



# Mineral News

Vol. 26 No. 7  
July 2010

The Mineral Collector's Newsletter

\$4.00

## To Walk in a Micromount Box . . . The Merkers Salt Mine, Germany

Frank de Wit  
str4hler@gmail.com

Do you remember, when you were a kid, that you hung a thread in a jar, and then filled it with water and lots of salt? And then after a few days beautiful white crystals had grown on the thread? Then, you imagined that you could shrink yourself, and step into that jar, walk around and look at those beautiful crystals. Meter-large crystals when you were small. You could walk in between them, walk on the faces of the crystals, hide behind crystals, touch them. Well, that's what happened to me in real life in 2005 – walking in between meter-sized halite crystals! That's what this article is about: the Giant Halite Crystal Cavity in the Merkers mine in Germany (ref.1,2,3).

First a little about salt and “rock-salt” (halite), the stuff that I'm standing next to in the picture. What is salt? Well, salt=money. The English word “salary” actually comes from the Roman word “salarium”, which again was named after “sal”. It is believed that (higher ranked) Roman soldiers were often paid with salt. There have been wars over salt mines.



Author feeling very small and humble next to meter-sized halite crystals!

(Continues on page 2)

## Orthorhombic Twins

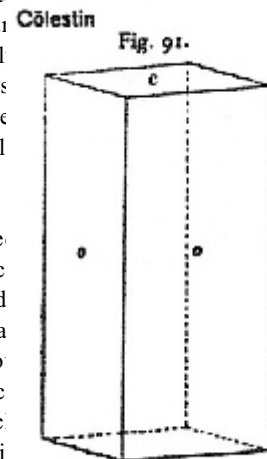
Bill Shelton  
laeliason@msn.com

To subdivide minerals based on structure, we often use six crystal systems. Some sources use seven; in that case the hexagonal is subdivided into the trigonal and hexagonal proper. This article deals with only one system, the orthorhombic. After describing what the system requirements are, you will find several twinned examples and some related information regarding terminology used to describe twinning. In addition to being the second most common system among mineral species (exceeded only by the monoclinic) the orthorhombic system contains a variety of types of twins and numerous species within it are noted to occur in twin crystals.

What does the orthorhombic system actually indicate and how might a collector determine if a specimen belongs here or elsewhere? For a well-formed crystal, one should first expect boxlike, tabular or even rectangular outlines. Prismatic crystals are likely to have a diamond-shaped outline; further luster and striations often differ amongst the faces present. Another good clue is faces that appear to be identical but occur in pairs on opposite sides or even the top and bottom (they are termed pinacoids). It is

common enough to see what may look like six sides to be considering this as a possible trait. Other minerals may have eight sides – these are likely to be in pairs too. The six or eight sides may be very similar in size; they also can be very different. Many crystals have, when completely formed, a minimum of six to eight sides. Some common species have twelve, fourteen or eighteen faces on simple crystals (eg., staurolite, barite, topaz).

Once a crystal is oriented, either a flat face at the top or some type of raised point will be evident. The flat surface should be called a pedion or pinacoid and generally speaking will be lettered a c with a Miller index of (001). If you observe a complete crystal, another face will often be found on the bottom which is parallel to the top. For a very basic crystal, a second pair of faces may be observed on the front and back; they are labeled a (index 100). The final pair, called b (index 010) will form the right and left sides.



Celestine; simple crystal

(Continues on page 3)

## Walking in a Micromount Box

(Continued from page 1)

Cities were founded and named after local salt mining (e.g., Austria: Salzburg, Hallstatt, Hallein, Hall; more beautiful, the city of Potaissa, now Turda, in Romania, from "potassium"). Countries became rich and powerful because of salt mining.

Second: we cannot imagine a life anymore without a refrigerator to keep our food edible. But until about 200 years ago, using salt was the only way to preserve food. As long as 8.000 (!) years ago, salt was already used to preserve meat and fish. Salt was important. And it still is. Salt is the basis for many industrial products, for fertilizers and we use it in our food almost daily as additive. Even better, our body would not function without salt. Salt is one of the primary electrolytes in our body. Too much salt, on the other hand, is again not good for us. And too much rock-salt (halite) is what you will see when you enter the Merkers mine!

