The Western Cave Conservancy
Protecting the West's Last Frontier
Vol 1 No 4 Fall-Winter 2004

A Year of Cave Conservation

It's been a busy 2004. Through the generosity of our members, The WCC has built up a significant war chest, allowing us to move confidently when opportunities arise to protect threatened caves. We've worked hard to advance the projects we already had going (Rippled and M2), and have started several new projects. Though we haven't been able to purchase a cave yet, it isn't for lack of trying.


Photo: Rolf Aalbu

Advocacy and Outreach

The WCC focused attention on the situation at **Millerton Lake Caves** in California, and the authorities in charge of the storage project there are now fully aware of the caves and potential impacts to them. We'll keep our members informed as the situation progresses.

When the Park Service called for help restoring **Crystal Cave** in Sequoia/Kings Canyon National Park, several WCC members rose to the challenge, helping to haul thousands of pounds of rubble out of the cave and up a long steep grade. Formations buried for decades shine once again, and the old bathrooms (inside the cave!) are gone.


Photo: Dave Bunnell www.goodearthgraphics.com

Acquisitions and Landowner Relations

Since its very inception, the WCC has worked to save **Rippled Cave**, a popular recreation and training cave in central California. We're happy to report a positive development. The owner has verbally agreed to our offer, but a related transaction must first be concluded. This could happen as soon as January, but may take several months.

In addition, the WCC has engaged the neighboring landowners to better understand their needs and concerns. Despite past efforts by concerned cavers to control visitation on behalf of the landowner, the cave continues to attract trespassers whose abuses of the neighborhood include blocking the private road, parking on nearby properties, and even lighting campfires.


Photo: Bill Frantz

Until the Conservancy owns the property, we have no power to address neighbors' concerns, or for that matter, our own. However, we join with the Mother Lode Grotto of the National Speleological Society, which has helped the owner manage the cave, in asking those wishing to visit Rippled Cave to continue the **voluntary moratorium** on trips.

Our recently formed Stewardship Committee is creating a management plan for the property. Our goals are to protect and conserve the land and its cave, to prevent trespass, to provide for reasonable levels of authorized visitation, and to be good neighbors and responsible landowners.

Throughout the year, we

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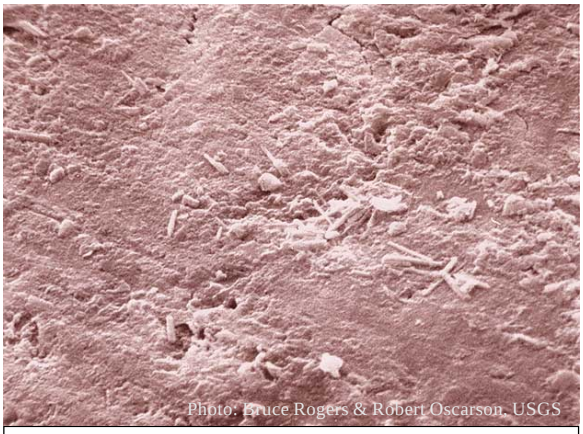
The Uncommon and the Small:
Phosphate Cave Minerals in Rippled Cave

by Bruce Rogers

In the natural world it is true that the closer one looks, the more complex things become. In the world of caves this is just as true as in the rest of the world. The subterranean world of caves has many splendid vistas, lofty chambers, and gargantuan stalactites; however, when one looks closely at this darkened realm, one finds more than first meets the eye.



