

Bulletin of the Mineralogical Society of Southern California

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November 2005

The 814th Meeting of The Mineralogical Society of Southern California

**"The Many Facets of Snowflakes:
A Close Look at the Genesis of Pattern and Form"**

by Dr. Kenneth G. Libbrecht

Friday, Dec. 9, 2005, at 7:30 p.m.

**Geology Department, E-Building, Room 220
Pasadena City College
1570 E. Colorado Blvd., Pasadena**

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December Meeting: Looking Closely at Snowflakes

The Friday, December 9, meeting will feature Dr. Kenneth G. Libbrecht of Caltech speaking about those ephemeral micro-minerals, snowflakes. The title of his talk, which will begin at 7:30 p.m., is "The Many Facets of Snowflakes: A Close Look at

the Genesis of Pattern and Form." Dr. Libbrecht has provided the following abstract:

A snowflake is an ice crystal that grows directly from water vapor, and the physics involved in the growth process can be both complex and quite subtle. For this reason, the lowly snowflake makes an excellent case study for investigating the molecular dynamics of crystal formation in general. Snow crystals are especially fascinating because their morphologies are extremely sensitive to growth conditions, reflecting changes in the ice surface structure with temperature. This talk will examine why snow crystals grow the way they do, how patterns emerge, and what this all means for the fundamental physics of crystal growth and structure formation. (For a preview, see snowcrystals.com.)

Dr. Libbrecht is Professor of Physics and Chariman of the Physics Department at Caltech. He holds a B.S. degree from Caltech and a Ph.D. from Princeton University; both degrees are in physics. He has won numerous scientific awards as well as a 2004 Benjamin Franklin Book Award for "The Snowflake: Winter's Secret Beauty." In addition to his research about the formation of snow crystals, current interests include electrically modified crystal growth, advanced detector development for the Laser Interferometer Gravitational-wave Observatory (LIGO), and tunable diode lasers in physics education.

Minutes of the November Meeting

The 813th meeting of the Mineralogical Society of Southern California was held on Friday, November 11th, 2005 in the Geology department at Pasadena City College. Vice President James Kusely brought the meeting to order at 7:31 pm. There was an especially high turnout for the evening's speaker Bill Green, who gave an enlightening talk on the geology of Mt. Wilson in addition to the surrounding geology of the San Gabriel Mountains. Mr. Green indicated that there indeed is a presence of gold in 'them there hills' in the form of placer as well as hard rock sources. Incorporated in the talk was an in depth discussion as to the various rock types located within the San Gabriel Mountains, including that of the Mt. Lowe Granodiorite, the ever present anorthosite, and pegmatites.

After the talk a motion was made to approve the panel for next year's officers and board directors, the motion passed unanimously. The new officers for 2006 and board directors for 2006-2007 are as follows:

President: Ilia Lyles
Vice President: James Kusely
Secretary: Pat Caplette
Treasurer: Walter Margerum
Federation and Board Director: Jo Anna Ritchey
Board Director: Ken Raabe
Board Director: Robert Houslesy

An announcement was made regarding the open house at Jewel Tunnel Imports for the members of MSSC; the open house will be on December 10th from 10 am to 4 pm. Congratulations to departing Secretary Ilia Lyles for being this month's door prize winner. The meeting came to a close at 8:56 pm.

Respectfully submitted by Ilia Lyles, Secretary



Minutes of the October Board Meeting

The October 2005 board meeting of the Mineralogical Society of Southern California was held on Sunday, October 2nd, 2005 at the home of James Kusely. President Bill Besse brought the meeting to order at 2:25 pm. In attendance at the board meeting were the following members: Bill Besse, Ilia Lyles, James Kusely, Jo Anna Ritchey, Walter Margerum, and Ken Raabe.

There were a number of issues discussed during the October board meeting. Walter Margerum gave the treasurers report and a general dialogue on the financial well-being of the club. Following the treasurer's report, there was a brief talk regarding the upcoming MSSC show. The progress in the sales of the display cases and light fixtures were also a topic during the meeting. At the end of the meeting there was also a short discussion of possible nominations for next year's officers and board members.

The board meeting was brought to a close at 3:39 pm.

