11th is free to all Utah Native Plant Society members, so if you have friends that are thinking about becoming members please let them know about the event. Contact Lisa White at Lisa_Ogden@nps.gov for more info.

Larry Rupp, professor and extension specialist from Utah State University, spoke about “selection and propagation of native plants for low-water landscaping” at our February 19 chapter meeting. Water conservation has long been of critical importance in Utah. The state continues to emphasize water conservation through smart controller technologies, pricing structure incentives, and public water conservation gardens. There is increasing interest in native plants for water conservation, as shown by the establishment of groups such as the Intermountain Native Plant Growers Association which provides information on how to use the wonderful diversity of intermountain native plants in the home landscape.

Larry stressed attractive color, marketable form, ability to be grown in nursery situations, and tolerance of poor soils, pests, cold, and drought in identifying the ideal water conserving plant. One such species being investigated is the Bigtooth maple (*Acer grandidentatum*). It has potential for water

conservation, is a small landscape tree, and has good genetic diversity for selecting superior clones. To try and locate the best Bigtooth maple samples he used aerial digital photography and found the location of desired trees with latitude and longitude found on Google Earth™ images. Larry is also experimenting with the propagation of Rubber rabbitbrush (*Ericameria nauseosa*), Whitebark pine (*Pinus albicaulis*), Greenleaf manzanita (*Arctostaphylos patula*), and Fremont's mahonia (*Mahonia fremontii*).

Larry is actively looking for any interesting specimens of native woody plants that might have potential for propagation and landscaping. He would be happy to visit with people (Larry.Rupp@usu.edu, 435-797-2099) who may know of such plants and is also able to help individuals protect their “ownership” rights to any plants they discover. —*Lisa White and Lydia Jakovac*

Manzanita (Kane County): On the evening of Thursday, May 20th we will be visiting the Coral Pink Sand Dunes north of Kanab as part of the week-long “Amazing EarthFest”. Meet at the Grand Staircase-Escalante NM visitor center at 6:30 PM sharp to carpool or caravan to the Dunes.

On May 29th, I will lead a hike on the East Rim Trail of Zion NP starting from the east entrance trailhead. We will explore sandstone outcrops and Carmel limestone caprock in search of several rare species and try to find *Cryptantha humilis* (reported for the park, but not confirmed with a photo). Plan to meet at the GSENM visitor center parking area at 8 AM to carpool to the park. The trip will be limited to 12 people and entrance fees may apply unless sufficient numbers of drivers have entry passes.

See the Bulletin Board on page 4 for more activities.—*Walter Fertig* (walt@kanab.net)

Salt Lake: At our March 3rd meeting, Tony Frates did a great job of unveiling what we know of Beckwith's violet (*Viola beckwithii*) in Utah, starting with the historical explorations of Gunnison and Beckwith and the strange fact that Marcus Jones never collected it within a few miles of where he lived in Salt Lake City. Since the talk, we have had a flurry of activity, highlighted by new discoveries described elsewhere in this issue of *Sego Lily*.

On April 7th, Mitch Power, the new director of the Garrett Herbarium at the Utah Museum of Natural History, made a tour de force of unearthing evidence for climate change buried in sediments, including prehistoric records of plant distributions from pollen analysis. Some amazing computer animations tracked the migrations of various conifers as the ice ages fluctuated, and also showed how coastlines shrank as the ice sheets melted. We were left with a lot of food for thought.

The following field trips and meetings are open to the public. Please contact the listed person to get details of when and where to meet, so they can keep you posted. For general inquiries, contact Bill Gray (cyberflora@xmission.com).

Sunday, May 2nd: Emigration Canyon, Pinecrest, 10 AM. This is a very gentle walk along an old railroad grade. It is notable for having a combination of plants that represent habitats of both lower and higher elevations. Contact Ty Harrison (tyju@xmission.com, 801-255-3167).

Wednesday, May 5th: Salt Lake Chapter meeting at REI (7 PM). Kipp Lee will talk on Gardening with Native Penstemons. The talk will include both the natural history and the horticulture of these colorful native plants which are well adapted to our climate. They are a beautiful and important addition to any native dry garden. Contact Marni Ambrose (marni32@hotmail.com, 801-512-3033).

May 7-9, Horseshoe Canyon camping trip: Horseshoe Canyon is an outlier of Canyonlands National Park, famous for its wonderful pictograph panels. There are also many interesting native plants in the

area, which lies between the San Rafael Swell and the Green River. We shall be dry camping, probably near Goblin Valley State Park—the group campsite at the park is not available. Contact Bill Gray (cyberflora@xmission.com, 801-532-3486).