### Land of the White Mountains

The Merkers mine is located in former East Germany/GDR. In the so-called "Werra-Fulda-region" in the official "Freistaat Thüringen". Also called "the land of the white mountains", referring to the immense white dumps that the salt mines in this region have left behind. Mining for salt started here ca. 2,500 years ago by the Celts. And in the 1860's the first real shafts were created, of which now three large salt mines are still active (Unterebreizbach / Thüringen and Hattorf - Wintershall / Hessen). Those mines are now owned by K+S Group. At this moment ca. 15,000 (!) people are active in/for these salt mines, producing ca. 35-million tons of salt per year, and producing industrial products from that salt such as fertilizers. During the long last winter we have all seen the result of the mining on our streets. Much of the road salt, to melt the snow, was mined by the K+S Group. For more information see <http://www.k-plus-s.com/>.



The "white mountains" of mining dumps from the salt-mining

At ca. 750 meter depth, in 1981, the famous halite cavity was originally hit during the active mining operations. Just as in coal mines, the salt in the Merkers mine is layered and divided into "fields" underground, the so-called "Flöze". Each Flöz is mined via room-and-pillar method and is between three and five meters high. When the mine was connecting "Flöz Thüringen" and "Flöz Hessen," they drove a gallery right into the cavity. What a nice surprise that must have been! Remember: 1981 was during the Cold War period. It was a difficult time for East Germany. And the East German government was selling mineral specimens from its territory to get hard currency from the West. The mine management knew that if it became known to the government that they found this extraordinary cavity, the government would remove the big crystals from the cavity, and sell them on the western market.

(Continued on page 4)

# EAST COAST GEM, MINERAL & FOSSIL SHOW

Better Living Center, Eastern States Exposition  
1305 Memorial Ave., (1 mile west of I-91), West Springfield, MA

**AUGUST 13 - 15, 2010**

Special Exhibit ~ *Bill Larson, Pala International*

Guest Speakers ~ *Bob Jones, Nancy Millard & Kevin Downey*

Minerals • Fossils • Beads • Lapidary • Meteorites • Jewelry • Gems • Gold • Diamonds

200 great retail and wholesale dealers • Air Conditioned Hall

An easy drive from the entire northeast!

Martin Zinn Expositions, L.L.C., P.O. Box 665, Bernalillo, NM, 87004  
Fax: (303) 223-3478, [mzexpos@aol.com](mailto:mzexpos@aol.com), [www.mzexpos.com](http://www.mzexpos.com)

Show Hours: Fri. & Sat., 10 - 7 • Sun., 10 - 5  
Admission: \$6. • Children under 12 free with adult  
Parking: \$5.00



## Walking in a Micromount Box

(Continued from page 2)

So the miners closed the cavity, and kept it unknown to the outside world. Only a few insiders knew about the cavity and were able to visit it, until the 13th of March 1989 at 14:02. At that moment a 5.75 magnitude earthquake, caused by mining in the Merkers Mine, hit the region and lasted for 12 seconds. The earthquake luckily did not take any lives, but caused damage to 80% of the houses in the region. It also closed the underground entrance to the halite cavity. Then, on the 9th of November 1989, the wall fell, and East and West Germany were re-united. Times had changed . . . it was time to re-open the halite-cavity!



One of the two main shafts of the Merkers Mine.

The Merkers Mine has stopped production since 1993, and is now a mine for tourists. When we visited the Merkers Mine in 2005, they were still securing and stabilizing parts of the mine. So there was still a lot of activity underground. At the present time it is possible for everyone to visit the mine (ref.4), and to see the cavity via a balcony. But it is not possible to enter the cavity and walk in between the crystals. The Merkers Mine itself is ca.140 square kilometers in size and has a stunning 4.000 kilometers of galleries! It is connected underground to other K+S mines, so the entire mining region is even larger: ca.1.000 square kilometers! Imagine how long you can drive underground there, without taking the same route twice. If you will be visiting the mine, you'll be descending also by shaft, and then transported by bus 8km to the halite cavity.

**PERFECT BOUND ANNUAL EDITIONS  
of Mineral News for 2004-2009**

**\$35 per year postpaid!**

**Mineral News**

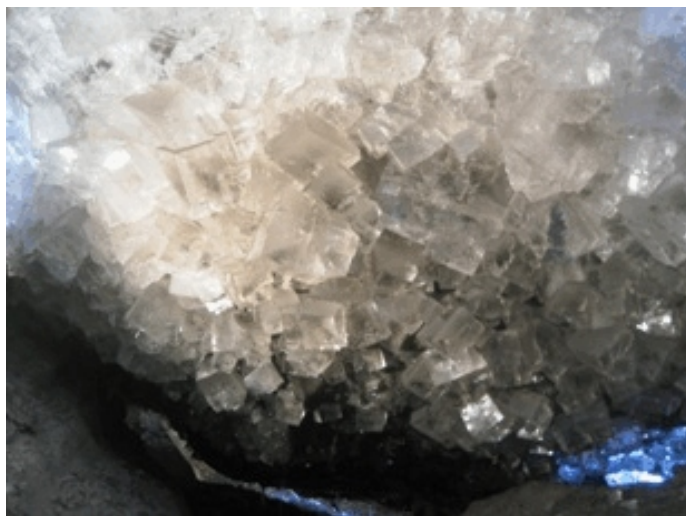
**PO Box 2088—Peekskill, NY 10566-2088**



A dumper with mined salt at the Merkers Mine Museum.

