



MEDIA RELEASE

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Two new, critically endangered Wildflower species Discovered by Amateur Botanist at Lime Ridge, Mt. Diablo, in heart of urban area near downtown Walnut Creek, in the San Francisco East Bay, California; they survived 100 years of lime quarrying until protection but remain threatened.

High Resolution Photos & Map (permission to use given): contact Beryl at banderson@savemountdiablo.org or (925) 947-3535.

Photo Credit: Scott Hein, www.heinphoto.com; **Map Credit:** Save Mount Diablo

Where: The exact locations of the new species are being kept secret to protect them; Lime Ridge Open Space can be viewed from Ygnacio Valley Road in Walnut Creek, east of Oak Grove Road.

(Walnut Creek/Concord) Lightning has struck twice in Walnut Creek, CA, at Lime Ridge Open Space, a biodiversity hot spot of just three square miles but including roughly 35 rare species. David Gowen, an amateur botanist associated with the California Native Plant Society, has discovered two new plant species never before described by science, near downtown Walnut Creek. The discovery is startling because the area is easily accessible and it has been studied by botanists for 150 years. Conservation efforts are underway.

Representatives of the California Native Plant Society (CNPS), Save Mount Diablo (SMD), the Walnut Creek Open Space Foundation (WCOSF), the City of Walnut Creek (city), and U.C. Berkeley's Jepson Herbarium (Jepson Herbarium), announced the discovery of two new plants, two pretty and related wildflowers in the phlox family, which resemble star shaped flower-studded pin cushions.

The plants, the Lime Ridge Navarretia (*Navarretia gowenii*) and the Lime Ridge Woollystar (*Eriastrum sp. nov.*) miraculously survived a hundred years of quarrying and other activities until their habitat was protected as the cities of Walnut Creek and Concord's jointly owned Lime Ridge Open Space. Both have been confirmed as new species by genetic and other testing. Both are critically and globally endangered given tiny habitats and small numbers.

"This isn't in some foreign country or in the boonies," said David Gowen, both plants' discoverer, "it's the heart of an urbanized environment where many famous botanists have worked. It was a surprise that the plants had been missed. We still have a lot to learn right here in our own backyard. Discovering one new plant is incredible; that there are two new species in the same general location is a miracle. This same three square mile area has more than thirty other rare plant and animal species. Lime Ridge is a hot spot for biodiversity."

"What a gift that the people of Walnut Creek had the foresight to protect this area." said Brad Rovnpera, Public Information Officer for the City of Walnut Creek, "Walnut Creek voters approved an open space bond measure in 1974 that sought to preserve these precious lands in perpetuity."

"These two new species were hiding right under our noses. Their locations are being kept secret to protect them," said Seth Adams, Director of Land Programs for Save Mount Diablo, a conservation organization that helped to create Lime Ridge Open Space. "Mt. Diablo and Lime Ridge are an incredible gold mine for an enormous number of rare plant species. This is a very big deal, not just one but two new species in a tiny area on the edge of development. It's incredible that there are still unexplored areas so close to an urban area, with eight million people within an hour's drive. This is one of the most exciting discoveries of my life, right up there with the rediscovery of

the Mt. Diablo buckwheat and possible sightings of the Ivory-billed woodpeckers,” he said, referring to a plant long thought extinct and considered the ‘Holy Grail’ of East Bay botanists until its 2005 rediscovery just after the bird, also thought extinct, was sighted.

“Lime Ridge is spectacular but it’s not pristine,” said Bob Simmons, the President of the Walnut Creek Open Space Foundation which also helped to preserve Lime Ridge and which restores native plants and wildlife habitat there and in the other open space areas and which advises Walnut Creek on its management of the open space areas. “It was quarried for lime for a hundred years but these plants managed to survive in less than 2,000 acres—the spots where they grow probably total less than an acre. They’re on the critical edge of extinction—it’s up to us to make sure that they’re not lost.”

“The two new species are annuals,” said Heath Bartosh, Chair of the Rare Plants Committee of CNPS. “They flower, seed and die each year then grow from seed the next year. We delayed the announcement of their discovery until they seeded to make their location even more difficult to find. They’re only found in small areas. There are people out there who might ‘love them to death.’ Nonetheless we announced their discovery to help support conservation and biodiversity protection. Lime Ridge *Navarretia* has already been given the highest level of protection through CNPS’s Rare Plant Inventory. Once the Lime Ridge *Woollystar* is described we will be pursuing the same Inventory protection for it.”

“These discoveries may be just the tip of the iceberg,” said Ron Brown, Executive Director of Save Mount Diablo. “Mt. Diablo harbors one of the healthiest and most important ecosystems in the San Francisco Bay Area. “It’s the crown jewel of the East Bay. The discoveries underscore the need to conserve and buffer the mountain’s biological richness. If we can find two new species in such a small area, it makes you wonder what else is out there, what other secrets does Mt. Diablo hold? It’s also important that we protect and monitor these rare species and biodiversity hot spots because they can be indicators of global warming and other threats.”