Tuesday evenings in May: “Woad Runner” weeding project. Join the Salt Lake Watersheds Department for the 5th annual Dyer’s Woad pull in the City Creek watershed on Tuesday evenings from 5:30-8 PM.

- May 11: meet at Morris Meadows trailhead.

- May 18: meet at Ensign Peak trailhead.

- May 25: meet at City Creek Guard Station. Contact Vanessa Welsh (Vanessa.welsh@slc.gov.com, 801-483-6884).

Saturday, May 15th, 4th Annual Purge Your Spurge event and Native Plant Sale (10 AM). Myrtle spurge, frequently planted as a succulent ground cover, has been declared a noxious weed because of the way it has invaded our foothills. Pull it from your yard and exchange it for horticulturally approved native plants at REI (33rd S and 33rd E) from 10 AM to 3 PM. Check out the important information about the plant’s nasty juice (www.weeds.slco.org/html/education/edMap_calendar.html). Contact Sage Fitch (sfitch@slco.org, 801-440-7537).

Wednesday, May 19th: City Creek Canyon Weeds tour. (6 PM). Join SLC watershed specialist Vanessa Welsh for a special tour to see first hand the serious weed problem and what is being done towards control. Meet at the City Creek Canyon gate and shuttle to the Pleasant Valley area (Area 12). Contact Vanessa Welsh (vanessa.welsh@slc.gov, 801-483-6884).

Saturday, May 22nd: Big Springs Park, Provo Canyon (9:30 AM). Steve Hegji of the Utah Valley Chapter will lead a modest hike open to members of all UNPS chapters. Expect to see plenty of violets, woodland stars, and other moisture-loving plants. Contact Steve Hegji (steve_hegji@yahoo.com, 801-473-1337). —*Bill Gray*

Southwestern: Wednesday, May 5, 7 PM: “Fire in the Pines: Restoring Ponderosa Pine Forests in Zion and Across the Southwest”. Joel Silverman, lead Fire Effects Monitor from Zion National Park will discuss fire ecology and share his interests in native plant communities and the impacts of invasive exotic plants across the landscape. The talk will be held at Springdale’s Canyon Community Center. —*Barbara Farnsworth*

Utah Valley: The Utah Valley University Herbarium is planning a series of regular events in coordination with the Utah County Chapter. First, Jason Alexander, the herbarium curator, will be presenting a talk on floristic projects currently underway at UVU. These projects include many opportunities for members to volunteer their time and contribute to the botanical knowledge of the state. The talk will be held at Utah Valley University in PS110 on Tuesday, May 25th at 7 PM. Parking is available near the entrance to the new library (Lot N). Second, we will be discussing the possibility of having a regular herbarium volunteer day starting in June. Tentatively, this is scheduled for Saturday, June 26th from noon until 4 PM. For further information on either of these events, or if you would like to volunteer in the herbarium on a regular basis, please email Jason at alexanja@uvu.edu.

Utah Valley will be hosting a trip to Price Recreation Area on Saturday, June 5th. Kim Despain will lead the hike to a Bristlecone pine forest. For info contact Celeste (celeste2byu.edu) or Kim Despain (801-375-8267).

Plants and Preschoolers resumes on Thursday mornings from April-October. We will be hiking many canyons in Utah County this year. These are all kid friendly hikes. If you want to get on our hiking list, send an email to celeste@byu.edu. —*Jason Alexander & Celeste Kennard*

Bulletin Board

12-13 June 2010: UNPS State Board Meeting and Kanab Creek Botanical Foray— The Manzanita (Kane County) Chapter of UNPS will be hosting the state board’s annual southern Utah board meeting on Saturday, June 12 at 4 PM at the Village cafeteria at Best Friends Animal Sanctuary, ca 7 miles north of Kanab. The board meeting is open to society members but does focus mostly on arcane board business.

All UNPS members are invited to come to the Best Friends Sanctuary on the morning of June 12 and June 13 (starting at 8 AM both days) to participate in a “botanical foray” of the Best Friends Sanctuary. A foray is analogous to a bio-blitz (see the January 2010 *Sego Lily* for discussion of the Deer Creek effort near Boulder, UT) in that teams of botanists visit different habitats within a study area over a 24 hour period to record all of the species that they can. While a bio-blitz typically includes all species (vertebrates, insects, plants), a botanical foray is focused solely on plants. The Best Friends Sanctuary includes an undammed reach of Kanab Creek covered by riparian woods and thickets of Coyote willow, Yellow willow, and Fremont cottonwood, as well as Navajo sandstone slickrock, sagebrush and saltbush grasslands, pinyon-juniper woodlands, sand dunes, and hanging gardens. The area has never been thoroughly inventoried and the results of the foray will be made available to Best Friends to educate visitors on the biodiversity of the sanctuary.

