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Sweet Scent of Native Cactus to be Analyzed

By Dorde W. Woodruff

This spring Herr Dr. Roman Kaiser of the fragrance and flavor firm Givaudan will look for *Coryphantha vivipara* and perhaps some *Sclerocactus* species in his local Dübendorf, Switzerland, botanical collection, or elsewhere.

In order to find out what chemical constituents produce any given floral fragrance, for some years now Dr. Kaiser has been able to capture the quite small amount of molecules (by our normal scale of things) required for sensitive machine analysis, and systematically analyzes flower fragrances, often trekking to rain forests worldwide with their enormous numbers of plant species.

Before modern organic chemistry, all that was available for fragrances and flavors were about 500 natural extracts. Now as a result of this sort of work by Givaudan and others, over a thousand synthetic compounds can also be used.

To do this work, Dr. Kaiser uses an apparatus that sucks in about an hour's worth of a flower's fragrance by pumping it into an adsorption trap, by funneling it from a flower placed within a glass vessel. Up to 200 μg is captured, then a solvent removes the captured microsample from the adsorbent, and this is placed in an ampoule and kept cool. On returning to the lab, it is run through a capillary gas chromatograph, a mass spectrometer, and other tests for distinguishing not only less volatile fractions, but also the quantities of the various constituents. Others can use his collecting apparatus, but Dr. Kaiser says they need to be trained in person.

Dr. Kaiser has studied cactus scents before, but mostly in tender tropical species, kinds that Utahns if they grow them will have indoors, at least in winter. Of the four types of pollinators found for cactus flowers, moth, bat, bee or other insect, and bird, our native species are mostly bee pollinated, except for the striking orange-red, sturdy flowers of *Echinocereus triglochidiatus*, a taxon split by some into various species or varieties, which is mostly hummingbird-pollinated. The name translates to Three-spined hedgehog cactus, but not all are three-spined. It's most often called Claret Cup Hedgehog but I like to call it Hummingbird Hedgehog.

Dr. Kaiser has his own personal reason for worrying over the fate of the rain forests. Although he's checked out about 9000 species of plants and investigated the fragrance of about a sixth of these, all those strange and unknown scents are out there and he hasn't had a chance to sample them yet.

While some of the compounds are familiar to chemists, or even herbalists or foodies who like to look at herb or flavoring constituents, familiar substances like linalol, neral, geraniol, limonene, vanillin, estragole, citronellol,

humulene, jasmone, and cubebene, others may be rare or even new, or encountered in surprising context. For instance, Dr. Kaiser didn't expect to find geosmin, a musty-earth odor most typical of soil microbes, emitted by some cactus flowers

It's unknown, as far as I can find out, why *Coryphantha vivipara* has such a strong, sweet fragrance, unusual and perhaps unique amongst hardy cacti. Floral scent is correlated with pollinator attraction—even to favoring certain species of bees over others— but much study needs to be done on connecting pollinators with cactus species. To this end, Utah State University has a very active bee lab, which would be happy to look at pollinators captured on cacti— contact Olivia Messinger, USDA Bee Lab, Utah State University, BNR 244, Logan UT 84322-5310.

Fragrance in cacti is a neglected study, not often noted in keys. It could be another key character for differentiating or delineating species. Cactus nomenclature seems to be a peskier problem than in many other families, though contemporary DNA analysis is quite helpful, often bringing new insights.

Separating *Coryphantha vivipara* from the taxa farther south and west has been done differently over the years. The most current treatment is that of *Flora of North America*. The finished parts of this major work are online, which is so helpful, rather than having to buy a series of hundred-dollar books. You can find *Coryphantha* at http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=108121. The treatment of this genus was written by Allan D. Zimmerman and Bruce D. Parfitt. Zimmerman did his PhD dissertation research “Systematics of the Genus *Coryphantha* (Cactaceae)” at the University of Texas.

Zimmermann and Parfitt subsume the genus *Escobaria* into *Coryphantha* entirely, a controversial move, although Stan Welsh, the author of the Cactaceae treatment in *A Flora of Utah*, agrees.

