

The Opal Express

American Opal Society
P.O. Box 4875
Garden Grove, CA 92842-4875

Volume #36 Issue #04
April 2003

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TO:

Important Dates:

Board Meeting: April 3
7:00 PM at Ball Jr. High School

General Meeting: April 10
Bob Halahan will share his insights on:
"What Goes on Inside an Opal"

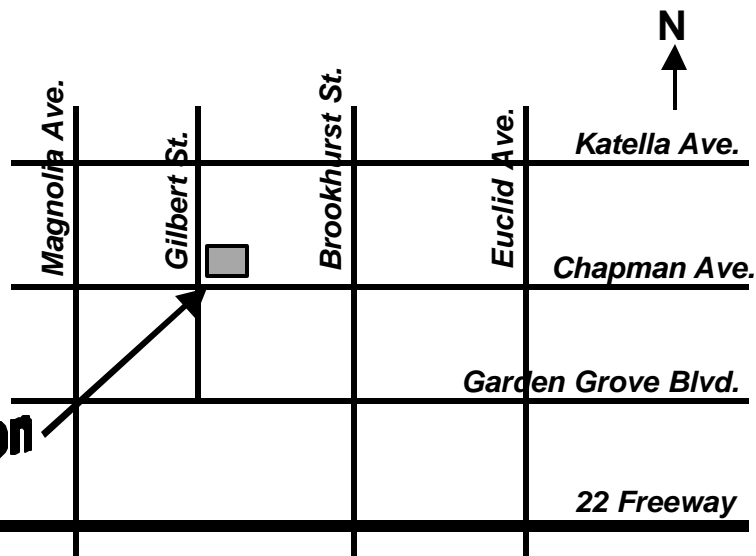
— GENERAL MEETINGS —

2nd Thursday of the Month
7:00 pm - 9:00 PM
Garden Grove Civic Women's Club
9501 Chapman Ave.
(NE corner of Gilbert & Chapman)
Garden Grove, CA

MEETING ACTIVITIES

Opal Cutting Advice Guest Speakers
Slide Shows Videos Other Activities

Meeting Location



The American Opal Society
<http://opalsociety.org>



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Editor-Jim Pisani

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Article Deadline is the 20th of the month prior to each issue

Are Your Dues Due Now?

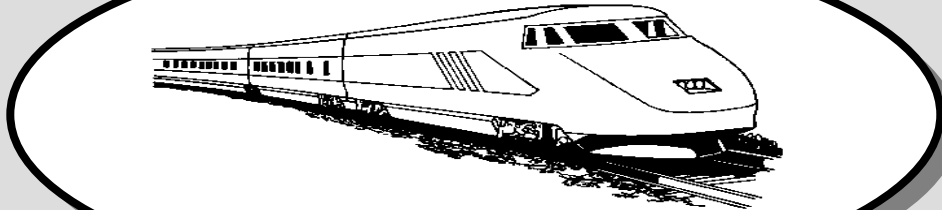
PLEASE CHECK YOUR ADDRESS LABEL. If your label shows the current month/year your dues are DUE NOW. If the date is older, your dues are overdue.

A Renewal Grace Period of two months will be provided. If your dues are due now you will receive two additional issues of the newsletter. Please note, however, that as the system is now set up, if your renewal is not received you will be AUTOMATICALLY dropped from membership thereafter. It is your responsibility to assure your dues are current.

Thank you,
The Editor

The Opal Express

Published monthly by
The
American
Opal
Society



April 2003

Volume 36 Issue 4

PRESIDENT'S MESSAGE

By Pete Goetz

Hi Folks,

Jim Pisani and I took a trip out to Stoddard Wells last week to have a little look-see. Rained off and on the way up, but it wasn't raining when we got to the Tailgate. About two-thirds of the way through, the rains came. Made for some possible rainy-day deals? On the way back we got caught behind a big car crash. Took us several hours to get out of where ever we were. The geology and good conversion made up for the inconvenience.

Last month's meeting wound up being a good "social hour," with lots of conversation covering a potpourri of topics. Our general meeting attendance has been a little light. I would like to encourage our local membership to participate in the monthly meeting. An organization's strength lies in its active membership. So... come on down, and join your fellow members in the enjoyment of OPAL.