On 11 March 2005, Dr.Thomas Krassmann, Dr.Thomas Witzke, and I had the rare opportunity to visit the mine and enter into the halite cavity. Our task was to make 360° fisheye panorama images of the entire cavity. Arriving at the mine, very early that cold morning, we got our personal guide, mine clothing, gear and instructions. While there was a snowstorm outside, we descended into the mine and arrived 500 meter below at a nice temperature of 27°C (80°F)! There we got into our jeep and drove eight kilometers to the halite cavity, located ca.200 meter lower at ca. -720 meter.

When we first saw the cavity we fell silent. The doors were closed behind us and we were, of course, allowed to walk in between the crystals for the photo shoot. We had all the time in the world to do our work and we took our time. The cavity in total is ca. 45 meter long. The width is between seven and ten meters and to 15 meters high on the highest point. The cavity is slowly shrinking (0.5-1cm/year; the roof is also slowly sinking) and it is now ca. 4,500 m<sup>3</sup> large. It is estimated that originally the cavity was 6,000 m<sup>3</sup> large. The picture below gives an overview of part of the cavity.



The halite cavity, ca.10 meter wide, with crystals ca.20-40 cm large.

(Continues next page)

**Geology**

The Merkers Mine, as well as most of the other mines in the Werra region, are mining Upper Permian Zechstein salts. These (to 300 meters thick) layers of salts were deposited as marine evaporates 250 million years ago (Ochsenius' "Barren theory" explains it all). The rock salt, in which the Halite cavity is located, consists mostly of sylvinite (a mixture of halite and sylvin). There is almost no rock-forming carnallite present anymore. But in earlier days there was. It is known that in the (pre-basaltic salt-)metamorphosis from carnallite into sylvinite, the rockmass shrinks with 50%! It is this shrinking process that made the room for this so-called "intrasaline cavity" (for more information on the genesis of the cavity, see ref.5). Other halite cavities were found elsewhere in the mine, but none as big as this one. Later, the cavity filled up with salt-brines. And that's when the growth of the crystals started . . .

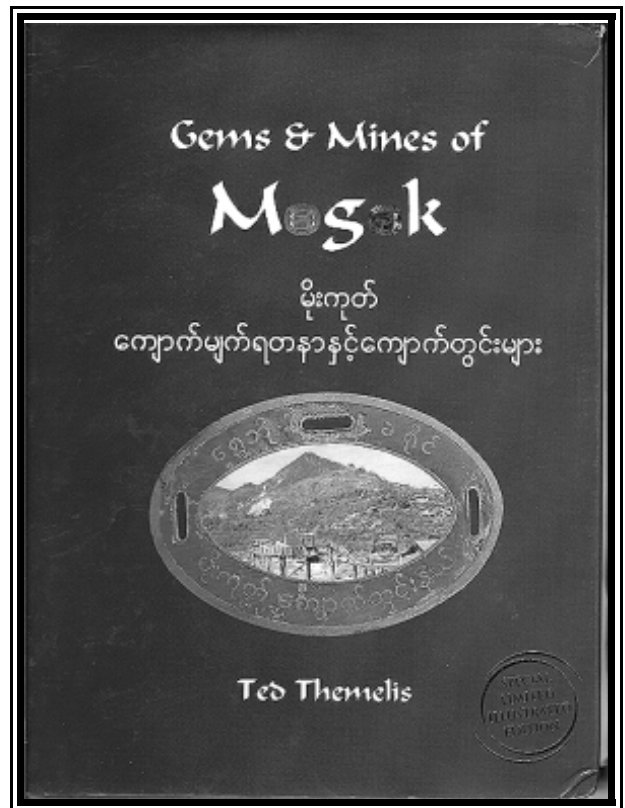


Helmet placed for scale on a meter-sized halite crystal.

After that metamorphosis process, another, perhaps an even more interesting geological phenomenon started – the basalt intrusions! Fifteen million years ago, basalt intrusions vertically entered the more or less horizontal evaporite salt layers. The hydrothermal fluids, coming up with the basalt, reacted with the minerals in the salts and created interesting new minerals on the contact zones and in cavities in the basalt. The nice thing about these basalt intrusions is that they are very well visible underground as vertical black and reddish veins cutting through the horizontal salt, sometimes even spreading horizontal into the salt layers. (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!

