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The 853th Meeting of The Mineralogical Society
of Southern California

How Gemology is Different than Mineralogy

By

Dr. Mary Johnson

Friday, April 10, 2009 at 7:30 p.m.

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

Featuring:

- Minutes of the March general and board meetings**
- PEGMATITE: a book review**

How Gemology is Different than Mineralogy

By Bruce Carter

As mineral collectors, we are used to examining specimens based on their mineralogy and the aesthetics of their association. People in the gem trade, however, regard minerals as raw material, so their "ideal mineral specimen" may be matrix-free, untermated, and covered with fracture surfaces. How is gemology a different way of looking at minerals? We will explore this in a short chat, then introduce Dr. Johnson's new book, *Gemstones*, co-written by British writer Karen Hurrell.

Gemstones is a convenient pocket-sized book that introduces the reader to the concepts of mineralogy, gemology, identification, and collection, and lists properties for 150 varieties of gemstones. Dr. Johnson will bring copies with her in case anyone wishes a signed copy.

Mary Johnson, Ph.D. is past president of the MSSC. She earned degrees in geochemistry from Caltech and mineralogy/crystallography from Harvard University, and was Director of Research at the GIA in Carlsbad, CA. She has performed research on sulfide minerals, high pressure chemistry and physics, outer solar system processes, meteorites and the early solar system, and gemstones and their cuts and treatments. An award-winning writer, her latest work includes the "Dear-Abby-like" column "Gemological Answers" for the trade magazine *National Jeweler*. She has a consulting firm in San Diego (www.maryjohnsonconsulting.com).

Minutes of the March 13, 2009 Meeting

The 852nd meeting of The Mineralogical Society of Southern California was held on Friday, March 13, 2009, at

Pasadena City College, Pasadena, CA. President Geoffrey Caplette brought the meeting to order at 7:30 p.m.

Vice President Bruce Carter then introduced the speaker of the evening, Dr. George Rossman, who gave a presentation entitled: "Oregon Sunstone and the Chinese Red Feldspar Controversy."

Dr. Rossman, a professor of mineralogy at the Division of Geological and Planetary Sciences at Caltech, is a renowned researcher and speaker in the field of gems and minerals. His impressive sleuthing abilities and access to sophisticated analysis equipment at Caltech, have shed light on many mineral mysteries. His current research regarding the recent emergence of red andesine feldspar in the marketplace, from heretofore unknown sources, is of great interest to both the scientific community and the commercial marketplace.

Dr. Rossman began his talk by describing the well-known locales for sunstone, and the characteristics of the feldspar at such areas. Red feldspar, hosted in basalt, has been found near Plush, Oregon and the Ponderosa Mine, both contained within the Steens Mt. volcanic area. Less than 5% of the feldspar has areas of red; most is of the yellow variety. It has been shown that the red and green colors found in feldspar arise from copper in different oxidation states. The schiller exhibited by certain specimens occurs because of the presence of platelets of copper metal. The Ponderosa Mine feldspar is very much like the Plush material, except for having darker colors (more copper present).

Glass clear feldspar has also been found in the Casas Grandes area of Mexico, and near Sonora, Mexico. A small percentage of the Sonoran feldspar has schiller.

In 2002, the feldspar world changed due to the reported presence of a red andesine locale in the Congo. No one could find either the source or reliable information regarding the source. A study of samples from the purported location revealed that the material had less calcium and more sodium

that the Oregon stones, but that the color did come from copper.

In 2005, the presence of a red feldspar locality in Tibet was reported, but again no specific information was provided. A third source, on the border between Mongolia and China, was also announced. Expeditions to Mongolia have confirmed a major source of yellow feldspar, but controversy still continues regarding the presence, or not, of naturally occurring red feldspar at any of the reported sites.

It was first thought that the Chinese feldspar was heat-treated to obtain the red coloration. However, researchers at Caltech, using very high temperature ovens, could not duplicate the appearance of such feldspar.

Then rumors began that Mexican or Oregon stones were being sent to China for diffusion treatments. Through analysis with electron microprobes, it was determined that there was no possibility the Chinese were using such stones.