Manzanita chapter vice president Jana de Peyer, a founder of Best Friends and local resident, will host a potluck gathering Saturday evening for board members and UNPS members participating in the foray. For more information on the event, or to RSVP, please contact me at walt@kanab.net. Hope to see many of you in sunny southern Utah in early June—*Walter Fertig*

Beckwith's Violet Fever (continued from page 1)

had this to say about the population (ca 200 plants) in northern Weber County: "This population of *Viola beckwithii* is at risk of disappearance. The residential and economic activity in the area have already taken a toll on existing plants, and there are plans for further residential development." Similarly, the small population (ca 100 plants) that I've been visiting in Utah County could easily disappear. Although there are no current indications of impending development, the site is dotted with mysterious and relatively fresh trenches and holes.

I first visited the Utah County site on March 20, 2010 with Robert and Susan Fitts and Kim Despain. It took a while for us to find the plants because they were just emerging, but eventually we found four small groupings of plants. The leaves were small and tightly bunched and only two plants had flower buds. I have returned to the site a half dozen times since then and plan to continue periodic visits this season until the plants are no longer visible. At this point I have located 14 sparse groups of plants at the site.

Dr. Stan Welsh accompanied me on one visit and we decided that the population could support taking a specimen, which has been added to the BYU herbarium. It is only the 8th specimen in the herbarium's collections, the first collected by Dr. Welsh, and the first since 1933.

The plants grow in the open spaces between clumps of oak. *Poa secunda* and *Gutierrezia sarothrae* dominate in those spaces. The violets can be found growing adjacent to, underneath, or intertwined with other plants, but mostly occur in the interstices. Also noticeably present are *Artemisia*, *Zigadenus*, *Calochortus*, *Hedysarum*, *Crepis*, and a variety of small forbs.

The soil is thin, overlying a deep layer of mixed sand and gravel, and is undoubtedly well-drained. The plants are found near the inflection point between the steeper slope to the east and the flatter terrain to the



west. Two-thirds of them occupy a quarter mile long, narrow band at an elevation of 4840-4855 feet. The other third are evenly split between two groups about 30 meters upslope from the narrow band.

I could not spot any morphological differences among the plants and the accompanying photographs are typical examples. The leaves are ternately compound and folded along the midline - more so when they are young. The upper two petals appear dark purple when in bud stage or just opening up. They age to a deep maroon color, and some had yellow streaks at the base. The lower three petals are white, becoming yellow toward the center of the corolla. The middle one has numerous maroon/purple guidelines and the two side petals are slightly bearded.

Species of *Viola* typically have chasmogamous flowers that open fully and are available for cross-pollination. Many also have cleistogamous flowers that do not usually open, form at or below ground level, and are self-pollinated. Studies of some other *Viola* species have shown that the chasmogamous flowers can also self-

Above: Beckwith's violet is characterized by bi-colored flowers and finely lobed, ternately-divided leaves. Photo by Steve Hegji.

pollinate, and that seeds from either type of flower can be fertile. There is some conflicting information in this regard concerning *Viola beckwithii*. A better understanding of propagation characteristics will be important to any conservation efforts.

What's in store for the future? Blake Wellard will be checking out another Weber county site based on a second WSU Herbarium specimen label. He also plans to check on some possible locations in Davis county, where the violet has never been collected. I will continue to visit the Utah county site and make observations. Others are looking for it along the Wasatch Front. Tony Frates has engaged several of us to try and find evidence of cleistogamous flowers as the season progresses. Hopefully a follow-up *Sego Lily* article can report on our findings.

Next year, why don't you catch the fever and join us in searching for, and learning about, this beautiful plant.

Beckwith's Violet, Bonneville Violet, and Emigration Market (1942-2010)