This 352 page book is a marvelous, detailed work, with over 1600 above average, full color photographs, diagrams and maps. A remarkable story of Myanmar's gem producing areas, the treatment of gemstones, and the minerals of the Mogok district. Priced at \$129 plus shipping, and clearly worth the price for the Mogok enthusiast!

The author is a former director of Research and Development of the Accredited Gemologists Association in the U.S., and he has worked extensively with numerous gem and jewelry organizations, publishing over a hundred articles pertaining to gem identification, enhancement, inclusions and instrumentation.

*FOB our warehouse - order from:*

**Excalibur Mineral Corporation**

1000 North Division Street - Peekskill, NY 10566

Tel: (914)739-1134 Fax: (914)739-1257

email: [info@excaliburmineral.com](mailto:info@excaliburmineral.com)

[www.excaliburmineral.com](http://www.excaliburmineral.com)

**The mineralogy** of a salt mine might seem very boring to you. It sounds like just salt, salt, and more salt. And in fact: yes, the genesis of the halite salt crystals in that cavity is quite simple. As I stated in this article: salt brines, waters almost saturated in salts, filled up the cavity, and crystals slowly started to grow. There were halite "seeds" in the rock. The conditions in the cavity remained stable for a longer time. Then the temperature slowly dropped and because of that, the over-saturation of the brine fluid started. The large halite crystals then simply grew around the seeds. In a delicate equilibrium, over a longer time, of dropping temperature, with a changing saturation and with an (in)stable surrounding rock. When the water evaporated again from the cavity, the crystals were just hanging there, waiting to be discovered.



**Touching a meter-sized halite crystal, unforgettable and unreal.**

If the miners had not frequently drilled into the cavity already by accident (releasing the remaining ca. 6-million liter brine from the cavity) the crystals would still have been growing, possibly into multiple meter-long halite crystals. It is possible that the cavity would have filled up completely (at continuous minimal oversaturation of the solution). But then the crystals hanging on the roof would have become too heavy and would probably have dropped off, crashing the crystals again growing on the floor. It is estimated, that the halite cavity was enclosed in the salt layers for between 15 and 20 million years. Only during the last hundred years there was active mining below the cavity with all the blasting and drilling. And . . . 200 meters from the cavity there is a basalt intrusion! Had the basalt intruded the cavity, 15 million years ago, it would never had become a closed system, and we would not have walked in between hundreds of halite crystals a few years later. So it's a little geological miracle that the hundreds of halite crystals survived . . . and the timing of the miners was perfect. Over all those millions of years they opened the cavity just in time.

The largest halite crystals in this immense cavity are 1.10 meters big. Ergo: 1 cubic meter in size! Sometimes, of course, these meter-long crystals grow together and form even larger aggregates. But the most stunning crystals are the water-clear, ca.20-40cm large, individual halite crystals hanging from the ceiling. Dozens of them. Only water-clear to white halite crystals

are found here, and frequently have fluid inclusions of salt-brines. Similar sized and quality halite-crystals were found, as you know, in the world-famous Wieliczka mines as well as in the PCA-mine near Carlsbad in 1962. For more "giant crystal cavities" see ref.3.

(Continues next page)

## WADDELL DISPLAY CASES

Expect the very best when displaying your collection with our fully outfitted Waddell Display Cases! Available in rich hardwoods with full mirror backs, matching fluorescent lighting cornice on top and extra shelves, our Mineral Collector's Special set up is the standard arrangement like those we use in our shop.



Hardwood finishes include Honey Maple, rich Cordovan Cherry and dark Danish Walnut. Eight (8) surface shelves, keyed locks, fixtured light cornice, and sliding glass doors are standard, specially priced at just \$1595, FOB factory. Full standing size is 36"W x 76"H x 14"D.



**Excalibur Mineral Corporation**  
1000 N. Division Street – Peekskill, NY 10566  
914-739-1134 [www.excaliburmineral.com](http://www.excaliburmineral.com)



Halite crystals, ca. 20-40 cm, hanging on the ceiling of the halite cavity.

Nevertheless, the size of this halite cavity is unprecedented. The floor of the cavity consists of a layer of max. 20cm thick light gray to gray mud containing gypsum, anhydrite, polyhalite, talc, illite, chlorite and quartz; the walls of the cavity consist mostly of sylvinite and little carnallite.