The Chinese red feldspar material has various stripes and swirls that are not commonly seen in Oregon material, and glass and copper are fused to the surface of the feldspar. However, these facts alone are not conclusive in determining whether the Chinese feldspar was treated in laboratories after emerging from nature's volcanic furnaces.

First, researchers at Caltech had to study the diffusion of metals into plagioclase. Experiments revealed that copper diffuses easily into feldspar. Next, tests had to be devised to demonstrate when the diffusion had taken place. ^{40}K is a naturally occurring radioactive isotope, with a half-life of 1.3 billion years. The process of decay causes the forming of a specific argon isotope. The heat of magma drives argon out of crystals. When a crystal is cooled, the decay again causes the argon to return over geologic time.

The Chinese red feldspar was found to be devoid of radioactively generated argon. Therefore, the material was subjected to high temperatures, in recent times. (The yellow

feldspar from the Chinese location did show the expected presence of the argon isotope).

The researchers also compared the Chinese stones with those purportedly from Tibet, using other isotope comparisons. The materials were found to be almost identical. Considering the geology of the two “locations”, and their geographic distance apart, this result would be completely unexpected and extremely unlikely.

The researchers concluded: 1) the color of the Chinese feldspar occurs through the diffusion of copper; 2) the Chinese red andesine is artificially colored; and 3) the Tibetan red andesine mine probably does not exist.

Bob Housley reminded members that the Friends of Mineralogy was holding a symposium at the Desert Discovery Center in Barstow during the weekend. Vice President Carter announced that Dr. Mary Johnson was the speaker for April, and that she would have copies of her recent book, on gemstones, available for purchase. Ann Meister will also exhibit and demonstrate the Meister trimmer at the April meeting.

The door prize was won by Bob Parisi.

President Caplette brought the meeting to a close at 8:50 p.m.

Respectfully submitted, Pat Caplette, Secretary

Minutes of the March 13, 2009 Board Meeting

The March board meeting was held immediately following the regular meeting. In attendance were the following MSSC members: Bruce Carter, Bob Housley, Jim Imai, Leslie Ogg, Jo Anna Ritchey, Herman Ruvalcaba, and Geoff and Pat Caplette.

Geoff Caplette stated that he picked up the codes and other relevant information from Bob Besse regarding the MSSC website. Leslie Ogg will review the information. In addition

to Leslie, Jennifer, of our micromount side, also expressed an interest in working with the website. We welcome assistance and input from both Leslie and Jennifer.

Bob Housley will let the MSSC mailbox contract expire in April, and will direct that all mail be forwarded to the home of Treasurer Herman Ruvalcaba. Herman agreed to this arrangement.

Treasurer Ruvalcaba provided a detailed general annual income and expenses statement for members to review. He announced that the banquet auction proceeds were \$591.00, and that \$310.00 in dues donations were received. It was agreed that a \$500.00 donation be made to the earth sciences section of the San Bernardino County Museum, and that a donation be made to the PCC Van Amringe Memorial, honoring two outstanding MSSC contributors, Gus Meisner and Walt Margerum.

Bob Housley will obtain Marty Zinn's contact information for Geoff Caplette. Mr. Zinn may be interested in having MSSC members display gems and minerals at the West Coast shows.

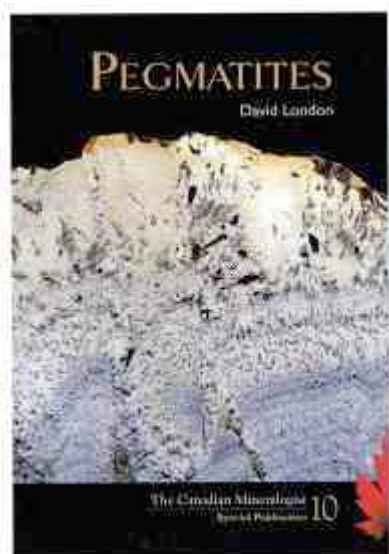
Jim Imai requests input and assistance from members regarding field trips. He has spent much time and effort scouting locations, but attendance has been discouragingly low. It may be advisable for the MSSC to keep an updated list of trips scheduled by other clubs, so that MSSC members can join in if they so choose.