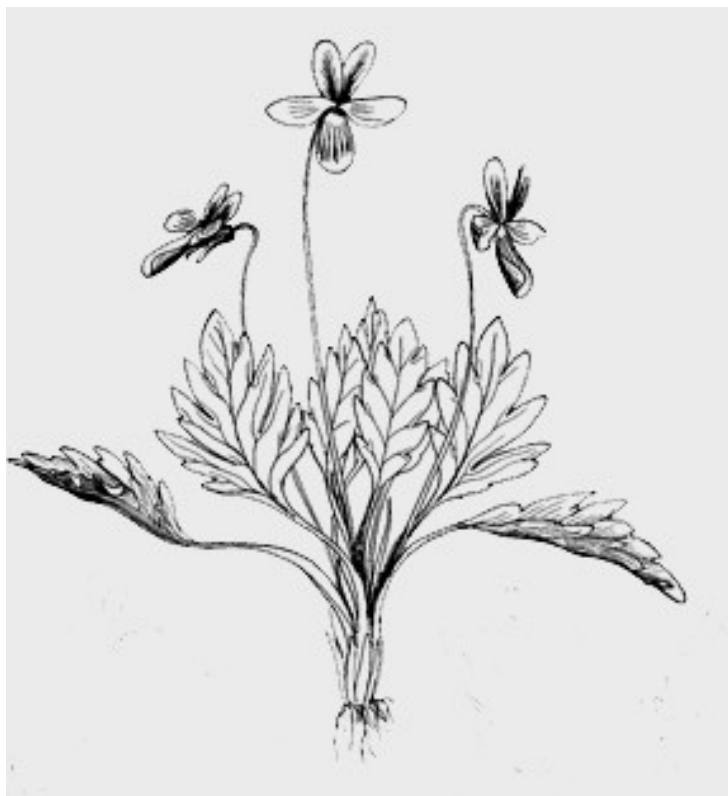
By Tony Frates

In Dr. Walter P. Cottam's 1939 paper "A New Violet from Utah", he indicated that on April 17, 1937 he noticed "a beautiful violet that was strikingly different from any species heretofore reported from Utah" found on a vacant property at the corner of 13th South and 17th East. The elevation, while not noted in the article, was at about 4500 feet. In a footnote, he further indicated that, "this property, as well as most of the bench land which harbors *Viola beckwithii*, is fast being utilized for residences." In the main text he then went on to say that this property and "neighboring areas to the east have been known to harbor one of the few relict colonies of *Viola beckwithii* T. & G. once so widely distributed over the Bonneville bench lands along the Wasatch Front." And he noted that growing in the same area was *Viola purpurea*.

Dr. Cottam noted that four essentially similar plants were found growing over about a one acre area. One of these became the type specimen (no. 7067 deposited at the University of Utah's Garrett Herbarium) and the others "were carefully removed to the garden for study." Where those plants were taken is unknown. They apparently continued to survive for some time since Cottam indicated later in the article that, "the hybrid nature of this plant is further suggested by the fact that for the past two years flowers have appeared on the garden specimens without the production of fruits."

It was suspected that at one point these few plants could have been transplanted to Cottam's long-time Sugarhouse residence but some recent urban field work conducted by Dr. Ty Harrison suggests that the landscaping of the former Cottam residence has significantly changed over the years, and there appears to be little chance that the plants are still in existence there.

Normally a botanical collector would not remove plants where a



Above: Viola bonnevillensis, the hybrid between Viola beckwithii and V. purpurea described by Walter Cottam in 1939 from specimens collected in a vacant lot in Salt Lake City. Note the broader, pinnately lobed leaves (true beckwithii has more finely subdivided, ternately compound leaves). Illustration by Seville Flowers.

sufficient population did not exist that could easily sustain the loss of any plants taken. In this exceptional case, it seems clear that the plants were removed out of fear that the area was about to be completely lost by encroaching development and could result in the extinction of a species which would be lost to science forever.

And in fact that might have been exactly what occurred. Had plants been found even sooner and in greater abundance, perhaps a better assessment could have been made as to how stable of a cross between *V. beckwithii* and *V. pur-*

purea this new form really was (see illustration by Dr. Seville Flowers, above, which was included in the article showing intermediate characters; *V. beckwithii* normally has deeply dissected leaves) and therefore support the validity of *Viola bonnevillensis* as a separate species.

Later taxonomists never had the opportunity to see *V. bonnevillensis*. Doc Cottam was very familiar with the local flora and with *V. beckwithii*. In 1937 his botanical field experience and knowledge was already vast. Cottam, born in St. George in 1894, was one of the first two people to obtain a BYU master's degree in 1919, established the first herbarium at BYU and began teaching there. In 1931, he became affiliated with the University of Utah where as botany professor he would teach and pursue numerous scientific investigations for the rest of his lengthy and fruitful career. The fact



Above: Emigration Market in Salt Lake City, probable type locality of *Viola bonnevillensis*, closed its doors in April 2010 after 68 years. What started as a vacant lot supporting hybrid plants in 1937 may be destined to become vacant again. But will the violets return? Photo by Tony Frates.

intersection at 13th So. and 17th East. It likely was one of the developments that was ultimately situated on the vacant lot where the type specimen for *V. bonnevillensis* was taken.