“When we talk about protecting biodiversity, we recognize that it’s not just the known universe of species that pertain,” said Laura Baker, Conservation Chair and member of the Board of CNPS. “We need to conserve large, diverse areas, including those adjacent to urban areas, to protect as-yet-undiscovered species. Native plant species, especially rare species, are not as well known to the public and so sometimes they’re hiding in plain sight. The beauty of these discoveries is that the new species were found on protected lands, in essence waiting until the right person came along to notice them. And identifying them is just the first step in protection. We need to know more about the ecological role of these species and how the overall ecosystem works because ultimately it’s the ecosystem that supports biodiversity.”

“David Gowen deserves a lot of credit,” said Leigh Johnson, an Associate Professor at Brigham Young University and the recognized expert of the genus in which one of the new species is found, “amateur’s not the right word...he has this great power of observation, he pays close attention to detail. If he hadn’t done that then the plant would have been overlooked.”

“Lime Ridge is an interesting place, which is why I’ve directed botanists there,” said Barbara Ertter, Curator of Western North American Flora at U.C Berkeley’s Jepson Herbarium, and co-author of *The Flowering Plants and Ferns of Mount Diablo, California*, 2nd edition. “As far as I know, the earliest collections are those by Bowerman, who had to get special access since the mining was still in operation. There is NO record of what grew on the lime deposits prior to mining; one can easily visualize the Lime Ridge *Navarretia* and the Lime Ridge *Woollystar* being tiny remnants of a lime-adapted set of plants, on a specialized habitat comparable in size to Antioch Dunes or the Mt Diablo serpentines. Who knows if there were other species, lost before they were ever recorded?”

“The new discoveries highlight how exceptionally important Lime Ridge and Mount Diablo are to science,” said Gowen, “and how much we still have to learn.”

David Gowen, amateur botanist

David Gowen is a retired carpenter who lives in Oakland and spends much of his time botanizing. Although he’s 62, you’d never know it. About 6’, wiry and fit, he smiles all the time and looks about 45 or 50—and hikes fast up steep slopes whether there’s a trail or not. Only his wavy grey hair and sun weathered skin hint at his age. He is positive and enthusiastic and at the same time humble and shy.

A Southern California native who moved to the Bay Area in 1965, his life has been characterized by succeeding obsessions centered on the outdoors. He collected snakes as a kid, raised hawks and bird watched, which led to hang gliding, became a runner and triathlete, then stumbled on botany, “Plants were just another reason to be outside wandering around looking at things,” said Gowen. He’s an amateur botanist associated with the California Native Plant Society (CNPS) but is by any measure an expert and a professional.

He went on his first CNPS hike, at Mt. Diablo around 1990. “I’d lived here thirty years and had never been to Mt. Diablo. It was incredible, that it was so rich and so close.”

The Search

A plant thought extinct led Gowen to Lime Ridge, the Mt. Diablo buckwheat, *Eriogonum truncatum*. In 1998 when he took his first trip to Lime Ridge, the buckwheat hadn’t been seen in 62 years. Although Gowen searched for the buckwheat for over a decade, it would finally be rediscovered in 2005 by Michael Park, a graduate student at U.C. Berkeley, on land preserved by Save Mount Diablo.

In the late 1990s Barbara Ertter, curator of the Jepson Herbarium at U.C. Berkeley, was nearing completion of an update of botanist Mary Bowerman’s Mount Diablo flora, *The Flowering Plants and Ferns of Mount Diablo, California*. (Bowerman was also the founder of Save Mount Diablo). According to Gowen, “I began looking for the Mt. Diablo buckwheat after a lecture Barbara Ertter gave at the botanical garden, challenging botanists to go out and find this thing. I just started tracking down any information I could. I went to the Bancroft library and managed to hold in my hands Brewer’s field notebooks from when he first collected it.” {William Brewer, who discovered the Mt. Diablo buckwheat, was a botanist and a member of the California Geological Survey from 1860-64.}

“Basically the concept was that the buckwheat lived next to chaparral. Lime Ridge was near a historical site that Bowerman had collected, I’d never been to Lime Ridge and I realized that Lime Ridge was actually public and accessible so in 1998 I went there and wandered around looking for it. That same first visit I came on this *Navarretia*, and filed it away in my memory. At this point I’ve probably been to Lime Ridge thirty or forty times.”

The Discovery of the “Lime Ridge Navarretia”

“I actually took home a little piece of the plant that first trip to identify it later and never came up with a satisfactory identification,” said Gowen. “I figured I would have to ask someone else, it wasn’t a group of plants I knew. Periodically I would mention it to someone else and no one really had an answer. It was a group of plants not too many people knew.”

“A couple of years went by and I slowly learned a little bit more. In 2002 I realized there was a *Navarretia* on Mt. Diablo and I went to see what it looked like, then went back to the Lime Ridge plant assuming they were the same thing, a *Navarretia* that we had in our county. In doing that I realized that the Lime Ridge plant and the Mt. Diablo plant were different. I waited until they made seed, because one of the characteristics of the more common relative was the number of seeds—they have more seeds. I realized that neither the Lime Ridge nor the Mt. Diablo plant was the more common variety, which meant that the Mt. Diablo one had been misidentified and that the Lime Ridge plant was still a mystery.”