It was proposed that meetings be put on webcam. All agreed to the proposal, and discussions will continue regarding the sourcing of the necessary equipment, and the identification of the individual to be in charge of the effort.

The meeting was brought to a close at 9:30 p.m.

Respectfully submitted, Pat Caplette, Secretary

BOOK REVIEW



PEGMATITES
by **David Manning**
Newcastle University

*Reprinted with permission from
Elements, Volume 4, page 356*

London, D. (2008) *Pegmatites*.
The Canadian Mineralogist
Special Publication 10, 347 pp,
ISBN 987-0-921294-47-4, US
\$125

Pegmatites are remarkable
rocks, and this is a remarkable
book. Almost everything one

could wish to know about pegmatites, their characteristics and their origin is contained in its pages. Thus, it provides readers from a very wide range of backgrounds and interests with an entry-level, a catch-up, or a state-of-the-art review about these fascinating rocks. It would also look good on a coffee table, with its large format and beautiful photographic illustrations.

David London, of the University of Oklahoma, has written a tour de force - a reflective analysis based on his over 30 years of experience working with pegmatites. The book combines and explains in depth field observations, mineralogy, geochemistry, experimental petrology and silicate science in the context of pegmatite science. Using this integrated approach and on the basis of substantial arguments, London proposes a new model for the formation of pegmatites, challenging the well-established Jahns and Burnham model. Hence the book is much more than a textbook; it is provocative and intends to stimulate future work on pegmatites.

The first half of the book is a primer on pegmatites, in which their field occurrence and mineralogy are described. The minerals in pegmatites are beautifully illustrated with the author's photographs of his mineral specimens. There are 24 full pages of photographs of minerals (three of feldspars alone), almost 10% of the book. For each mineral group, there is a useful systematic presentation of their occurrence, properties and uses.

The second half of the book covers the origin of pegmatites. It reviews the extensive experimental work that relates to pegmatite genesis, and it challenges the 50-year-old Jahns and Burnham model, which states that pegmatites form from an exsolved aqueous phase derived once late-stage granitic melts become water saturated. Instead, pegmatitic textures are proposed to originate from the very rapid crystallization, between 350 and 450°C, of late-stage melts enriched in fluxes and incompatible elements. The evidence to support this hypothesis (including the origin of graphic quartz-feldspar intergrowths through magmatic crystallization from highly viscous melts) is carefully and thoroughly discussed. Again challenging accepted wisdom, according to which large crystals grow slowly, the author presents strong evidence from many sources to demonstrate that pegmatite intrusions crystallize in days to a few years, even pegmatites with crystals tens of metres in length.

David London's authority to reflect upon pegmatites comes from his career at the forefront of research into the phenomena that characterize volatile-enriched granitic melts. Based on fundamental principles of mineral equilibria and melt-vapour-mineral interactions, his thesis takes shape in a logical and structured way. The discussion of how theories concerning the origin of pegmatites have developed is interwoven with the human dimension, addressing the characteristics and human failings (as well as the strengths) of influential individuals. Readers with an interest in the history of science will find these aspects of the book most rewarding.

When starting to review this book, I began at the back. Here, 800 references, mostly from peer-reviewed journals, are listed in 38 pages. At the front of the book, the author notes that he has included only reference to papers that he has actually read. Returning to the back, one of the most interesting chapters concerns what we know and don't know about pegmatites. London is keen to recruit disciples to the pegmatite faith, and in this chapter he highlights some of the key research that still needs to be done.

The book is easy to pick up and read on a selective basis. Each chapter starts with a short summary, which helps to make the book more easily accessible. Readers can embed themselves in the book with ease and, as long as they read the summaries, they can skip chapters that they consider low priority. The quality of the illustrations is one of the book's strengths, as is the provision of a CD-ROM that contains not only the figures (for teaching, research, outreach, etc.), but also a pdf of the chapters of the original Mineralogical Association of Canada Short Course Handbook on Granitic Pegmatites, edited by Peter Cerny and published in 1982.