Coryphantha vivipara opens its flowers at noon, or 1 p.m. daylight saving time. The next time you're in Southern Utah some afternoon at the appropriate sort of place, and you see a starry pink flower on a ball cactus (see photos in Jeff Mitchell's article in *Sego Lily* Jan/Feb 2006, pp 3-4), get down and smell it, for a whiff of the sweetest scent imaginable. With any luck, in the future we will know what other scents that of *C. vivipara* may be like, but in my experience it's unique.

In Memoriam – Dr William Reid

By Editor and Margaret Malm

UNPS is sad to hear of the passing of Bill Reid. Bill was an ecologist and taught at UTEP (University of Texas-El Paso) for some years.

After he retired, he moved to Southern Utah, doing some work for Zion National Park, helping to define some ecosystem limits up on the Kolob Terrace. On one such trip with Margaret Malm, they found some really interesting things – as Margaret recalls.

“big clone rings of gambel oak, and large fairly regular rounded rocky mounds (not really big enough to be called hills maybe 40-60 feet high) rising up from the flats, that had, for instance, a ring of gambel oak around the base, and a little higher up a ring of some other shrub; still higher yet a ring of another different species. Sort of like the tiers in a wedding cake, each being different. It really awakened my interest in such things.”

Bill also worked on a project for the Grand Canyon Trust on some of their properties to, west and south of Zion. He also worked on the early stages of the search for the – at that time – elusive Shivwits Milkvetch. Bill was a real expert and a genuinely nice person, and will be badly missed by all who knew him.



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Natives in the News

These articles are re-produced with permission from the authors, thank you to Mark Havnes of the Salt Lake Tribune and Heidi Toth of the Daily Herald. Research by Kelly McNulty

Working through thick and thin. Biologists try to restore plant balance in Southern Utah.

By Mark Havnes
The Salt Lake Tribune

Melissa Siders likes to watch the grass grow. The wildlife biologist for the Bureau of Land Management is monitoring a project designed to restore areas on the Grand Staircase-Escalante National Monument to a state of healthy vegetation beneficial to grazing livestock and wildlife.

"The deer herd on the Paunsagaunt Plateau is declining and could be because of loss of winter habitat," Siders said. "One of the problems is the understory, where shrubs, grasses and flowering plants are not growing under thick tree cover."

To allow the sunlight onto the ground, Siders is thinning stands of pinyon and juniper trees and planting the area with native grass seeds.

Her efforts are part of a larger program that has brought together federal and state government agencies and private groups to restore wildlife habitat in several projects spread across southern Utah.

The Southern Region Partnership for Restoration and Development is raising funds and helping with four of the projects on the 1.9 million-acre national monument.

For a 1,000-acre project near the Buckskin Wash in Kane County, the BLM contracted with crews to thin trees then plant the area with native species that will be studied to assess how they grow back.

The Buckskin project is one of three such test sites using similar methods. The other two will have different tree-thinning densities and will be planted with different seed mixtures of native and nonnative species.

Once the project gets to a certain point, the deer and other animals will be able to browse on bitterbrush, sagebrush, cliffrose, service berry and other plants that have been denied sunlight by the heavy tree canopy.

The native grasses to be planted in the experimental are intended to prevent invasive species like cheat grass and Russian thistle from taking over the land and choking out native plants. The results of the program should start bearing fruit in about three years.

Riddle campaign aims to increase awareness of weeds.

By Heidi Toth
Daily Herald

Southbound commuters on Interstate 15 have a riddle to solve: What's free but costs millions?

The question is posed on a billboard near Lehi, but the answer, say the sign originators, actually lies in Utah's state parks, canyons, river banks and hiking trails in the form of noxious and invasive weeds. The invasion is one everyone should be concerned about, weed experts say.

"Traditionally, the problem has been, at least the perception has been, that it's an agricultural problem," said Steve Dewey, a professor of weed science at Utah State University who works with the U.S. forest Service, the Bureau of Land Management and state and local governments to identify and control noxious weeds. "Essentially the truth is, weeds are impacting everybody, one way or another."

A noxious weed is a plant that's been legally determined to pose a threat to land management and public health, and landowners are required to make efforts to control it. Invasive plants share similar characteristics but are not classified as noxious. They fall more into the obnoxious category, said Lisa Bryant, soil scientist and weed program leader with Utah division of the Bureau of Land Management. Often, a weed species is so widespread that any effort to control it would be a waste of resources.