“At that point I took a couple of snapshots and sent them to Barbara Ertter and told her that there was some confusion I was trying to sort out, assuming that there would be an answer from an expert if you found the right one. She directed me to a botanist at San Francisco State who directed me to Leigh Johnson at Brigham Young University. Leigh {pronounced “Lee”} was working on the treatment for *Navarretia* for the Jepson Manual and the new flora of North America, so he was the current expert on the genus.” Johnson is an Associate Professor at Brigham Young University, Herbarium Curator of the Stanley L. Welsh Herbarium there, and a research associate with the Rancho Santa Ana Botanic Garden.

“In 2004 I sent Leigh photographs and with my suggestions about what they were and what my confusion was. His comment back was that the Lime Ridge plant wasn’t in any current flora—it wasn’t ‘in the book.’ That started a correspondence that was a really good experience. He didn’t just blow me off as someone who didn’t have anything to offer, he treated me like a colleague, which encouraged me to do something, to get deeper into studying the plant.”

Establishing a New Species

Together Gowen, the amateur botanist, and Johnson, the botany professor, began researching the plant. Said Gowen, “Initially he {Johnson} thought it was the same as an undescribed species from southern California; it took a little while before he decided that it was different from that plant, partly because of the differences that I was able to suggest. He is the author of the treatment that described and established it as a new plant. I was simply the discoverer of the plant.”

“I looked at the plant, collected pieces, took them back to the herbarium and corresponded with Leigh about things that were relevant,” said Gowen. “It was really his work. He asked me what I wanted to do about it, that I could author it, or co-author it, or he could author it. I’m working on another species, so the whole concept of authoring a plant was a new thing for a non professional like myself.”

"I first heard from David in 2004," said Johnson. "When David contacted me I was just beginning my studies of *Navarretia*, and trying to become an expert. David sent me a photograph along with a plant. I was very busy but this is where I really learned to appreciate his powers of observation, I said it really looked like one species, and he wrote back and said it couldn't be because of this and this and I suggested another possibility and he said it can't be because of two or three other characteristics, so I started looking really closely. His persistence and attention to detail really led to the characterization of the species. He's a great example, one I use in my classes while I'm teaching, that there is still discovery to be made and anyone can make those discoveries if they have a desire to learn and pursue something instead of just taking something for granted or accepting simple answers."

"Most people tend to think most plants have already been named," said Johnson. "If you find something, you assume it's named and you go through a key and assume it matches something already described. What David does is, when it doesn't match, he asks why doesn't it match, maybe it's something new. That's something we should all keep in mind. Is it the same species or is it different enough that it really is something new. He's just a great guy, friendly, eager to learn, enthusiastic; he loves nature."

Johnson did DNA testing of the *Navarretia*, to identify whether it was a new species. "David gave me the prodding," said Johnson. "I had the resources to do the comparative work—there was a lot of work, comparing it to other species, to show the differences really were differences. David was supportive and sent me materials. It was a three year process, I couldn't have done it alone." Ultimately it was morphological differences that confirmed the new species. The new species, *Navarretia gowenii*, was published in the December 3, 2007 issue of *Novon*, a respected botanical journal of the Missouri Botanical Garden. The local announcement was delayed until now, when the plant bloomed and good photos could be taken.

Lime Ridge Navarretia, *Navarretia gowenii*

"I think it looks like a Dr. Seuss plant—a thin stalk topped with a green puffball, studded with star shaped, purple spotted flowers," said Adams, "or a green snowflake Christmas tree ornament."

"The genus *Navarretia* has about 34 species," said Johnson. "Some are quite common; with one exception it's a North American genus. The center of diversity is in the western U.S., probably 90% of the species are in California, quite a few are only in California. Lime Ridge has six species of *Navarretia*; that number in such a small area is remarkable."

"The definitive character is that the flower is white with a purple spot at the bottom of each petal," said Gowen. "It's spiny like other *Navarretias*—when they're dry you don't want to pick them up. It's about six to eight inches tall. In good years they might be slightly taller, in dry years like this one it might be just a couple of inches—it's not as small as it might be, they're just blooming and drying up earlier. It's a single stalk with a leafy head that has several flowers that protrude out of the head."

"It grows in open sun," said Gowen, "it seems like it can't take much competition so it appears that it could easily be forced out by exotics. Last year was really poor; there were fewer plants than this year. Over five years there just haven't been many plants. They live in four small spots, each area having 50-100 plants. Put it in perspective, in other parts of the state there might be acres and acres of *Navarretias*, here in the worst year there might be 150 plants total and in the best year there are fewer than a thousand."

"The million dollar question is why the diversity in *Navarretias* exists," said Johnson. "We have a good family tree of the plants. One part of the answer is that we've found several instances of doubled chromosomes which no one ever suspected before in this genus, and hybridization between species. In the phlox family there are many examples of hybridization, *Navarretias* were never suspected of that—it gives rise to diversity. *Navarretias* have been successful in moving into new environmental conditions and habitats and being successful. It's a genus that's radiating into new habitats, and continuing to radiate."

"California is very diverse in terms of the geology and micro-climates," said Johnson, "so there's a very diverse landscape of environments. As plants disperse into those new environments then are isolated, it provides hot beds of opportunity for evolution. We don't know if Lime Ridge has caused speciation or that there are simply remnant populations; Mt. Diablo has certainly been a good refuge for species that were once more widespread and are now restricted there."