The reader is drawn into the book. The photographs in the first half are seductive, and the second half exercises the reader intellectually through its use of phase diagrams, discussion of the kinetics of crystal growth, thermal modeling, etc. The wide range of techniques discussed in the context of pegmatite evolution makes this book ideal for teaching petrogenesis. The textures that are described are easily visible in the photographs (and can be scrutinized in more detail using the CD-ROM). Concepts that many students find difficult, such as phase diagrams, are explained clearly. By using this book, a student will become familiar with a range of transferable interpretative skills that can be used in the investigation of many igneous rock types. The pedagogic value of pegmatites for teaching and engagement is an important aspect of the book.

What is there to criticize? A number of minor points arise. The description of pegmatites in rocks that are not granitic is very limited, despite a substantial literature. The coverage of the book very much focuses on North American examples, and this means that the 'known knowns' section of the last chapter, which identifies pegmatites that are well studied, omits work on pegmatites in Europe and descriptions that are written in languages other than English. Also, it is disappointing that the book lacks an index (but it is so clearly structured that this is not a major problem). Perhaps the most irritating deficiency of the book is the way in which captions for the photographs of the mineral specimens overflow from one page to the next. It is hard to link the photograph with the caption in some cases.

The criticisms are minor and do not detract from the value of the book for anyone interested, in whatever way, in pegmatites. It is a 'must-buy' book for any igneous petrologist, challenging as it does much accepted wisdom in that field of geoscience.

Elements

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An institutional subscription is also available for \$150 a year. Contact your book agent or the managing editor at pierrette_tremblay@ete.inrs.ca

2009 Calendar of Events

April 3-5 2009, Bakersfield, CA San Joaquin Valley
Lapidary Society Kern County Fairgrounds 1142 South
P. Street - Corner S. P & Belle Terrace Hours: 9-5
Daily

April 3-5 2009, Vista, CA San Diego Co. Council of G&M
Societies The Tractor Museum 2040 N. Santa Fe Ave.
& Museum Way Hours: Fri. Noon-5; Sat. & Sun. 9-5

April 4-5: Maraposa, CA Maraposa Gem & Mineral Club
Maraposa County Fairgrounds Highway 49 (S. of
Historic Mariposa) Hours: Sat.10?; Sun.10?

April 11-12 2009, Paradise, CA Paradise Gem & Mineral club Paradise Elks Lodge 6309 Clark Road Hours: Sat. 10-5; Sun. 10-4 Website:

www.goldnuggetwebs.com/PGMC

April 18, Carlsbad, Seventh Annual Sinkankas Symposium on Spinel, by San Diego Mineral & Gem Society and Gemological Institute of America. Due to popular demand, contact Anne Schafer at (858) 586-1637 or for available seat.

April 17, 18, 19, 2009, San Jose, CA 54th Annual CFMS Show, Nature's Showcase Hosted by the Santa Clara Valley Gem & Mineral Society Santa Clara County Fairgrounds 334 Tully Road Hours: 10-5 Daily website: www.scvgms.org

April 18 - 19 2009, Lancaster, CA Antelope Valley Gem & Mineral club Lancaster High School 44701-32nd St. West Hours: 9-5 daily Website: www.geocities.com.av.gem

April 25 - 26 2009, Santa Cruz, CA Santa Cruz Mineral & Gem Society Santa Cruz Civic Auditorium Corner of Center St. & Church Hours: 10-5 daily

May 1-3 2009, Bishop, CA Lone Pine Gem & Mineral Society Tri County Fairgrounds Bishop Corner of Sierra St. & Fair Drive Hours: Fri. 6p.m.-10p.m.; Sat. 9:30-4; Sun. 10-3

May 2-3 2009, Anaheim, CA Searchers Gem & Mineral Society Brookhurst Community Center 2271 West Crescent Ave. Hours: Sat. 10-5; Sun. 10-4:30

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