Respectfully submitted by Ilia Lyles, Secretary

TUCSON 2006 . . JAN. 28 - FEB. 11 (Sat. - Sat.)
 Show Hours: 10 to 6 Daily (except Sat. Feb. 11th), Sat. Feb. 11th only - 10 to 5

ARIZONA MINERAL & FOSSIL SHOW

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- **Ramada Ltd.** - 665 N. Freeway, at St. Marys
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George Rossman Honored with Friedrich Becke Medal

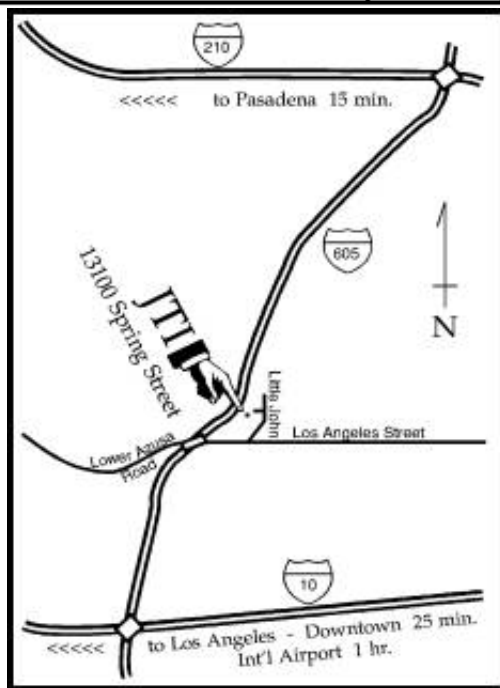
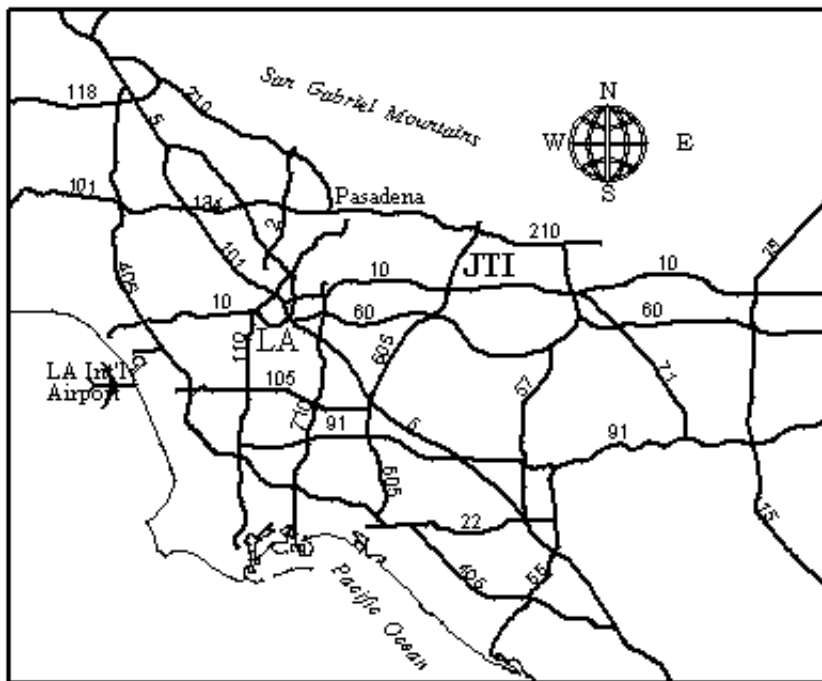
Dr. George R. Rossman, Professor of Mineralogy at Caltech and an active MSSC member, received the prestigious Friedrich Becke Medal on Sept. 26, 2005 in Schladming, Austria. The award was presented by P. W. Mirwald, President of the Austrian Mineralogical Society, at its MinPet 2005 mineralogy/petrology conference, co-sponsored by the University of Loeben's Department of Applied Geosciences and Geophysics. George was recognized for his outstanding contributions to mineralogy and petrology including work on water-bearing phases in the mantle. The award was shared Jointly with Dr. Dmitri Yu. Pushcharovsky of Moscow State University, Moscow, Russia. The MSSC extends its congratulations to George!