The Naming of a New Species

It's customary to name a newly discovered species after the person who found it, or after the place where it was discovered. The genus *Navarretia* is named after Francisco Fernandez de Navarrete, an 18th century Spanish physician.

Johnson named the new species *Navarretia gowenii*, after David Gowen, but Gowen calls it the “Lime Ridge Navarretia.”

“I named the plant after David to recognize and honor his persistence,” said Johnson. “He didn’t give up when I was really busy; he was persistent in a very nice way. That was a great example for students in my classes, something worth emulating. I talked to him once about having both of us credited as author of the new species; he thought otherwise; it was then that I decided to name it after him. I just really appreciate his help and count him as a friend and colleague. He may feel he knows less because he doesn’t have the degree in botany but I feel that the degree isn’t what’s important, it’s your powers of observation, and study, and persistence.”

“It’s been a relatively long process to see this thing become a reality,” said Gowen, “when I saw it again the first time this year, it was like seeing an old friend. Until it was published it was a nebulous entity. It didn’t have a name.”

“When Leigh told me it was going to get published, I said, ‘you finally gave it a name’,” said Gowen. “He calls it Gowen’s Navarretia; I call it the Lime Ridge Navarretia. I don’t call it by its scientific name, it’s too close to home, it’s an unusual form of flattery. I knew he was going to name it after me, but I half believed it was never going to happen. It’s not that often that someone gets a plant named after them, it’s not like many professional botanists will ever have a plant named after them. I’m honored and flattered. Sooner or later I’ll call it by its scientific name, but it’ll be awhile.”

A Second New Species - the “Lime Ridge Woollystar”

“About the same time that I was repeatedly visiting the site of the Navarretia,” said Gowen, “I found an *Eriastrum* {Woollystar} and after going to several other sites, I realized I didn’t know what this one was either. It was mentioned in the supplement of Ertter & Bowerman’s Mt. Diablo flora {book} with the comment that it was a dried specimen and was unidentifiable.”

“That sparked my interest to figure out what it was,” said Gowen. “We sent a collection to the botanist at the Santa Barbara Botanic Garden who was fairly knowledgeable on this group, his annotations about what he called the plant was that it was closest to one species but could represent an undescribed plant. That provoked me to understand what it really was, to learn everything I could about *Eriastrums*, collecting them every where I went, comparing it to a species up in Lake County and with another one in Trinity County and deciding that it was neither of those. Initially I thought it was an already described species, so I was surprised that the expert who looked at it didn’t think it was that.”

“So then I went to find similar species which live in the Central Valley,” said Gowen. “At the same time I was collecting seed to compare them under common garden conditions. It’s just one of the ways you deal with making comparisons of plants. Through all of this process I’m collecting other *Eriastrums*, and ultimately decided that the Lime Ridge plant was another new species. The final clincher was that I enlisted the help of Abby Moore, a graduate student I knew, to do some DNA analysis on several of the *Eriastrums* I was working on. The DNA seemed to suggest that it was a different plant altogether. DNA testing is one of the current tools to definitively separate things, it settles the final argument that this is a new plant. They look at portions of the DNA and compare the whole chain of parts for degrees of difference—they use it to create family trees and that shows relative differences and whether there’s a common ancestor or that they’re indistinguishable.”

“Now I’m finishing getting my paper written, a scientific drawing is going to be made, then it will be submitted to *Madroño*, the journal of the California Botanical Society,” said Gowen. “I’m co-authoring the treatment of *Eriastrum* of the Jepson manual, it won’t make the deadline for the new manual but it will be mentioned as a new undescribed species.”

The new *Eriastrum* species, which is referred to as *Eriastrum sp. nov.* until it is published, has not yet been named officially, but Gowen refers to it as the “Lime Ridge Woollystar.”

“As impressive as is David’s expertise with the East Bay flora,” said Ertter, “even more amazing is the story behind the Lime Ridge Woollystar. While he could send the problematic *Navarretia* to Leigh Johnson, who was the expert on the genus in Utah, there was no existing expert on woollystars (*Eriastrum*). David’s response? He effectively *became* the self-taught expert on the genus, and has sufficiently mastered the arcane protocols of scientific publication to have recently published a mini-revision of one segment of the genus {Madrono 55: 82--87, 2008}, in which he described a new species, *Eriastrum signatum*.”

Threats

"We're lucky that this is protected open space, but these are annual plants, every year they die completely down, and seeds sprout the next year," said Gowen, "Each plant might have 10-20 flowers, each *Navarretia* flower only produces 1 or 2 seeds, so every year is a roll of the dice. What we don't know is how long the seeds are viable. The *Navarretia* seeds are the size of a sesame seed, but a little darker."

"I think Lime Ridge *Navarretia* is managing to hold on," said Johnson. "Compared to some of the sister species with broader ranges, it looks like it's just holding on there but more work needs to be done to see how specific it is to the soil it's on. All *Navarretias* seem to maintain seeds in the seed bank—the soil—and over the years this plant has been known, the population has fluctuated. We really don't know what the longevity of the seeds are, or how much genetic variability there is in the population. There may be some genetic bottlenecks which could affect future populations."

"We don't know what the plants need, we don't exactly know what their preferred habitat might be, they might prefer more open space, less competition, or they might prefer disturbance, we just don't know," said Gowen. "Sometimes disturbance helps, sometimes it favors exotics that crowd out the plant. We don't know whether fire is good or bad."