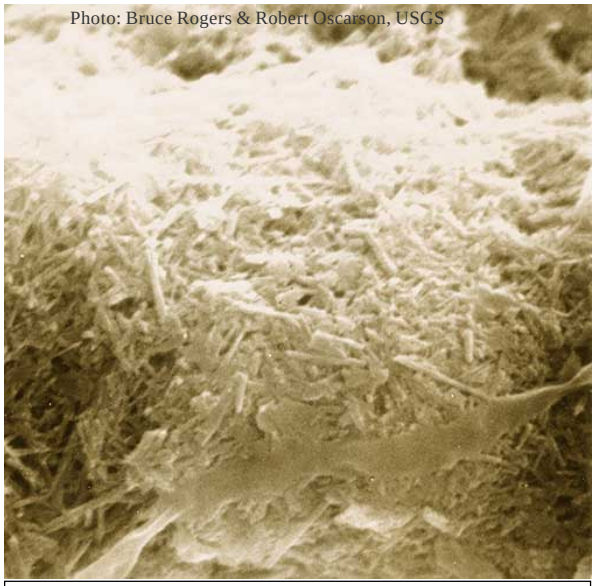
The surface of the dark brown, brittle, hydroxylapatite flowstone is remarkable in its plainness. Note the scattered, 2 to 5 micron-long crystals on its surface.

Rippled Cave, located deep within the Mother Lode, indeed has a huge chamber and lofty halls among its attributes. On a smaller scale, one may notice the scalloping of the walls that lends its name to the cave itself. Looking closer, the keen observer will note that delicate filigrees of calcite cave coral march along the arêtes delineating each basin-sized scallop. Still closer, one will note small, apparently smooth, chocolate-brown flowstone sheets tucked away in corners of the chambers. All is not what it appears, though, within these sheets.

The western complex of cave passages ends at the Scallop Room, a large hall with scalloped walls and a large chockstone wedged in its northern extreme. High on the east wall of the Scallop Room is a thin, dark, chocolate-brown sheet of flowstone. The years have not been kind to this area, however, and the press of many climbing boots has fractured the edge of the sheet. Close observation reveals that the brittle flowstone is only an eighth of an inch thick. Under it lies a quarter-inch-thick layer of yellow, plastic material that looks for all the world like thick, pale mustard. In 1976, tiny samples of both these materials were collected for study.

To our amazement, the flowstone was not the expected calcite. The material turned out to be the rather uncommon cave mineral hydroxylapatite—hydrous calcium phosphate. The underlying cream-colored layer, although of vastly different texture and color, was also hydroxylapatite. Both these samples were mounted in a scanning electron microscope (SEM) wherein bundles of electrons are passed over the sample and massaged by black boxes. When the machine was focused into looking at the samples under several tens of thousands times magnification, the resulting photographs were spectacular to say the least.

Apatite is actually a generic name for a small group of phosphate minerals with similar crystalline structure. The name, coined in 1788, comes from the Greek “to deceive” since clear, flawless crystals looked similar to other gemstones. Apatite has hexagonal symmetry—that is, its crystals are six-sided prisms with low six-sided pyramids at each end. While the crystals can be elongated, usually they are a more squatty, barrel shape. Bones and teeth are largely made of one of the apatite minerals, dahllite, a closely related calcium carbonate phosphate. Apatite is used in fertilizers and gemstones, although its marginal hardness, barely less than a knife blade, precludes its extensive use in jewelry. The mineral is usually vitreous and often transparent to translucent. Color shades from green and brown through yellow, blue, violet, and even colorless are known. It is uncommon to rare, but widespread throughout the spelean world.



The transition zone between the surface flowstone and the underlying plastic hydroxylapatite is made of tightly meshed, elongated crystals 1 to 3 microns long.

Even under the tremendous magnification of the SEM, the hard, brittle flowstone had little relief on its surface, appearing rather smooth and non descript, as any "normal" flowstone should. A scattering of thin, elongated crystals was found growing on the surface, but by and large, the surface was unspectacular.

A thin transition layer was found under the hard crust. This consisted of an irregular layer of thin crystals intricately meshed together much like jackstraws thrown into a pile. The further one looked from the surface, the denser the mesh became, until it resembled a pile of randomly stacked sheaves of wheat. At the base of the layer, the individual crystals merged into irregular nodular masses and sheets.