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Open House Reminder...

As announced in the November Bulletin, MSSC members and their friends are invited to an open house at Jewel Tunnel Imports Saturday, December 10, 2005, 10 AM to 4 PM. Refreshments will be served.

Directions to Jewel Tunnel Import's warehouse: 13100 Spring St., Baldwin Park, CA 91706, 626-814-2257, see the maps on the next page, or check out their web sight at www.jeweltunnel.com.



41st Pacific Micromount Conference

The Pacific Micromount Conference will be held January 27-29, 2006, at the San Bernardino County Museum. The festivities open Friday evening with a potluck buffet dinner followed by a program by Sugar White titled "What's New in Minerals." On Saturday, Jocelyn Thornton, a well-known author and accomplished micromounter from New Zealand, will present "Current Mineral Collecting in New Zealand" in the morning; and Dr. Don Howard, Professor of Physics, Portland State University, will speak on "Catalyzed Growth and Filiform Crystals." Sunday will feature a field trip.

More details may be found by clicking on the Southern California Micro-Mineralogists link on the MSSC web page: mineralsocal.org. Or you may contact Paul Adams for information at 310-336-6927 or paul.m.adams@aero.org.

Answers to Last Month's Trivia Quiz

1. miner's inch: a measure of water flow equal to 1.5 cubic feet per minute used to measure the rate of water flow in a miner's sluice box. 2. oryctology: the science of things dug from the ground, specifically an obsolete term for mineralogy (and definitely harder to spell).

3. mineralogic maturity: no, this is not a reference to the behavior of some collectors. Geologically it is the extent to which a sediment approaches the end product of the processes which operate on it. For example, the ultimate mature sand is pure quartz.

4. mineral soap: bentonite, guaranteed to be slippery when wet.

5. mineral blossom: drusy quartz. See the MSA's "the Nomenclature of Silica" page on the web (via www.minsocam.org) for more quartz terms than you ever imagined existed!

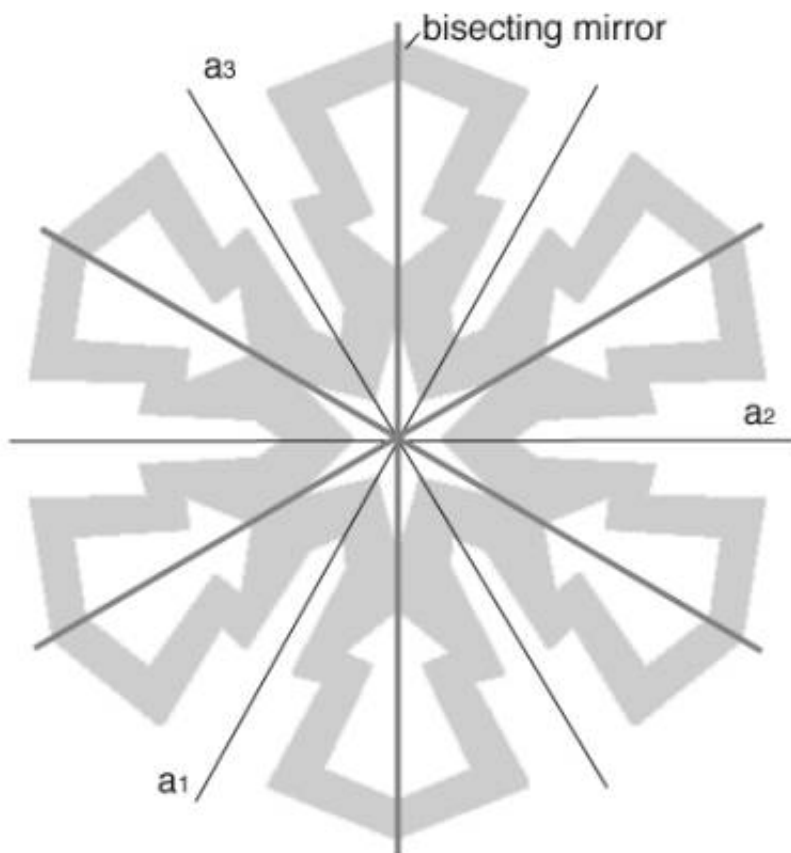
A Look at the Symmetry of Snow Crystals

by

All kids who have caught snowflakes on their mittens and many who have merely seen decorations in the department stores know that snow flakes have six points, but what else is there to observe? Consider the hypothetical snow crystal illustrated below. Pretend that it is actually thicker than this page and that the unseen bottom looks exactly the same as the top. Can you identify any places where mirror planes could relate parts of the pattern by reflection? Where might the crystallographic axes be? Think a moment before you turn the page.