Today *V. beckwithii* has almost completely been lost from the Salt Lake valley and *V. purpurea* is also mostly missing from lower elevation habitats that it too once frequented. It is sad to think that the type habitat of a species (or at the very least a site that might have provided a textbook illustration of evolution in progress for future generations of students) may have been lost as a result of a vacant lot having been transformed over a 73 year period into little more than a vacant parking lot.

Selected References:

Cottam, W.P. 1939. A new violet from Utah. *Bull. Univ. Utah* 29(13): 3-7
 Martz, M. 1999. Why Hurry Through Heaven? Salt Lake City, UT: Red Butte Garden & Arboretum, University of Utah. 253 pp.

that this plant appeared strikingly different to Cottam is significant, and it can be inferred that his mentor and friend Albert O. Garrett also saw these plants. Garrett also made a number of *V. beckwithii* collections in the Salt Lake valley. Cottam in fact in his article references observations made by Professor Garrett over many years that *V. beckwithii* produces abundant seeds from petaliferous flowers while *V. purpurea* produces seeds only from cleistogamous flowers (and that *V. beckwithii* was not known to produce cleistogamous flowers).

So publication of the name *Viola bonnevillensis* was delayed for two years from the time of discovery while plants in a garden setting were observed. Cottam's 1939 article indicated that future work to verify the hybrid origin of the species was going to be required; as far as it is known, that work did not occur. Current treatments of the *Violaceae* treat the name *V. bonnevillensis* as a synonym of *V. beckwithii*.

The Emigration Market at 1706 E. 1300 South in Salt Lake City opened in 1942. The market recently closed on April 3, 2010. The troubled economy coupled with competition and no doubt owner antics (the last owner, a SLC councilperson, became involved in several controversies resulting in some boycotting the store) led to the market's demise. The market was located at the southeast corner of the



More Beckwith's Violet News

On April 5, 2010, Margaret Harris and Blake Wellard of the Weber State University Botany Department rediscovered a population of *Viola beckwithii* in Weber County from a 1966 herbarium specimen. The latest population estimate is over 400, with more likely to be found. Botany faculty and students have been searching for new localities in the area.

This population is greatly threatened from a future subdivision. Some plants have already been lost to development. Red Butte Gardens and WSU Botany Department, among others, are investigating some conservation options such as seed collection and plant relocation. WSU Botany is also considering micropropagation. - Blake Wellard

The Cactus and the Beetle

By Dorde W. Woodruff

The cactus borer beetle, (*Moneilema* sp.) eats cacti from without as an adult, and from within as a larva. Although somewhat opportunistic (especially the adults), they are known as using various species of *Opuntia* (prickly pear) or *Cylindropuntia* (cholla) as hosts. In fact, *Opuntia* longhorn beetle or *Opuntia* borer beetle are alternate common names.

However, in the last 30 years or so, some of these beetles have changed hosts from certain members of the cactus subfamily Opuntioideae to those of the subfamily Cactoideae (the barrels, balls, and hedgehogs) and become a constant menace to these other cactus species. Knowledge of the threat these animals pose to our rare native cacti has been slow to develop and spread. Every book referring to them lists various cholla and prickly pear species as their hosts.

The Utah cacti most affected by these beetle borers are the members of the genus *Sclerocactus*, and the beetle species is *Moneilema semipunctatum*. This species can be distinguished from other U. S. species of its genus by having more than one white antenna segment. It has been sparsely collected throughout Utah, and into adjacent southern Idaho, southwestern Colorado, northwestern New Mexico, northern Arizona, then on into southern Nevada, the eastern Sierra, southern California, and adjacent northern Baja California. There may be some *M. annulatum* in the very northeast of our state.

M. semipunctatum is a black beetle about an inch long, with the two wing covers (or 'elytra') fused into one. These wing covers have evolved for protection of the body rather than the wings, as the insect is flightless. "Semipunctatum" means that some of the rows of impressed dots on its body are not very deep (or only partially punctate).



Above: the cactus borer beetle *Moneilema semipunctatum*. Photo by Robert Pearson.

The beetle is now an important factor in the health and survival of Utah *Sclerocactus* populations. It is possible that the beetle will make threatened or endangered species out of many *Sclerocacti* that have until now not been threatened.

Moneilema is not lethal for *Opuntia* plants, which can propagate vegetatively. The result of their predation on *Sclerocactus* plants varies a little with the species. Those that more readily produce offsets may make a new head from an eaten plant. *Sclerocactus parviflorus* (Smallflower fishhook), our most common species, dies. The larva will have severed the top of the root, dooming the plant.