"You can dump millions of dollars into controlling cheat grass, and you still won't get a handle on it," she said.

Instead that money is being funneled into controlling other weeds in a concerted effort by the state Department of Agriculture, the Utah Weed Control Association, the Utah Weed Supervisors and the U.S. Forest Service. Infested areas are sprayed with pesticides and weeds are removed manually by workers and volunteers, but they're looking for some help in the effort, hence the awareness campaign.

"If we can prevent the weeds from getting there in the first place, we can really reduce a lot of the other things that we're having to resort to, to control weeds," Bryant said.

They are also trying to recruit hundreds of extra eyes to watch out for weeds and ways to reduce spreading the seeds. "The trick was finding a way to get the average Utahn to pay attention to weeds; people don't generally think of weeds in terms of that," said campaign coordinator Sage Fitch.

"They think of obnoxious, but not noxious, and we wanted to use that to try and grab people's attention," she said.

The group needs the help of every Utahn because in most cases, people are responsible for spreading the

weeds. Dewey said that with the disproportionate amount of available outdoor recreation, people are coming from all over the place, and oftentimes they bring seeds into the state that have clung to hiking boots, tents and gear. The seeds then take root in Utah, displacing native plants and using up water.

"By not understanding noxious and invasive species, we city dwellers inadvertently spread them onto our public lands where we like to recreate," Fitch said.

Some noxious weeds are ornamental garden plants gone wild. She cited the Myrtle spurge craze in Salt Lake County; people were purchasing it for its hardiness in the desert. It's since spread into the foothills and trails in the area and is likely to keep going.

Bryant said because weeds don't hold soil as well as native plants do, infested areas experience more erosion, rangeland is degraded, soil nutrients are lost, wildlife can be affected and in some cases, the plants can pose a public health risk. Fitch said the spurge has a milky white sap that causes blistering and dermatitis.

In a nutshell, all three said the weed issue is one of which everyone should take note. So they asked the question. Fitch said in a few weeks, after giving people enough time to become sufficiently curious, the billboards will have the answer. Then, she said she hopes, awareness will increase and the problem will decrease.

"It's really just about being aware which plants are problems and which ones are not," she said.

For more information go to www.ob-noxious.org

UNPS Seed Grant Program

By Bill Gray

For many years we have had a program of making small grants towards projects that further the goals of UNPS. One of the earliest, and most significant, was to help fund studies of the Dwarf Bearclaw Poppy in Southern Utah – this has now become a showpiece conservation project with the Nature Conservancy playing the primary role.

Given our limited resources we have become increasingly "picky" in recent years, accepting only proposals that we feel will add real scientific knowledge about rare plant species in Utah. Time and again, when trying to get formal protection for such plants we come up against a Catch 22: the federal government requires strong scientific grounds for declaring a species to be threatened or endangered (which is not the same as rare), but they have rarely been forthcoming with the money to do the research!

This Spring we received a proposal from Ashley Egan, a grad student at BYU, who is starting her research on Pariah Breadroot (*Pediomelum pariense*). It is a very rare plant found only in a few restricted locations in Southern Utah. One critical factor for a rare plant is how the different parts of its population interact. Ashley's work will use modern genetic methods to look into this question, to try and get an idea of its vulnerability.

We were uniformly enthusiastic about the proposal, and awarded her a grant of \$1000 to help with the research. Partly on the strength of this award she was given a matching amount by BLM — that's what a seed grant is all about.

Congratulations to Ashley, and we look forward to hearing more as the research progresses. A short outline of her research is printed on the following page.

**The Conservation Genetics of the Paria Breadroot,
(*Pediomelum pariense*: Leguminosae), a rare Utah endemic.**

Ashley N. Egan and Keith A. Crandall

Endemic plants, those restricted in geographic range, are often rare and susceptible to extinction. Utah boasts many rare, endemic plants which add to our unique natural heritage and biodiversity. One such species, *Pediomelum pariense*, commonly known as the Paria Breadroot, is found in Kane and Garfield counties alone. This species is listed as imperiled by NatureServe due to its endemic status and low population numbers. It is not, however, listed as sensitive or threatened by any state or federal agency while its demographics suggest it may need to be. To understand the conservation needs of the Paria Breadroot, we have proposed a conservation genetic study of *P. pariense*.