A succinct way to describe the symmetry of snow crystals is to use its Hermann-Mauguin symbol: $6/m2/m2/m$. For hexagonal minerals this symbol is translated as follows. The first position ($6/m$) gives the symmetry associated with the c crystallographic axis. In this illustration, the c axis would be placed in the center of the snow crystal oriented perpendicular to the page so it could be used to spin the crystal like a top.



It is a 6-fold axis, which means that the crystal will appear the same when rotated like a top by 60° (that is, 360° divided by 6). The m below the 6 in 6/m means that there is a mirror plane perpendicular to the 6-fold axis. Remember the top and the bottom of the crystal were defined as being identical or mirror images each other for the purposes of this discussion.

The second symbol (2/m) refers to the symmetry associated with the a crystallographic axes. All hexagonal minerals have three identical a axes which meet at a point where they intersect the c axis. They are labeled a₁, a₂, and a₃ in their traditional orientations. The Hermann-Mauguin symbol indicates that these are 2-fold axes. If you were to rotate the crystal 180° (360° divided by 2) using the a₂ axis, which is in effect flipping it upside down, it would look the same. Notice the line marked "bisecting mirror" that is perpendicular to a₂. The two halves of the crystal on either side of the "mirror" are mirror images of each other. Each of the three a axes has a corresponding mirror perpendicular to it, hence the 2/m following the 6/m.

But what about the last 2/m in the symbol? This third place in the symbol represents the symmetry along the bisectors to the a axes. The bisecting axes have the same symmetry as the a axes, and there are also three of them. Think of the line labeled "bisecting mirror" as an axis. Note that the line labeled a₂ is perpendicular to it, and that the halves of the crystal divided by the a₂ line are mirror images of each other.

This particular combination of symmetry elements is the most symmetry that the external shape of a hexagonal crystal can express. Other hexagonal minerals such as quartz and calcite are not as symmetrical. Perhaps that is part of the charm of snow crystals. They are often well-formed and show their symmetry well.

The snowflake illustrations were drawn using the computer program "Kali." This program not only facilitates drawing symmetrical rosettes, but it is also excellent for constructing plane group "wallpaper" for those of us who lack the talent of M.C. Escher.



Mining and Minerals in North Carolina

Attending conferences is a great way to learn about geology and minerals, and one coming up in North Carolina looks interesting. It's the 42nd Forum on the Geology of Industrial Minerals, an international conference, to be held in Asheville North Carolina on May 7-13, 2006. Often the field trips are the best part of such meetings, and ten are scheduled. Forum participation is open to professionals, vendors, students, government officials, and the public. Also, Asheville hosts the Colburn Earth Science Museum with its fine collection of North Carolina minerals and gems.

You can start the conference with a ride on the Great Smoky Railroad which stops at quarries and other points of geological interest along the scenic transect through the mountains. A second trip goes to the Spruce Pine mining district where feldspar, mica, quartz, and olivine are produced commercially. Or take a night field trip for fluorescent minerals at the Feldspar Corp. Mine. There are also trips to old pegmatite deposits and gold mines. Note that the first authentic gold discovery in the state was in 1799 when Conrad Reed found a 17-pound nugget that was initially used as a door-stop. The Reed Gold Mine is now a state park. A visit to PCS phosphate mine, mill and chemical processing plant is also on the trip list. There's no caption for this picture clipped from the conference web site. What do you think it is?



www.geology.enr.state.nc.us/NCIndustrialMineralsForum

2005-2006 Calendar of Events

Dec. 3-4, Orangevale, CA, American River Gem & Mineral Society, Orangevale Grange Hall, 5807 Walnut Ave., Hours: 10-5 both days, Paul Daly (916) 725-6578, dalyconst@surewest.net.