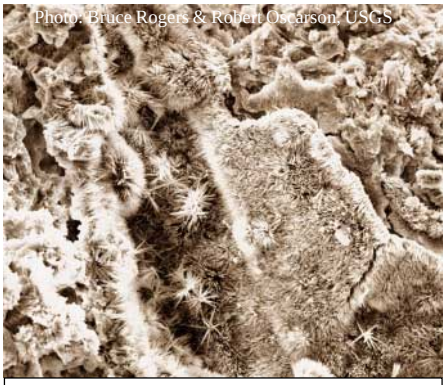


Photo: Bruce Rogers & Robert Oscarson, USGS

This little trough in the surface of the yellowish-white moonmilk has several rosettes of hydroxylapatite growing in its "depths." The large rosette in the center is about 5 microns in diameter.

The underlying plastic layer, which could be called moonmilk, was fascinating in its variety of forms; and considerable time was spent "touring" about the sample. Viewing under lower magnification showed an irregular, hackly surface. With increasing magnification, however, a wilderness of rounded ridges and valleys became visible. Long, thin, curved filaments that looked suspiciously like organic bodies—perhaps bacteria—sparsely criss-crossed the sample.

Further delving into this micro-landscape, the same elongated, lath-like crystals seen scattered about the flowstone surface were evident, but in much greater density. At the highest magnification available with this electron microscope, the lath-shaped crystals gave way to

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Photo: Kathy Graves

Letter from the President

Greetings Everyone and Happy Holidays!

I would like to take this opportunity to give my sincere thanks to all of you for the support and encouragement you have all shown for the WCC. I am not only speaking of the many generous donations and pledges of money and volunteer time but also of the sense of respect and acceptance I have observed over the last year. I am hearing many different voices speak of the organization as an integral part of the western caving community. This is humbling and inspiring to say the least. I'm sure I can speak for everyone involved on the board of directors and committees in saying thank you for ALL your support.

I also want to take this opportunity to let you know how successful our presence at the National Speleological Society's Western Regional meeting in Sonora was this fall. We hosted the Saturday evening dinner, which turned out to be an outstanding fund-raiser. Many generous donations of beverages, desserts, and other odds and ends brought the total out-of-pocket cost for the WCC down to $436.76. The revenue from dinner ticket sales totaled $1,660.00, leaving **$1,223.24** for the WCC! But wait…that's not all, there's more! Thirty-six people renewed their membership at our information table, many giving well beyond the minimum level. These monies along with $110.00 from the famous late-night Schnapps Tasting raised an additional $2,780.00—a whopping **$4,003.24** in all!! THANK YOU EVERYONE!

I would like to recognize and thank the following individuals and entities:

- The Ponsetti Family, who made a significant donation of $1,000.00
- The Lagunitas Brewery, who donated a generous amount of great beer
- Christopher Richard, who facilitated the beer donation
- Merrilee Proffitt, who lovingly seatbelted the kegs into her car and drove them from the brewery all the way to Sonora!
- Bill Papke, for donating many bottles of wine
- Eileen Belan, who organized and orchestrated the entire meal event
- The 30 or so individuals who barbecued, baked, cooked, served, cleaned, and did whatever else was necessary to make it all happen!

You all deserve a big hug and pat on the back!

Thanks also to everyone who attended the business meeting of the region to hear the WCC news report, and to those who took the time to buttonhole me or another officer during the weekend to discuss important issues or concerns.

Here's to a great 2005 for the WCC!

Marianne Russo

President, Western Cave Conservancy

Cave Minerals, continued from page 3

sheets made of extremely tiny barrel-shaped crystals. These shapes are typical of larger, up to truck-sized crystals of "apatite."

The biggest surprise was hidden away within a few very narrow folds in the surface. There resided spectacularly spiky rosettes of hydroxylapatite. The normal barrel-shaped crystals were elongated perhaps ten times their expected length. Nearly transparent spikes of the mineral resemble agave plants of the U.S. Southwest.