While studies on population numbers and density are vastly important to conservation management, these statistics alone do not provide all the information we need for a thorough conservation-level survey. Determining the underlying genetic diversity within and between populations of a species is essential to understanding the species' contribution to biodiversity and its aptitude for continued survival. The greater the genetic variation a species has, the more likely it is to adapt and survive and the less likely it will move towards extinction. Thus, quantifying and qualifying the genetic diversity within the Paria Breadroot is paramount to defining its conservation status and risk of extinction. As populations of a species are established, genetic races may arise due to segregation of populations and a reduction of cross pollination or the sharing of genes. This segregation can increase genetic diversity by allowing separate genetic lineages to form. Uncovering the existence of genetic races between populations will help us better choose those areas to place under management, should it be required, enabling the conservation of the greatest genetic diversity possible. Because the Paria Breadroot exists in three different watersheds, the sharing of genes may be somewhat limited, making the existence of differing genetic races a possibility.

To thoroughly assess the Paria Breadroot's conservation status, we will nondestructively sample known populations by removing a single leaf from each of 20 plants per population for DNA extraction and analysis. This will enable us to estimate genetic diversity both within and among populations. Microsatellite markers, which are indicators of a change in the length of a plant's genome, will be used to estimate genetic variation. Analysis of this data will enable us to determine how much genetic variation exists in the species and how that variation is distributed throughout its range. We will be able to estimate the levels of cross pollination occurring between populations and whether populations are in growth or decline. In addition, we will be able to take a look at how historical events have shaped the Paria Breadroot's current distribution. This knowledge base will enable us to determine the conservation status of the Paria Breadroot and make educated suggestions for management procedures should they be required.



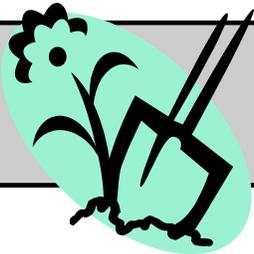
Paria Breadroot in flower - photo by Walt Fertig

WHITE DOME BEARCLAW POPPY HABITAT UPDATE

The Nature Conservancy will purchase the North West Corner of White Dome this year and hopefully the rest of the habitat at some point in the future.

TNC's acquisition costs are likely to be around \$2 million. They will also have to meet substantial management costs for fencing, fence repair, site monitoring, education, enforcement etc. They are continuing efforts to raise the necessary funds to keep the project going.

If you would like to make a donation to protect this rare habitat please go to www.unps.org and click on the "news" page for further details.



Events and Chapter News

Salt Lake Chapter

Our last monthly meeting for the year was held May 9th, with Sage Fitch talking about the weed problems that are besetting the county, and about the Cooperative Weed Management Areas that have been set up to coordinate efforts of agencies and volunteer groups in fighting some of the worst ones. We kept her so busy with questions during the talk that we had to cut things short as the library needed to close!

At the same meeting (the closest we could get to May 11th, "National Endangered Species Day") Jeff Mitchell displayed some of his unique collection of Utah's endangered cacti, all grown from seed. Jeff enlightened us about what it takes to be in legal possession of endangered plants.

Chapter members have served as volunteers in various projects, including the "Woadrunner" (pulling Dyer's Woad in City Creek canyon); surveying for rare plants in the Uinta Basin, including *Sclerocactus brevispinus* and *Penstemon grahamii*; and teaching a workshop on penstemons at Cactus and Tropicals. In July we shall be providing guides for a National Wildlife Federation "Family Summit" up at Snowbird. Paul Zuckerman has created a CD with about 50 wonderful close-up photos of local plants, proceeds from which he is generously donating to the Salt Lake Chapter. We shall have more details on this later.

We just got back from a wonderful field trip out to Painter Spring in the House Range. Organized by Maggie Wolf, a group of 8 of us met at the remote spring on the west side of the range, with huge sculpted granite cliffs. The area gets about 6 inches of rain a year, but here was a flowing spring with hundreds and hundreds of orchids in bloom. It was truly a wonderful experience. We'll

make a write-up of this for a later Segó Lily.