"*Navarretias* have preferred niches, often soil types in combination with other environmental factors—they don't grow under other plants, they wouldn't grow if the area was taken over by poison oak," said Gowen. "Generally the areas are really open."

"Potential threats might be misused vegetation management," said Gowen, "cutting everything down like goat grazing, but it's unknown. Foot traffic might be good or it might be bad, we just don't know. We need to err on the side of caution."

"There are so few of the plants compared to other *Navarretias*—they normally cover a fair amount of land in a given locality," said Gowen. "Other rare plants might be sporadic but cover a fair bit of land—this is just a couple of spots and a few plants. In the case of the *Navarretia* it's hard to believe that it's this limited—it seems like it's been there forever but it might just get wiped out. The Mt. Diablo buckwheat clearly always had a limited number of sites—the fact that it persisted in one of them is remarkable. We may have discovered this plant in the nick of time—if there was a housing development it would have been gone. Setting aside land for its own sake also protects rare species like this one. There's wildness all around us and we don't know everything."

Conservation

The Lime Ridge *Navarretia* is known from just two locations, Lime Ridge and one location in Stanislaus County, about 70 miles to the southeast. Given small populations and limited distribution it has to be assumed to be critically endangered unless other populations are located. The Lime Ridge Woollystar is known from just Lime Ridge, and is even more rare.

"CNPS maintains a botanical database on the location and status of statewide rare plants," said Baker. "The CNPS Inventory is well-respected and used by regulatory agencies and environmental consultants for baseline information on special status native plant species—those that are rare, threatened, or endangered. Despite the grave implications for conservation of some species, our listings indicate a fundamental optimism about even those plants that are presumed extinct. We don't give up on them but instead we continue to list them in the hope that a population survives undetected. Sometimes miracles do occur. The Mt. Diablo Buckwheat was re-discovered after 70 years, thanks to the active conservation of Mt. Diablo lands."

"This new rare plant, the Lime Ridge *Navarretia*, has just been listed as 1B, indicating that it is rare throughout the state, with a threat level of 1, the highest level that can be assigned. The baseline information about a plant species is formally logged into the inventory and when it's assigned a listing, the world is on notice that this species is special, worthy of protection. That is the most fundamental step in conservation—recognizing the species itself and providing objective, science-based information about it. This is just one of the contributions that CNPS makes in the conservation of California biodiversity."

The Lime Ridge *Navarretia* will appear in the online CNPS Rare Plant Inventory in July; the listing means that projects which require environmental review must consider the plants as part of the review. A state or federal listing may also be sought in the future. The Woollystar is not expected to be listed until after it has been published, but given similar locations, protection for one will also benefit the other.

Once the two plants were confirmed as new species it was realized that even though their location were on protected lands, park management and other activities could potentially harm them. CNPS, SMD and the WCOSF

formed the “Lime Ridge Rare Plants Working Group” to consider management strategies in association with the City of Walnut Creek.

The organizations have overlapping expertise. CNPS is the local expert on rare plants. CNPS and SMD have worked together on other rare plant working groups and plant conservation efforts. SMD & WCOSF have strong contacts and experience locally and helped to create Lime Ridge Open Space; and SMD owns a large adjacent property. WCOSF has close ties with the City of Walnut Creek and carries out restoration efforts in the city’s Open Spaces.

The Working Group is coordinating with the City of Walnut Creek so that open space activities don’t harm the plants. We’ve developed interim protocols for management activities while we learn more about the plants.

The Working Group also recognized that management of the two new and critically endangered species could benefit 28 other rare plant species found at Lime Ridge as well as several listed or rare animal species.

For Gowen there are strong implications for conservation. “We often make land use decisions based on relatively quick snapshots of an area, often with incomplete knowledge of what’s there, and no understanding of how things interrelate. Since this habitat is already protected we need to make sure management is appropriate.”

Next Steps

The Working Group is considering seed collection and offsite propagation, and will work to survey other similar locations to see if other populations can be found. Largely efforts will be made not to harm existing populations of the two plants while learning more about their needs.

“We need to do some basic studies, to look at variation in the population,” said Gowen.

Conservation will be made more difficult given the small number of seeds produced by each plant. In the case of the Mt. Diablo buckwheat, a single plant can produce thousands of seeds and just two generations of propagation resulted in more than 165,000 seeds, for safe keeping in seed banks, for research, and for propagation efforts and reintroductions. The two new species at Lime Ridge produce just a few seeds per flower, a maximum of a few dozen seeds per plant.

Further Reactions

“This is right downtown,” said Gowen, “this isn’t in some foreign country or in the boonies, it’s in the heart of an urbanized environment. Not only is it a new species, but it was never even collected before, that you could look at and say it had been misidentified. Many famous botanists have worked in this area, Jepson, Bowerman, they clearly visited Lime Ridge multiple times, it was a surprise that it had been missed. We still have a lot to learn right here in our own backyard. Land being preserved allows these things to be both discovered and protected. If a housing development had destroyed this site, the plant might have vanished off the earth without anyone ever knowing.”