Dying plants will then progress to a skeleton of spines with the cactus's cylindrical or globose shape and some dry crumbly flesh at the base. The skeleton will break down into separate spine clusters. Finally, the spine clusters will become indistinguishable from other woody litter on the desert floor. Sometimes after the spine clusters disintegrate you will see an empty basal ring of spiny areoles with the center silted in. This process can be hastened by wind or disturbance from animals.

It is difficult to know the details of a beetle kill on a colony of *Sclerocactus* unless you catch it in the process. The time sequence of dissolution of a dead *Sclerocactus* has not been quantified, and will depend on disturbance. Without

monitoring, it is impossible to know the rate at which the *Scleros* are being killed, or to know what killed them unless they are freshly dead. Some monitoring studies or surveys state the cause of death (if possible to determine), although some do not.

It is often possible to tell that a plant is infested. The areoles of the plant will be too close together, indicating that it is not metabolizing well, and is not healthy. The apex will look shriveled, it will not flower when the others are in anthesis, or it may have a discolored patch on its side. It may be asymmetric, though this can result when it is stepped on or otherwise injured.

This photo (below) of a recently killed Uinta Basin hookless cactus (*S. wetlandicus*) shows what the beetle does to a *Sclerocactus* plant. The female lays her eggs at the bottom of a cactus. The larva burrows into it and eats the cactus from within. Pathogens may also move into the injured flesh. The larva pupates in the plant or in the soil nearby — authorities are unclear whether it is one of these or both — and emerges as an adult beetle. It is also not known how many individual plants one female can infect.



Above: A federally Threatened *Sclerocactus wetlandicus* plant eaten by cactus borer beetle. Photo by Dorde Woodruff.

In my early years of working with *Sclerocactus* from 1960 through the early 1970s (as I went from cactophile to master's degree) I never saw mass mortality. I've seen no cause for mass mortality other than these beetles since becoming active in cactus research again in 2005. Only a few species of *Sclerocactus* are monitored, so we really don't know what is happening with the others.

Not being able to read the future, no one in the 1960s was documenting the health of *Sclerocactus* populations. One exception was an unusual population of *S. parviflorus* I observed (and photographed) in 1962 on a 6 km stretch of road along Cottonwood Wash in what is now Grand Staircase-Escalante National Monument (GSENM). The population was not only uniquely abundant, large, and many-headed, but there were many white or pale pink flowers instead of the usual bright pink. I went back in 2005 intending to document this wonderful population — and they were gone. Instead of being able to see hundreds right from the car, I couldn't see any. The old photos were useful although Ektachrome, sadly, deteriorates badly (see photo at right) — we didn't know that at the time. I matched the photo stations and did repeat photography. With lots of walking, I did find a very few cacti hidden in flourishing cheatgrass.

How did this happen?

Study has shown that this terrible disappearance was relatively recent. Beetles weren't totally responsible, but they were a large factor. A change in grazing regime increased competition. I could still find some undissipated cactus skeletons from beetle kill. In 2005 an army of cheatgrass moved in.

After a beetle kill, cheatgrass is the biggest threat to the recovery of *Sclerocactus* populations. The cactus must re-establish from the seed bank in the soil. Competition from cheatgrass is likely to be devastating to the survival of the tiny, slow-growing, vulnerable cactus seedlings. Also cheatgrass is subject to fire, to which small cacti like *Sclerocactus* have no resistance. *Sclerocactus* populations in environments where cheatgrass has not become established, such as *S. mesae-*



Above: Numerous individuals of healthy Sclerocactus parviflorus can be seen in this faded Ektachrome photo from 1962 along the Cottonwood Road in the future Grand Staircase-Escalante National Monument. In 2006, only 8 dead plants were found in the same area. Photo by Dorde Woodruff.

verdae on Mancos shale, have a better chance of re-establishing. But even there, after a mass kill the beetle will have selectively removed the best seed producers of a population — the largest, oldest ones that they prefer. The population, if or when it recruits from the seed bank, may not have time for large plants to mature before another round of beetle kill.

Skeptics say that the beetles are just part of the natural cycle. But this is not true. As far as we know, *Moneilema* hosting regularly and preferably on *Sclerocactus* and other Cactoideae is a new thing, at a time when our native plants are facing many new threats.