As I wrote earlier: for me the most interesting mineralization in salt mines, is where basalt intrudes into the salt as here in the Merkers mine. A handful of rare minerals is found directly around these intrusions. When we visited the mine in 2005, we were allowed to drive a few more kilometers underground to one of these areas. It is not uncommon to find rare minerals like kainite, polyhalite, leonite, langbeinite, blue halite, sulfides, zeolites and even some yet unknown phases in those basalts and on the contacts.

When the jeep stopped it was impossible to miss the basalt intrusion at the side of the road. We were allowed to sample on that contact and found rinneite (together with sylvite, halite, anhydrite and akaganeite, ref.8), which was a superb bonus for this underground trip. I then walked a little away from the contact zone, where I saw another large cavity, of which the floor was filled with brine. I crawled into that cavity, over layers of broken bischofite crystals. And when I looked up, the ceilings were full of carnallite crystals up to 2.5 cm long! Knowing that carnallite is hygroscopic, I took three pieces with me in plastic. We stepped into the jeep again, drove ca.10 kilometers underground, and 500 meters up again we went into the snow storm – the end of a warm and unforgettable day!

For more pictures of this Halite cavity, please see <http://www.facebook.com/frankdewit>. If you're interested in a full-color article including some more color photos, please contact us via our travel website [www.mineraltravel.com](http://www.mineraltravel.com).

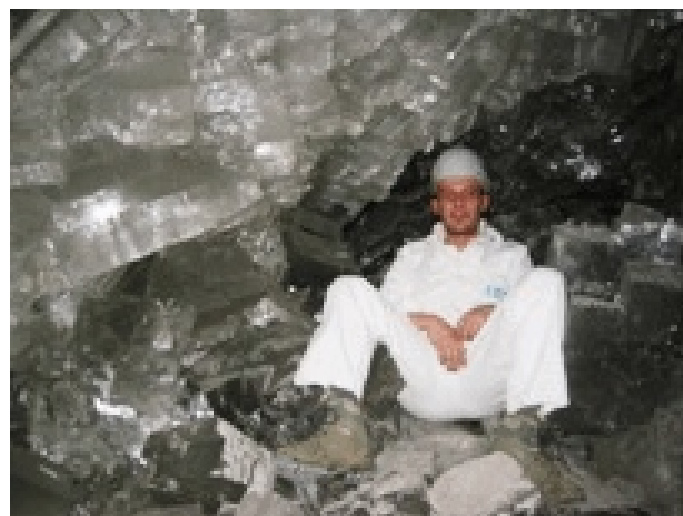
**References**

1. <http://www.mindat.org/loc-36091.html> The Merkers mine on Mindat.
2. <http://www.strahlen.org/vp/de/merkers/> The Merkers mine on Strahlen.
3. <http://giantcrystals.strahlen.org/europe/merkers.htm> Giantcrystals.strahlen.org.
4. <http://www.erlebnisbergwerk.de/> the official site of the Merkers mine.

5. M. Pippig (1992): Über das Vorkommen einer Kristallsalzschatte im Kalibergwerk Merkers. Kali und Steinsalz 11:1-2-mai-p.2-7. Including a number of mining and geological maps.
6. A.Dietrich, G.Behnke and T.Thönelt (2004): Kristalle aus der Tiefe - Eine Auswahl von Mineralen aus Kali- und Steinsalzlagerstätten. Kali und Steinsalz:3.p.6-14.
7. A.Dietrich, G.Behnke and T.Thonelt (2005): Kalisalzbergbau an Werra und Ulster: Mineralien aus dem "Land der Weißen Berge". Lapis: 6.p.13-23.
8. Akaganeit. Analyses Dr.Thomas Witzke, unpublished.

**Table 1: Minerals from the Merkers Mine**

<p><b>III - Halides</b>                  Bischofite                  Carnallite                  Halite                  Rinneite                  Sylvite</p> <p><b>IV - Oxides and Hydroxides</b>                  Akaganeite</p> <p><b>VI - Borates</b>                  Boracite                  Lüneburgite</p>	<p><b>VII - Sulphates, Chromates, Molybdates and Tungstates</b>                  Aphthitalite                  Blödit                  Kainite                  Kieserite                  Langbeinite                  Leonite                  Löweite                  Polyhalite</p>
---	--



Author feeling extremely happy under 20-40 cm large halite crystals.

**THE-VUG** [www.the-vug.com](http://www.the-vug.com)

THE portal to all things rock & mineral on the web!

**Mineralogical Research Co.**  
 MINERALS, METEORITES, BOOKS, BOXES,  
 MICROSCOPES, GEIGER COUNTERS, UV LAMPS  
 (408)923-6800 [www.minresco.com](http://www.minresco.com)