“The recognition of the Lime Ridge Navarretia as a new species is just as important as the rediscovery of Mt. Diablo buckwheat in 2005,” said Heath Bartosh, Chair of the Rare Plants Committee of CNPS, “because it shows that there are still discoveries to be made locally and throughout California. Thanks to the richness of the collection at the Jepson Herbarium, there is a large body of knowledge. Thanks to the people of Walnut Creek, there is a wild in which the Lime Ridge Navarretia can survive and continue to grow. And thanks to David Gowen, the East Bay has much cause to celebrate.”

“This is a marvelous discovery that demonstrates the wisdom of those who more than 30 years ago worked so hard to protect the open space areas in and around Walnut Creek,” said Bob Simmons, President of the Walnut Creek Open Space Foundation. “It also underscores the importance of very carefully managing this special area with a primary emphasis on protecting and preserving the unique biological resources that are present at Lime Ridge. The discovery of two new species together with the several dozen other rare species on Lime Ridge is a fascinating mix for a City that has one of the hottest shopping districts in the state of California, but this mix is one of the things that makes Walnut Creek such a special place to live, work and play.”

“There are so many highlights associated with this discovery,” said Heath Bartosh, Chair of the Rare Plants Committee of CNPS. “The remarkable abilities of David Gowen and the forethought of protecting Lime Ridge are indeed central themes to this story. But what stands out to me is the importance of a diligent field botanist. It is a reminder that in spite of our scientific and technological achievements, and the contemporary focus on genetic research, classical styled botanists are still adding to our catalog of native diversity. David’s attention to detail is reminiscent of Edward Lee Greene, who was a classical styled field botanist and professor of University of

California Berkeley in the late 19th century. Much like Greene, David has taken the time to notice subtle differences in this Genus of plants to not only find a new species but to achieve a better understanding of the Genus' diversity and distribution throughout California. Lastly, it is refreshing to know that someone with the interest, time, and talent can make a significant scientific discovery in their own "backyard" and add to our ever changing California Flora. California is still ripe for new botanical discoveries."

"There are a good many things that I like about the story of the discovery of the Lime Ridge *Navarretia*," said Laura Baker, a member of the Board of CNPS, "starting with the plant's discoverer. I've known David for fifteen years--he's my next door neighbor--and we've shared the bond of nature nerdiness for a long time. Every time we are in the field together, I marvel at his powers of observation. He simply notices everything and is constantly reading the environment--better than any formally trained scientist that I know. He's a skeptic which means that, unlike most of us, he has the capacity to sift through his own competing and conflicting hunches and not get upset. This quality affords him the chance to see through obscurities because he's not biased. That he has deepened and refined his knowledge of plants to the point that he is finding new species is wonderful but not at all surprising."

"The other compelling aspect of this story," said Baker, "comes from the fact that it took a community to lay the foundation for the discovery. Without the vision, tenacity, and dedication of the people of Walnut Creek, there wouldn't be Lime Ridge open space. They deserve credit for setting aside land not just for now but for the future. The Lime Ridge *Navarretia* survived without folks knowing it was there all along. It seems to me that it's payment from an investment that Walnut Creek residents made years ago by foregoing the money from development--now they and all of us are reaping the benefits of their wise investment. It will continue to pay off in biodiversity dividends that are real and measurable. Stories like these should be told over and over so that the larger community understands this is how it works."

"The cool thing about not one but TWO new plant species from Lime Ridge is proof that the Age of Discovery is still alive, in our own backyards," said Ertter. "It is also a cautionary note that we can't assume that everything is known, even in an area that has been home to botanists for 150 years. Who knows how many similar opportunities for new discoveries are missed when biologists only survey for a punchlist of known rare species, in the process blindly bypassing plants of even greater rarity that are thereby consigned, nameless, to an unmarked grave? We are collectively that much poorer if we lose what we never had a chance to know."

"Which makes it all the more important to celebrate the David Gowens of the world," said Ertter, "with their enthusiasm, persistence, and amazing powers of observation. The two new plants from Lime Ridge are only the most amazing of David's discoveries; he has also been a continuing source of plants that had not been previously collected from the East Bay, many of them tiny and off the beaten path. This skill of David's is hard-won, and anyone who wants to emulate him had better be prepared to spend long hours becoming intimately acquainted with the flora of an area. You can't tell what's different and unusual until you first know what's ordinary. David has not only spent vast amounts of time covering huge swaths of ground, but he is also a familiar face in the Jepson Herbarium, where he spends uncounted hours examining minute details of decades-old dried plant specimens under a dissecting microscope."

Further Background & History

Native Plants in California

California has about 6300 native vascular plant species, about 1/3 are endemic (found only) in the state. Mt. Diablo has 900 plant species of which a quarter are non-native, yet non-natives represent a vast majority of what you see, especially in grassland areas. About 150 species on Mt. Diablo are considered rare or endangered and fourteen are endemic to the Mt. Diablo region.

The Polemoniaceae or "phlox" family is a relatively small family comprised mostly of annual plants (they go to seed and die each year), native to the Northern Hemisphere and also South America, with the center of diversity in western North America, especially in California. Their flowers have five sepals, five petals fused, five stamens that alternate with the lobes of the corolla, and an ovary made up of three fused carpels.