Sclerocactus at present faces many threats, many of them man-made:

- oil and gas exploration and production
- coal or other mining and

related activities

- commercial and residential expansion
- road building and maintenance
- construction and maintenance of powerlines and pipelines
- off-road vehicles
- commercial and private collecting
- livestock grazing, trampling, and soil disturbance
- natural threats, such as herbivory by different insects or mammals, unusual or erratic weather events, erosion, and competition
- for some species, restriction to a narrow edaphic range and limited habitat availability
- climate change

Moneilema has always been known to be opportunistic, using other cacti for adult food if not for larvae — but only occasionally, and always preferring chollas or prickly pears. So when did this host-switching occur?

The first observations of the beetle switching hosts to *Sclerocactus* were in the late 1970s. Larry England of the Salt Lake office of the Fish and Wildlife Service made one of these very first observations. He was originally hired by the BLM in Vernal because of a flurry of oil and gas development at that time. None of these early observations appeared

in print right away. People had no idea of the significance of this. At first no one knew the identity of the borers.

A few written accounts began appearing in the 1980s, for some of the Cactoideae species other than *Sclerocactus*. In the 1990s *Moneilema* was identified as the agent. Ron Kass' 2001 papers in the *Proceedings of the 3rd Conference on Rare and Endangered Plants*, and in *Western American Naturalist*, were the first readily-available, detailed, published reports of this host-switching, in this case of *M. semipunctatum* to *S. wrightiae*.

It is a common experience in recent years to visit a *Sclerocactus* population that is pleasingly numerous, only to find on each revisit the plants are harder to find. For instance: populations of *S. wetlandicus* in the southern end of its distribution; *S. parviflorus* adjacent to I-70 at the west end of Salina Canyon; the yellow-flowered *S. parviflorus* east of Hite on U95; a unique population of *S. wrightiae* x *S. parviflorus* in the San Rafael Swell — all of these were healthy and numerous, until quite recently. In as short a period as three years, live individuals have become scattered and scarce. In a 2006 reconnaissance of *S. pubispinus* and *S. spinosior* sites at the south end of their range (some known to be of great abundance) plants were few and scarce. In the 1960s and early 1970s, if you found one *S. spinosior* or *S. pubispinus* plant, it would always be in a colony.

North of the Badland Cliffs, *S. wetlandicus* and *S. brevispinus* do not show extensive beetle kill. Kipp Lee reported a numerous and healthy population of *S. pubispinus* near its northwestern limit. This and other information suggests that while the host-switching beetle has been known to be widespread for more than three decades, the amount of beetle kill has increased in recent years, and seems to have spread from the south. But we really don't have enough data.

So we have some idea of when this host-switching occurred, but why is it doing this? Christopher Smith, whose PhD dissertation and subsequent papers were on the bio-

geography of *Moneilema*, suggests three possible causes: 1) competition with other insect species or within *Moneilema* species; 2) a scarcity of host species; 3) evolution of a distinct race or races of insect species with a different host preference. Reasons 1 and 2 don't seem likely. No other insect has the *modus operandi* of *Moneilema*, and *Opuntia* and *Cylindropuntia* species are not scarce. An hypothesis would be that some beetles found that Cactoideae were effective hosts, and a genome with that host preference began to develop, thrive, and increase. Chris Smith in a study of *Sclerocactus mesae-verdae* in 2000, did collect material for genetic analysis, but was unable to complete it due to lack of funds.

Moneilema is quite willing to use new cacti for hosts opportunistically. Arizona growers or collectors of either native or exotic cacti such as the South American *Echinopsis* loathe this beetle. Cultivated cacti are better watered and fertilized, protected from competition, and thus especially succulent and tempting dainties for a cactus-eating insect.

Reports of *Moneilema* species hosting on Cactoideae other than *Sclerocactus* have been scattered throughout this same time period of the 1980s on. These reports with their date of publication are: Cochise pincushion, *Coryphantha robbinsorum*, in southeastern Arizona in 1985; Acuña cactus, *Echinomastus johnsonii* ssp. *acuñensis*, in southwestern Arizona in 1992; *Escobaria sneedii* in southeastern New Mexico in 2003; Star cactus, *Astrophytum asterias*, in northeastern Mexico in 2007; Siler's pincushion, *Pediocactus sileri*, in southwestern Utah and northwestern Arizona in 2008, based on a 2006 report; Scarlet hedgehog cactus, *Echinocereus coccineus*, and other hedgehog species in Colorado in 2009. Larry England observed beetle predation on our *Pediocactus despainii* and *P. winkleri* in the 1980s, and took photos.

Cactophiles in Utah have learned not to bring *Sclerocactus*



Above: Healthy young adult *Sclerocactus parviflorus* from the Andy Miller Flats in the Orange Cliffs of Utah. Photo by Dorde Woodruff.

from the wild* without treating them with insecticide so that any hidden larvae will not hatch out beetles ready to infest other Cactoideae in their gardens. Mark Dimmitt of the Arizona–Sonora Desert Museum in Tucson, concerned about the Museum's gardens, considers *Moneilema* the most injurious insect predator of cacti in the U. S.

