



Mineral News

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The Mineral Collector's Newsletter

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Mining Aficionado Stricken with Exonumia Or . . . More Useless Stuff I Never Knew I Needed

Tony Nikischer

Excalibur Mineral Corporation

Once upon a time, long, long ago in a world seemingly far, far away, I was just a collector of minerals. I dabbled in stamps, coins, old Marlboro boxes and other assorted junk, but "just minerals" was where my focus always returned. Somehow, it became too much of a good thing, and that focus became distorted (some might say corrupted), as my interests expanded to all things mineral or mining related. Whether it was an American Banknote Company steel engraving of a mining scene, a check written by a long-forgotten mining company clerk, or a letter written by someone who would someday have a mineral named for them, all of it found a home in my corrupted empire of collecting interests. When full-time mineral dealing became my profession, my personal mineral collection went into near-complete, cold shutdown, along with the corporate suits and ties I had donned for so many years. I still need an outlet for my collecting disease, and today, I rediscovered one of those distractions from long ago: *Exonumia!*

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Figure 1: A token good for "one loaf of bread" from the Chloride Bakery. The mining of gold and silver around the town of Chloride (Mohave Co.), Arizona produced numerous minerals (over 30 species) during its heyday. Author's collection and photo.

Hell Can Be Beautiful . . .

Frank de Wit

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Standing on the rim of the Fossa Crater on Vulcano Island the first thought that popped into my mind was "if this is hell, it is damn beautiful!" The view from the rim to the north to the nearby Lipari, the largest of the Aeolian Islands in the Tyrrhenian Sea off the north coast of Sicily, is stunning. And the look down into the crater, with all the yellow stinking fumaroles was frightening. Looking around I remembered something that made a big impact on my life.

A few years ago I met someone with HIV-AIDS. Although neither of us was in any way religious, I asked him one evening: "Where do you want to go? To heaven or to hell?" He smiled and answered "to hell, because that's where all the naughty boys are". We laughed out loud about it. Now it brings tears to my eyes. He died shortly after that. Hell can be beautiful. I took my gas mask out, tested it, kissed my wife, put my gas mask on, looked back, waved, and slowly descended into the crater.

Some background before I go into more detail. The Fossa Crater (ref.1) is located on Vulcano Island (a logical name, isn't it?) 45 minutes north by speedboat from the small harbor of Milazzo on Sicily. This crater has been on my "hitlist" for over ten years now. And, although it's only a one day travel by airplane, car

and boat from Holland, I did not make it here until now. Every time I wanted to fly here, something happened. Life is what happens when you made other plans. Also this time: the "other" volcano with the unpronounceable name (yes, Eyjafjallajökull, ref.3) threw ash all around Europe, and caused chaos in air traffic until two days before our flight. But this time I was able to fly!



View from the Fossa Crater rim to the north to Lipari, the largest of the Aeolian Islands near Sicily. Acidic fumes are blowing to the left.

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Hell Can Be Beautiful

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Vulcano Island is part of the Aeolian Islands, together with Lipari, Salina, Panarea, Stromboli, Filicudi and Alicudi. At this moment, only Stromboli and Vulcano are more or less active. And this is not only geologically speaking. Both Vulcano Island and Stromboli are usually packed with day-tourists from Sicily. But now, in May, both the volcano and the Vulcano Island were still sleeping. Lucky us! However, the nearby underwater Marsili volcano, 70 x 30 kilometers wide (!), three kilometers high, and only 450 meter under water is predicted to become active in the (near) future too (ref.2). Marsili collapsing and exploding might cause tsunamis, flooding the whole south of Italy and Sicily! 'Scienceblogs' write that the Marsili might become "the undersea version of the Mount St. Helens 1980 eruption". I'm therefore happy that I'm walking on the rim of the Fossa Crater, 501 meters above sea level. Then I can watch it from above and from a secure distance.

Well, enough about the geographic setting. Geologically speaking, Vulcano is a 'normal' stratovolcano. But for me the Vulcano volcano is special: the mother of all volcanoes. Why? Because it was the first volcano actually called *Vulcano*. That should be enough reason already to travel here. Right?



(A very early morning view from the Vulcanello crater towards the smoking Fossa Crater. On the right side of the harbor is the famous "Alum-cave".)

Vulcano has been active six times in the last 136,000 years. The last eruption took long, from the 3rd of August 1888 to 22nd of May 1890, but only dumped a few meters of pyroclastic material on and near the summit. Since then the fumarolic activity on the largest crater (the "Gran Cratere"; also called Fossa Crater) has been periodically rising and dropping. A rise in temperature of the fumaroles around the 1990's (to ca.700°C) caused interesting mineralizations in the fumaroles (more on that later in this article, of course).