Within the Phlox family there are roughly 34 species of *Navarretia*; they are sometimes called "pincushion plants." The inflorescence which bears the flowers is surrounded by frilly green bracts bearing soft spines, giving it the appearance of a pincushion.

Within the same family there are roughly 13 species of *Eriastrum*, a genus of flowering plants known commonly as "woollystars." These wildflowers are somewhat diverse in appearance but are usually erect, thin-stemmed herbs which bear purple to white blooms. Most species have inflorescences which are webbed with a woolly mesh of white fibers. Woollystars are native to western North America.

Lime Ridge Open Space and Mount Diablo

Lime Ridge Open Space, the neighboring Crystyl Ranch Open Space and Save Mount Diablo's Mangini Ranch preserve include approximately 2,000 contiguous acres (3 square miles) extending northwest from Mt. Diablo, separated by a half mile gap from Mt. Diablo State Park. The preserve is 3.5 miles from downtown Walnut Creek, California.

The Open Space includes rare or endemic species such as the Alameda whipsnake, the Diablo manzanita and the beautiful Mt. Diablo Globe Lily; in total there are at least 30 rare plant species at Lime Ridge—an area of just three square miles.

"Lime Ridge is similar to Mt. Diablo; it's an extension of the mountain," said Gowen. "It's a wild place, full of rare plants, full of rare animals. It has everything you can imagine—it's less a park than a natural preserve. Despite the lime quarrying, I think it's been relatively unchanged compared to historically, and not many people go there. It gets warm and was opened recently so there are fewer people. There's an ongoing struggle between bicyclists who like the single track trails and park people, clearly it's a fun place to ride at the same time that it's a hot spot for rarity—but the steep terrain and the chaparral keep people to the trails."

"Lime Ridge is an extension of Mt. Diablo," said Gowen. "It's a wild place, full of rare plants, full of rare animals. It has everything you can imagine—it's less a park than a natural preserve. Despite the lime quarrying, I think it's been relatively unchanged compared to historically, and not many people go there. It's also a hot spot for rarity; there are potential conflicts with protection of rare plants and some of the uses of the area."

Lime was discovered there in 1850 and an electric train line extended to nearby in 1911. From 1909 to 1946 the Henry Cowell Lime and Cement Company was located at the neighboring company town of Cowell; the quarries were an important job source during the Great Depression. Lime quarrying has simultaneously scarred the ridge and provided diverse wildlife habitat. The decades since quarrying ended have allowed restoration to take place. The long history of quarrying limited public use and investigations to some extent.

In the mid-1970s the Walnut Creek Open Space system was created, with tremendous citizen involvement and work by grassroots organizations including Save Mount Diablo and the Walnut Creek Open Space Foundation. Much of Lime Ridge Open Space was acquired with a 1977 regional bond measure and subsequent acquisitions. Much of the Open Space's boundary is formed by lands dedicated as a condition of nearby development. For twenty years the majority of the Open Space was closed to the public, until 1997.

From the air, Lime Ridge is a classic ridgeline greenbelt, a wildlife and recreational corridor between its joint owners, the cities of Walnut Creek and Concord. The Open Space begins near downtown Concord and rises along a ridgeline and through beautiful Paradise Valley to a chaparral covered peak then through grassland and other habitats to the mountain. Ygnacio Valley Road and Treat Boulevard cross the Ridge and the Contra Costa & Ygnacio canals and trails follow its western base. The Open Space provides panoramic views of Mt. Diablo and the Ygnacio Valley, the Carquinez Straits, Briones, Lamorinda, and the Berkeley-Oakland hills. At an elevation of 1001 feet, the Open Space's highest peak is 400 feet above the Canal Trail. New staging areas have been constructed on the west and east faces.

Mount Diablo is the northernmost peak of the Diablo Range and the center of Contra Costa County, approximately 30 miles east of San Francisco, California. Created in 1921, Mt. Diablo State Park was one of California's first seven state parks but preservation efforts around the mountain languished until the East Bay Regional Park District expanded into Contra Costa County in 1964 and began acquiring land around the mountain in 1971, the same year that the conservation organization Save Mount Diablo was founded.

The State Park includes both of the mountain's highest peaks, Mt. Diablo at 3,849' and North Peak at 3,557'. They are the San Francisco East Bay's highest points with commanding views of thirty-five counties across distances of 200 miles. For that reason, the main peak was an early navigational landmark for shipping and the first overland emigrant expeditions and was chosen as the initial base point for surveys throughout California and Nevada.

Mt. Diablo is a geologic anomaly. The upper elevations are volcanic and sedimentary deposits of what was once one or more island arcs of the Pacific Plate dating back to the Jurassic and Cretaceous periods, between 190 and 90 million years ago. During this time, the Pacific Plate was subducting beneath the North American continent and these deposits were scraped off the top and accreted onto the North American plate. This resulted in the highly distorted and fractured basalt and serpentine of the "Mt. Diablo Ophiolite" and metasediments of the Franciscan Complex around the summit. East of the subduction zone, an aquatic basin was filling with sediment from the ancestral Sierra. Up to 60,000 feet of sandstone, mudstone, and limestone of the Great Valley Sequence were deposited from 150 to 66 million years ago. These deposits are now found faulted against the ophiolite and Franciscan deposits.