This phenomenon needs more observation and documentation. Because the present-day cycle of beetle kill and recruitment from the seed bank is a multi-year cycle, monitoring or observation needs to be done over the long term. Also, it's counterintuitive to make a specimen of *Sclerocactus* from a population that is doing badly. But when it's clear that a plant is infested, it is almost certainly doomed, and the presence of a larva would document the kill. Beetles can be searched for near twilight, though Smith in his 2000 study did not find many. It only takes one egg-laying female beetle to kill a 20-year-old cactus.

Sclerocactus is challenged by modern-day adverse factors as never before. How much will the beetle contribute to downward spirals of *Sclerocactus* species? We already know that it is a factor in the ill health and sketchy prospects of colonies of *Sclerocactus wrightiae*.

* only through legally permitted collecting, lest you worry

Utah Botanica

Odds and Ends from Utah Botany

Forest Service Updates

Sensitive Plant List - For the first time since 1994 the Intermountain Region (Region 4) of the U.S. Forest Service has revised its list of Sensitive plant and animal species. On March 30, 2010, the service officially added 38 plant species to the Sensitive list, of which 13 are known from Utah forests. Another 17 plant species were dropped from the Sensitive list for Region 4 (which includes national forests in Utah, southern Idaho, Nevada, western Wyoming, and eastern California). None of the dropped species were from Utah's six national forests (Ashley, Dixie, Fishlake, Manti-LaSal, Uinta, and Wasatch-Cache).

The Forest Service defines Sensitive species as "those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution." Sensitive species receive special management attention which helps ensure that they do not need to become federally listed under the Endangered Species Act. Projects that may impact the habitat of Sensitive species undergo scrutiny to determine how they might adversely impact populations, viability and the ecology of the species as a whole. Sensitive species programs are therefore critical and cost effective programs that in the long run not only help to preserve biological biodiversity but also save tax dollars and represent excellent long term investments.

See the table for a list of what was added in Utah. For a complete region wide list that incorporates these changes, see www.unps.org/miscpdf/R4TESList2010.pdf or simply click on the "Rare plants" tab at www.unps.org and scroll down to the link provided there in the Forest Service (Utah/Region 4) section.
—Tony Frates.

Additions to the US Forest Service Intermountain Region (Region 4) Sensitive Plant Species List, March 30, 2010

Apiaceae (Umbelliferae)

Angelica wheeleri (Wheeler's angelica), Uinta, Wasatch-Cache

Asteraceae (Compositae)

Erigeron garrettii (Garrett's fleabane), Uinta, Wasatch-Cache

Brassicaceae

Draba abajoensis (Abajo Peak draba), Manti-LaSal

Draba brachystylis (Wasatch draba), Uinta?, Wasatch-Cache

Draba burkei (Burke's draba), Wasatch-Cache

Draba ramulosa (Mt. Belknap draba), Fishlake

Draba santaquinensis (Santaquin draba), Uinta

Lepidium montanum var. *alpinum* (Wasatch pepperwort), Uinta?, Wasatch-Cache

Fabaceae (Leguminosae)

Astragalus iselyi (Isely's milkvetch), Manti-LaSal

Fumariaceae

Corydalis caseana ssp. *brachycarpa* (Wasatch fitweed), Uinta, Wasatch-Cache

Orchidaceae

Cypripedium parviflorum or *C. calceolus* var. *parviflorum* (Lesser yellow lady's-slipper), Wasatch-Cache

Primulaceae

Dodecatheon utahense or *D. dentatum* var. *utahense* (Wasatch shooting star), Wasatch-Cache

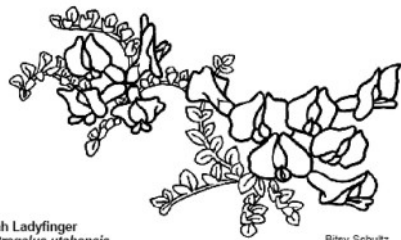
Rosaceae

Ivesia utahensis (Utah ivesia), Uinta, Wasatch-Cache

Two additional species (*Botrychium simplex* and *Viola charlestonensis*) that are listed as Sensitive region-wide occur in Utah, but not on US Forest Service lands and are thus excluded.

Top: *Utah ivesia* (*Ivesia utahensis*) illustration by W. Fertig





Utah Ladyfinger
Astragalus utahensis

Betsy Schultz

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