So, from the 1990's to present date, eighteen new minerals were described from the Fossa Crater (twenty in total), and other potential new minerals are under study at this moment. Since the 1990's the temperature in the fumaroles has been dropping to around 450°C but for few months now, temperatures have been rising again. So I planned my trip to the Fossa Crater. The only problem was: who wanted to come with me? I asked my friends, I posted on mineral forums, I asked on Facebook, but everyone was afraid to go mineral collecting with a gasmask on or did not have the money/time to join me. So when I told my wife "I think I will have to go there alone", she looked at me and said "Well, why don't we go together? I will sit on the crater-rim and watch the beautiful nature, and watch out for you, and you can have your fun then inside the crater". That's one of those moments you are reminded of real love.

Now, only two weeks after that decision, I started to descend into the crater. Slowly. A little nervous. Adrenaline rushing through my veins. Watching every step. Everywhere around me the roaring noise of sulphuric fumes blasting from hundreds of yellow fumaroles. I remembered the Iojima volcano visit in 2008, where my leg broke through a thin crust over a fumarole. One moment I was looking around, and before I knew it my leg was inside a hot fumarole. It was like breaking through snow on a glacier and falling into a crevasse. When the bottom falls out under your body. Scary. So I moved slowly. Testing the ground on every step. After a few minutes I felt more confident, speeded up my pace and walked from fumarole to fumarole, testing them for sulfosalts and halides.

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What surprised me was the incredible amount of gas coming from the fumaroles. All photos I'd seen from the crater before, showed people walking in t-shirts with a gasmask, and without eye protection. They were sometimes even in short pants and sneakers and a mouth-only gasmask. But I was walking in clouds of acidic fumes. The drop in temperature of the fumaroles logically lead to a different geochemistry and therefore different gasses coming out (for 16 videos of the smoking Fossa Crater, see YouTube (ref.4)). But the amount of gas was incredible. A friend later said that the pictures look like a graphical Dante's Inferno. Hell...!



"Photomodelling" for a colorful picture inside a large sulphur fumarole. For a movie with the roaring sound of the fumarole, see ref. 4.

Now, to move from the geology part to mineralogy: all those yellow and white sulphur and salammoniac fumaroles are beautiful. But I was looking for the special ones, the ones which deposit the rarer minerals, those fumaroles with black crusts of sulfosalts around them. I also looked for fumaroles that don't seem to smoke much, where rare (fluorine containing) halides crystallized in the vuggy rock around the fumaroles. It's like looking for a needle in a burning haystack. But it paid off. Almost halfway down into the crater, ca.40 meters under the crater rim, there was a fumarole with relatively much sassolite (H_3BO_3) and regular sulfates (Na,K,Al, SO_4 -compounds). A meter to the right was another large fumarole with abundant sulphur (S) and sal ammoniac (NH_4Cl).

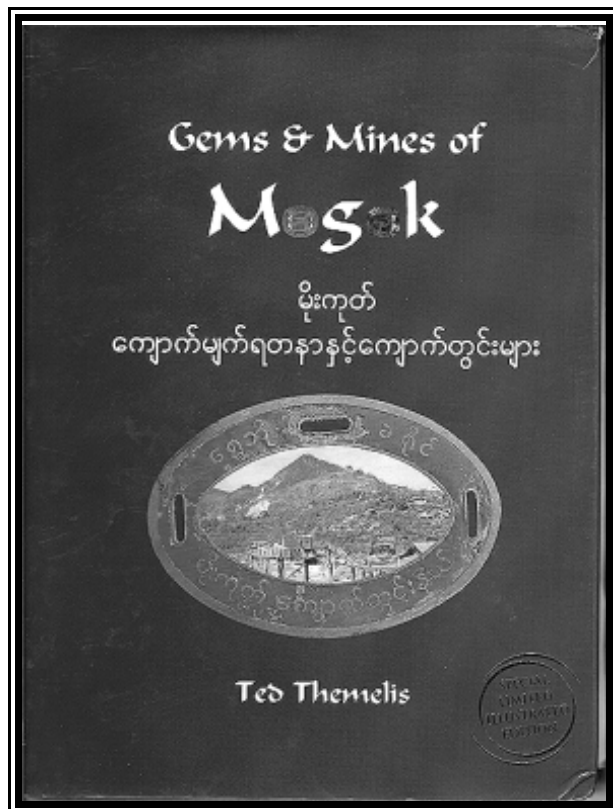
The halogen elements fluorine (F), chlorine (Cl), bromine (Br) and iodine (I) in the minerals indirectly and partially originate from the seawater / meteoric water that feeds the fumaroles deep below the crater; where the F also has its origin in the fluorapatite in the volcanic rocks (the Fossa crater has a mixed/open system, where both magmatic gases and hydrothermal vapors from seawater feed the fumaroles; ref.8). All in all, enough ingredients there for the rare minerals to form for which the Fossa crater is the type locality.