To my imperfect knowledge, no other cave apatites have been reported to show such extreme forms. Indeed, most apatite crystals described since the mineral was identified in 1856 are much more barrel-shaped and nowhere so spiky.

Although the shapes are unexpected, the origin of the mineral is fairly well known. In caves, it is common for the urine of bat colonies to alter the surrounding calcite cave walls, floors, and decorations to one of several apatite family minerals. The limestone or decorations provide the calcium carbonate and the bat urine provides the phosphate. Such deposits are uncommon throughout the world's caves and, indeed, in only four other California caves have they been thus far reported.

An enlargement of the central rosette in the previous photo shows the extremely elongated hydroxylapatite crystals made of thin, six-sided prisms with long, tapering pyramids at their ends.

To the inquisitive mind and keen observer, even the most mundane of caves—such as Rippled—hold many secrets to be reluctantly revealed by Mother Nature.

Note: Comprehension of the size of these tiny structures sometimes escapes us all. One micron is 1/1,000,000 meter or about 1/40,000 inch long. To compare the size of these cave mineral structures to something a bit more understandable, if one could shrink a tennis ball to a micron in diameter, then a "real" tennis ball would be about 38 miles in diameter or roughly equivalent to the straight-line distance from San Jose to San Francisco! In other words, a micron is to the diameter of a tennis ball what the diameter of a tennis ball is to 38 miles.

Year, continued from page 1

have tracked **M2 Cave** in southern Oregon as it changed hands. At the new landowners' behest, WCC staff made the first organized trip to the cave since 1997, and confirmed that M2 is beautiful and well worth protecting. Currently we are discussing several conservation options with the landowners. They have expressed strong interest in a government land swap.

We are pursuing **several other projects** (both cave purchases and joint conservation agreements) in California and Arizona. Due to the sensitive and protracted nature of these efforts, we cannot announce particulars unless and until they come to fruition.

Be sure to check out the Western Cave Conservancy website:

http://www.westerncaves.org.

It's the place to go for all the latest information about WCC acquisitions, activities, and history, and it boasts a gallery of photographs of threatened, protected, or otherwise interesting caves.

Our thanks to webmaster Matt Bowers, matt66@thirdmedia.com, for both hosting and managing the site, and Peri Frantz, peri@frantzfamily.us, for content coordination.

You Can Help!

We can only work on the properties we know about. A majority of Western cavers have long opposed establishing a comprehensive database of Western caves, and no such database or survey is available to the Conservancy. Knowledge of caves in our territory resides primarily with local cavers, speleologists and NSS grottos, and we rely on them to tell us about properties in need of protection.

If you know of a cave in **California, Oregon, Washington, Idaho, Nevada, Utah or Arizona** that you'd like to see the Conservancy purchase, please contact Land Research Advisory Committee Chair Rolf Aalbu, at raalbu@westerncaves.org. Information received by the committee is kept in strict confidence and cannot be released without the explicit consent of the Board of Directors and on a case-by-case basis.

Let us know as much of the following as you can:

1. Briefly describe the cave, and include a map if possible.
2. Describe the cave's biological, geological, hydrological, archeological, historic, aesthetic, recreational or other significance.
3. How vulnerable is the cave to development, quarrying, timber harvest, damage from unregulated visitation, or other pressures? Are any threats imminent?
4. Who visits the cave, and how often?
5. In your opinion, is recreational access appropriate, and to what degree?
6. Who owns the cave? Provide the county assessor's parcel number if possible.
7. Does the landowner know about the cave?
8. How large is the property?
9. Describe the surface topography and vegetation. Are there special features above ground, such as an archeological site or endangered species? Is the surface relatively pristine, or highly disturbed?
10. Are there any improvements (structures, wells, etc.) on the property?
11. Try to give us a sense of property values in the area and the trend over time.