Events for Calendar

July 18th (Tuesday) **Picnic in City Creek Canyon.** We have reserved Area 29 (Weeping Rock) for a potluck/hike. Dinner at 6:30pm. Come earlier (somebody will be around by 4:00) to look for flowers. Please bring a potluck item and dress appropriately for a flower hike. It can get quite cool in the evening. Contact Kipp (759-6204) or Bill (532-3486).

Date tba. Flower hike on Bald Mountain.

Date will be announced, depending on snow conditions.

Manzanita (Kane) Chapter

Manzanita has another field trip in Cedar Breaks on Saturday July 1 from 10-12 AM, meeting in the VC parking lot. This is in conjunction with the Cedar Breaks Wildflower Festival going on that weekend and through July 4 (UNPS member Doug Reynolds of Cedar City is coordinating the event).

Utah Valley Chapter

On Friday, May 19th, the Utah Valley Chapter met for its quarterly potluck and lecture. The lecture was given by Bernadette Barthelenghi the Uinta National Forest Landscape Architect. She showed slides and discussed the restoration of Brush Creek in Snow Mass Village in Colorado. It was an excellent presentation.

The Utah Valley Chapter will meet on August 18th for our next lecture. Details will be posted on the website.

In addition the Utah Valley Chapter is hosting hiking for small children every Wednesday morning at 10:00 am. Come and see native plants along the Bonneville Shoreline Trail at a toddler's pace. For details and weekly locations contact Celeste Kennard at (801) 377-5918 or e-mail celeste@byu.edu.

The Utah Native Plant Society is planning on hosting a native plant sale on September 30th. We would like any donations of plants (seeds, cutting, or actual plants) for the sale. We also plan on having a sale on April 28th, 2007. If anyone has available greenhouse space for growing plants, or know where we could find some we would appreciate it.

Miscellaneous events for June

- The Intermountain Herbarium (USU) and The Garrett Herbarium (U of U) are pleased to announce a 1 day working field trip to the beautiful Ogden Valley of Northern Utah. Come get your hands dirty with working botanists from both schools as well as invited botanists from BYU, as we explore the botanical wonders of the area. For those with a side interest in insects Christy Bills, collection manager and entomologist at the Utah Museum of Natural History will be joining us.

Date: Saturday June 24, 2006

Time: 8:30 A.M. (return approx. 6:30 P.M.)

Cost: \$20.00 (will include transportation from the University and a light snack)

Please bring water, a lunch, and insect repellent. Vans will be departing from USU and the U promptly at 8:30.

For more information contact Michael fungi@biology.usu.edu or Mary mary@biology.usu.edu at the Intermountain Herbarium or Ann Kelsey Kelsey@umnh.utah.edu at the Garrett Herbarium or visit the Intermountain Herbarium's website at <http://herbarium.usu.edu/>

Miscellaneous events for July

- July 21 - 26 : International Interim Rock Garden Plant Conference, sponsored by the Wasatch Chapter of the North America Rock Garden Society. The Conference is titled, "Plants of the Western Cordilleras : Alpines in All Directions," and will be based at the Snowbird Ski and Summer Resort in Snowbird, Utah.

The double-barreled format consists of a lecture series, followed by a three-day fieldtrip. The lecture series will be held at Snowbird, where the knowledgeable and entertaining speakers will cover the geology, the plants and the ecosystems to be seen in the field.

The three-day fieldtrips will roam far afield, to:

Ruby Mountains, eastern Nevada

Cedar Breaks, southern Utah

Teton Mountains, western Wyoming and Bear River Range, northern Utah. And the three-day trip around the Wasatch Mountains (based at Snowbird) has been specifically designed so that members whose hiking abilities may have decreased, but whose enthusiasm remains undiminished, can still enjoy the alpine flora.

For more information, go to <http://www.narqs.org/IIRGPC.html>

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Many thanks to Xmission for
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Please direct all suggestions,
articles and events for the
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**The deadline for next issue
is 12th August, 2006**

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