Mineralogy, in that sense, is a just a sort of advanced cooking. I was told before I traveled that the temperatures were probably too low to find sulfosalts at this moment, so I moved my focus to the halides. For which, by the way, the Fossa crater holds ten minerals with their type locality here! One of the newest halide minerals, first found here, is adranosite ($(NH_4)_4NaAl_2(SO_4)_4Cl(OH)_2$), something I had been dreaming to find. So I started to dig into the fumaroles here and immediately

encountered a problem I did not have before. Adranosite crystals almost never exceed 1 mm in length, so I needed to use my loupe to find the crystals in the little vugs. But how to use a loupe through a gasmask? (Continues next page)

GEMS & MINES of MOGOK

By Ted Themelis



The "special limited illustrated edition" of this relatively recent hardcover book, a thoroughly researched, scientific treatment!

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Gasmasked collecting in the halide fumaroles below the Fossa Crater rim

Inhale, take off my gasmask, look, put on my gasmask again? No way! So I tried to see something, but ended up looking half blinded, and putting “interesting material” in my backpack. Then after an hour or so I walked up to the crater rim to eat, drink and relax a little in the sun with my wife, Veronique.



Beautifully-shaped salammoniac vent on a fumarole

Sitting safely outside of the smoking fumarole zone I looked at the specimens, remembered the type of rock I had to go back for, and then descended again to the fumarole field. By the way – first I had to let all the water run out of my gasmask. It is interesting how much water you can collect in your gasmask from chin to mouth. Going down and up to look at specimens worked out fine in the end, and (I think) I was lucky to find some pieces with adranosite, panichiite, thermessaite and alunite. When home, going through the literature, I found out that, for that type of fumarole, this actually was the typical paragenesis. But to be 100% sure I will need to sacrifice some specimens for analysis.

Another reason for me to hunt for adranosite and thermessaite is that in 2007 I found the Fe-analogue $((\text{NH}_4, \text{K})_4\text{Fe}_2(\text{OH})_2(\text{SO}_4)_4 \cdot \text{NaCl})$ of adranosite (ref.10) from the burning coal dump of the Anna coal mine (ref.5,6). Mineralogically the burning Anna coal dump and the Fossa Crater volcano are related. So if I could find that Fe-analogue also in the Fossa Crater, then we would be able to describe that new phase as a new mineral.

And, in fact, while I was collecting at the Fossa Crater, Dr. Uwe Kolitsch analyzed the (already-suspected) NH_4 -analogue of thermessaite $((\text{NH}_4)_2[\text{AlF}_3\text{SO}_4])$ from the Anna coal dump on specimens that I found in March 2010 (ref.7). So I was specifically hunting for new minerals. The odds of missing were high, but the smaller odds for hitting a bullseye were large enough to try. (And also a good excuse for a little adventure into the beautiful hell of the Fossa Crater!)

In the meantime in June 2010, Dr. Günter Blaß also analyzed barberiite at the Anna coal dump (together with cryptohalite), and also pyracmonite has now been confirmed from the Anna. The rare kremersite was already known from the Anna. Perhaps I will be able to report more on the currently done research when it is finished in the course of 2010. Let's cross thumbs and wait.

Vulcano Island is type locality for 23 minerals (see table 1). About 40 new minerals are being studied at this moment (not submitted to the IMA yet) so there is the possibility for more.

I would like to express a big thank you to **Alfredo Petrov**, for proofreading the article and to all other friends in Italy who helped me in planning this trip and supplied information and literature.

For more pictures of the Fossa-crater and Sicily, please see <http://www.facebook.com/frankdewit>.

N.B. There is more on Vulcano Island than just the Fossa Crater. If you're interested in a full-color article, including the other localities (like the famous “Alum-cave”), and more color photos, please contact us via our travel website www.mineraltravel.com. Have fun!