Over the past 20 million years, continental deposits have been periodically laid down and subsequently jostled around by the newly-formed San Andreas Fault system, forming the Coast Ranges and up thrusting Diablo's Franciscan core through six miles of marine sediment. Within the last 4 million years, local faulting has resulted in compression, folding, buckling, and erosion, exposing the peaks and creating the foothills. This faulting is ongoing. As a result of this complex geology, the mountain supported the first major mining on the West coast of coal and lime, as well as mercury, glass making sand and other quarrying.

The mountain's geology also resulted in diverse soils which, along with its climatic and geological diversity and location at the edge of the Coastal Range and Central Valley near the Delta, support a wide array of habitats creating a biodiversity "hot spot" with many species reaching their northern or southern extents.

The mountain is the most important wildlife habitat in the East Bay. Mount Diablo includes approximately 253 vertebrate animal species. 900 plant species, three quarters of which are native, are found on and around the mountain, representing one tenth of the native plants found in California. More than 150 species are rare or listed, and fourteen are endemic to the Mt. Diablo region.

When Save Mount Diablo was founded in 1971 there was one park on Mt. Diablo including 6,788 acres (10.5 square miles). Currently thirty eight parks and preserves have been created around the mountain, including 90,000 acres (141 square miles).

The mountain became a focus of tourism in the 1860s. Diablo is a center of outdoor recreation including a hundred trailheads and 520 miles of public trails; over a hundred picnic areas and campgrounds; eighty named ridges, canyons and valleys; and hundreds of miscellaneous cultural landmarks. More than a million visitors enter the state park alone annually, making Mount Diablo one of the state's top twenty most popular park units.

Contra Costa County has sometimes been known as "the Wild West of development." According to ABAG and County projections, from fewer than 20,000 citizens at the turn of the century and 100,000 by 1940, "Contra Costa until the 1970's and 1980's grew faster than the region, state, or nation." It now includes more than one million residents; the East Bay includes 2.5 million. More than 8 million people live within one hour's drive of Mt. Diablo.

Except for San Francisco, of the nine Bay Area Counties, Contra Costa and Alameda are in last place in total acres protected and acres protected per capita.

The Diablo range has only recently gained significant attention. California's coast and the Sierra range have long been the focus of state, federal and private preservation efforts, and include large areas of public lands such as national forest and parks. California's deserts, although more recently the focus of preservation, have been more easily protected since much of their area was owned by state and federal agencies like the Bureau of Land Management.

Organizations and Agencies

California Native Plant Society (CNPS) was formed in 1965 in the East Bay region. Today it is a statewide organization with thirty-three chapters. The East Bay Chapter covers Alameda and Contra Costa Counties. The state organization and the local chapters work together to increase understanding of California's native flora and to preserve this rich resource for future generations. Contact: CNPS, East Bay Chapter, P.O. Box 5597, Elmwood Station, Berkeley, CA 94705; www.ebcnps.org

The City of Walnut Creek, California is a suburban community located east Oakland in Contra Costa County. It lies in the East Bay region of the San Francisco Bay Area. While not as large as neighboring Concord, Walnut Creek serves as the business and entertainment hub for the region, given its location at the junction of Highways I-680 and SR-24. The city includes 65,384 residents and has an outstanding open space system including more than 2,700 acres. Contact: City Hall, tel: 925 943-5800; 1666 North Main Street, Walnut Creek, CA 94596; www.ci.walnut-creek.ca.us

Save Mount Diablo is a non-profit 501(c)(3) conservation organization which has been preserving lands on and around Mount Diablo and educating the public to the mountain's natural values since 1971. Preserved lands have increased from 6,788 acres to more than 90,000. Save Mount Diablo continues to raise funds to preserve the remainder of the mountain. Contact: Save Mount Diablo, tel: 925 947-3535, FAX: 925 947-0642, 1901 Olympic Boulevard, Suite 220, Walnut Creek, CA 94596; www.savemountdiablo.org

Walnut Creek Open Space Foundation works to preserve and enhance Walnut Creek's nearly 3000 acres of open space and to educate area residents so that they can enjoy this wonderful resource. The Foundation is a volunteer organization that performs habitat restoration projects in the open space and supports open space related activities sponsored by the City of Walnut Creek. Contact: Walnut Creek Open Space Foundation, tel: 925 939-6610; P.O. Box 309, Walnut Creek, CA 94597; www.wcosf.org

The Jepson Herbarium at the University of California, Berkeley focuses its research on the plants of California. It was established in 1950 by an endowment from Willis Linn Jepson (1867-1946), California's most eminent early botanist. As the only herbarium devoted exclusively to the study of California's native plants, we continue to strive toward understanding the complex nature of the flora through systematic and floristic studies. In addition to conducting classic and modern research, the Jepson Herbarium Curator and staff are dedicated to providing educational opportunities and publications for interested amateur and professional botanists as well as support for conservation efforts around the state. The Herbarium serves as a liaison between the scientific community and the interested public. Info: <http://ucjeps.berkeley.edu/active.html>

The Stanley L. Welsh Herbarium at Brigham Young University is a research center for botany with an emphasis on the Western United States. Leigh Johnson's research on *Navarretia* at the Welsh Herbarium is supported by a grant from the National Science Foundation grant, DEB-0344837.

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