Dec. 10, MSSC Open House at Jewel Tunnel Imports, Sat. 10-4. See details on p. 6.

Jan. 6-Feb. 3, Quartzsite, AZ, various gem and mineral shows. See www.quartzsitechamber.com/show_schedule.html.

Jan. 13-Feb. 22, Laughlin, Nevada, 5th Annual Cloud's Jamboree Rock, Gem and Mineral Show.

Jan. 21, 2006, MSSC Banquet! Save the date, details to follow. Jan. 21-22, Exeter, Tule Gem & Mineral Society, Exeter Veteran's Memorial Building, Hwy 65, hours: Sat. 10-5, Sun. 10-4.

Jan. 21-30/Jan. 27-29 Redlands, Southern California Micromineralogists, 41st Pacific Micromount Conference, San Bernardino County Museum, 2024 Orange Tree Lane. Hours: Fri. 3-10, Sat. & Sun. 8 am-10 pm., Paul M. Adams (310) 336-6927, paul.m.adams@aero.org.

Jan. 28- Feb. 11, Arizona Mineral and Fossil Show, Tucson, AZ, www.mzexpos.com, see ad on page 5.

Feb. 3-7, Tucson, Westward Look Show, Westward Look Resort, 245 E. Ina Rd., Sunday evening Steve Smale and Bryan Lees present "My Favorite Minerals" at 7:30,

Feb. 9-12, 52nd Annual Tucson Gem and Mineral Show, Tucson Convention Center, Hours 10-6 Thurs.-

Sat., 10-5 Sun. Special seminars every day, silent auction Saturday evening, www.tgms.org.

Feb. 17-26, Indio, San Gorgonio Mineral & Gem Club, "Date Festival" Riverside Count Fair and Date Festival, Gem & Mineral Building #1, 46-350 Arabia St., Hours 10-10 daily, Gert Grisham (951-849-1674, grish1@msn.com).

Feb. 25-26, Antioch, Antioch Lapidary Club, Contra Costa Co. Fairgrounds, 1201 West 10th Street, Ella Bauer (925) 458-2539, jbauer@wwdb.org.

Mar. 3-5, Hayward, Mineral and Gem Society of Castro Valley, Centennial Hall, 22292 Foothill Blvd., Hayward, Hours: Fri. & Sat., 10-6, Sun. 10-5, www.mgscv.com.

Mar. 4-5, Arcadia, Monrovia Rockhounds, Inc., Los Angeles County Arboretum and Botanical Garden, 301 North Baldwin Ave., Hours: Sat. & Sun. 9-4:30, Janie Duncan 626-358-8157 or Jo Anna Ritchey j.ritchey@verizon.net, www.moroks.com.

Mar. 4-5, Ventura, Ventura Gem & Mineral Society, Seaside Park, Ventura County Fairgrounds, Hours: Sat. 10-5, Sun. 10-4, Jim and Nancy Brace-Thompson (805) 659-3577, www.vgms.org.

Mar. 11-12, Salinas, Salinas Valley Rock & Gem Club Annual Show, Spreckels Veterans Memorial Bldg., 5th and Llano Street, Hours: 10-5 both days. Jim Bassett (831) 758-5830.

Mar. 11-12, San Marino, Pasadena Lapidary Society, San Marino Masonic Center, 3130 Huntington Dr., Hours: Sat. 10-6, Sun. 10-5, (626) 355-6964 or (626) 914-5030, Todd Neikirk (323) 256-4992.

Mar. 11-12, Turlock, Mother Lode Mineral Society, Stanislaus County Fairgrounds, 900 N. Broadway, Hours: 10-5 both days, Bud and Terry McMillin (209) 524-3494, www.motherlodemineralsociety.com.

April 21-22, Desert Symposium, Theme: Dinosaur Track Ways with field trip to Utah and California on April 23-25. Desert Studies Center, Zzyzx, California. Contact William Presch Ph.D., Director, Desert Studies, Department Biological Sciences, California State University, Fullerton, 714-278 2215 or wpresch@fullerton.edu.

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