On (In)security While Collecting:

1. Without a gasmask you can inhale these fumes *once*. You will start coughing the *second* time. And you will suffocate the *third* time you try to inhale.



2. With a gasmask you are still in danger because you have to use the right filters to filter poisonous gasses/elements from the rarified air. There are volatile metallic elements here like Bi, Hg, Sn, Au(!), As, Se, Te, etc. And even then: most gasmasks need a minimum percentage of oxygen in the air to function (and logically a maximum percentage of carbon dioxide and other gasses). If you have the right gasmask and the right filters. Test them first and take spare filters with you. And even then the contents of fumaroles change over time, so use filters that have the broadest capacity. You might get poisoned and not notice it until you're at home. Some elements just enter your body and become carcinogenic over time. Also use a gasmask that includes eye protection!

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Hell Can Be Beautiful

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3. Wear protective clothing: aluminum-coated gloves, heat resistant trousers and shirts (used in metal melting plants), shoes of which the soles are resistant and a heat-shield (mounted on my helmet). Why the heat-shield? It does not only look cool on pictures, but makes me stay cool too. It keeps 450°C-700°C hot fumes from hitting unprotected parts of my face and throat. Protective clothes are also important to keep gasses (like SO₂, H₂S, HCl and the very dangerous HF) from directly touching your sweating skin or wet eyes. HF gas touching your wet skin/eyes will turn into hydrofluoric acid, which in turn is very corrosive (will burn the skin fast), poisonous and deadly. It also etches the glass lenses of your camera (I know that from experience).

4. Eat and drink enough and take breaks. Watch your step and look over your shoulder for safe points to return to in case of immediate danger. Take it slow. And if needed, use godspeed!

Why all these warnings? If you break your leg in the crater, or burn yourself so badly you become immobile, or suffocate then other people have to risk their lives to save you or to get your dead body from the crater. Using the right equipment and testing/preparations is simply responsible behavior. **Luck = Equipment + Preparation + Experience + Energy + Coincidence.** The coincidence part is the nasty part. For that you need to dream the unthinkable, practice the things that will never happen and make routine of all the other things. And even then, entering an active crater is just not the smartest thing to do, shit can happen.

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Table 1: Minerals first discovered on Vulcano Island

1882 - Hieratite	2008 - Adranosite
1913 - Millosevichite	2008 - Aiolosite
1924 - Cannizzarite	2008 - Brontesite
	2008 - Demicheleite-(Cl)
	2008 - Panichiite
1982 - Magnesioaubertite	2008 - Pyracmonite
	2008 - Steropesite
1994 - Barberiite	
1998 - Mozgovaite	2009 - IMA2009-031
	2010 - Demicheleite-(I)
2003 - Lafossaite	2010 - Aluminocoquimbite
2003 - Vurroite	(23 in total)
2006 - Demartinite	2010 - more to come.
2006 - Knasibfite	Ca.40 new minerals are being studied at this moment, of which a number of new halides (fluorides, chlorides, bromides and even iodites!)
2007 - Demicheleite-(Br)	
2007 - Hephaistosite	
2007 - Thermessaite	

(From latest source ref.9)

New Building Planned

The A. E. Seaman Mineral Museum is pleased to announce that on July 15, 2010, the Michigan Tech Board of Control approved construction of a new on-campus building as a transitional home for the museum. Although the new structure will be built to museum specifications, pending funding, the long-range plan is still to move the mineral museum into two historic buildings adjacent to the Quincy mine in Hancock. When this occurs, it will free up research and business-incubator space for other departments.

Conveniently located on Sharon Avenue, the new single-story building will enable the museum to continue to grow and further enhance its reputation and that of the University. Museum visitors will enjoy easy access to parking shared with the university's Advanced Technology Development Complex. Visitors to the new building will enter the museum from the adjacent parking lot, through a spacious new gift shop, and into the main exhibit area. The main exhibit hall will feature sections devoted to the beauty of minerals, gems, the minerals of Michigan, the uses of minerals, sustainable mining, fluorescent minerals, a systematic (Dana) collection, and a new gallery developed around the theme geological and mineral-forming processes. The building will also include sufficient space for current and future collection management and conservation, as well as staff offices, surpassing the high quality layout of its current space.

Construction of the new building will commence in September, and will hopefully reopen to visitors in the summer of 2011. This aggressive schedule will require that the current museum close for an extended period of time for packing, moving and unpacking between October 2010 and May 2011. Please refer to the museum website (www.museum.mtu.edu) for updates as this exciting project moves forward.

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