Looks like we will get the "workshop" up and running this month. Stan McCall has agreed to continue our workshop on a rotating weekly basis.

I look forward to our round table discussion with Bob Halahan this month on healing opal. Don't miss this interesting discussion.

Board of Directors Meeting Minutes - March 2003

- The move to Ball Junior High School with for the AOS workshop is almost complete. Stan McCall has again agreed to run the workshops in the evenings. Future workshop schedules will be announced in the newsletter.
- The AOS Library has to be moved from the Garden Grove Civic Women's Club by their direction. The new workshop at Ball Junior High School will be the new location for the library.
- The Board of Directors is looking for volunteers to find

speakers for our monthly meetings. If anyone is interested, please contact a board member.

- Pete Goetz suggested that we have a talk on some aspect of opal given by one of our expert members each month. This would provide a way of educating our members with some of the excellent knowledge that has accumulated in the Society.
- Jim Pisani will send out renewal notices to those members that have had their memberships expired.

April Meeting Agenda

Bob Halahan will share his insights on "What Goes on Inside an Opal" at the April 10, 2003 Meeting in a round table discussion.

Bob and his brother Mike have been experimenting for some time on healing cracks in opal and have achieved some amazing results. In addition they have been experimenting on sealing and setting the structure on British Columbia hydrophane opal and Andamooka matrix. By successive treatments they can improve the fire in certain opals. In some cases opal that had only blue and green fire were changed to red fire by their treatments.

They have also investigated opal memory, where with controlled heat they could change the structure opal and with successive treatments bring it back to its original state.

Bob is an innovative person, who by thinking beyond normal limits and expectations has been able to achieve some remarkable results in his experimentation on opals. We look forward to hearing his comments and seeing the results of some of his experiments at our April meeting.

ITEM: The GIA Museum Display - The Opals And Dinosaurs Exhibit - will end Mid-May, 2003. It is located in the S. Tasaki Student Lecture and Graduation Hall, GIA Headquarters, Carlsbad, CA.

Hours: 9 AM to 4 PM Mon. thru Fri. except for holidays.

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April Snippets

By Barb Whyre

A recent old timer to *visit the Ridge* is Barney Nolan, son of Patrick, who grew up and worked on Dunumbral Run 1920-1939, where opal was found near the tank in Wallangilla Paddock, 1900. Today, the most western 9000 acres are part of Baroona Station, bordering onto Lightning Ridge.

Barney's father had a claim on Pony Fence opalfield in the early 1920s, and was offered £500 for the only significant opal he mined. His wife sold it during WWII for £25!

In earlier years, the track (15 gates!) from the village of Collarenebri to the east came through Dunumbral to the opalfields. A Chinese gardener had a healthy plot near the Nolan cottage, and miners came across to buy fresh produce.

Although Barney didn't mine himself, he knew Lightning Ridge and its people well. Most miners were shearers or worked on the land. It was a colorful life - drain delving, tank sinking, horse breaking and droving sheep and cattle.

The Nolans were a large family. Barney had four uncles and lots of cousins, all well known in Walgett Shire. Father Paddy's stock horses from Dunumbral were sought after for their good training.

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Donation to AOS Collection of Opal Samples

By Mike Kowalsky

Rena Schmidt has donated a very large and beautiful sample of Arizona Opal to the AOS collection.

Rena had called me and said she wanted to see me in Tucson as she had something very beautiful for me. I told her about the opal seminar that I was going to be presenting at. I was very please to see her arrive at the seminar looking as if she stepped out of a society page, very tastefully and exquisitely dressed. We were able to talk for a little while and she presented me with this large sample of blue Arizona Opal that has very strong fire over all of the face. I'm sure that it was one of her prize personal possessions. It certainly is the largest specimen of blue Arizona Opal, with fire across the entire polished face, that I have ever seen. The American Opal Society will be proud to display it in our showcase that contains opal from the Americas and display her name as the donor of the specimen. Thank you very much for your generosity Rena.

Claudia and A J. Couture have donated two outstanding specimens of pink base opal from the Spencer Opal Mine in Spencer, Idaho for the American Opal Society Collection.

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Bob Dixon and I had made the long trip to Spencer Idaho in August 2002. It was one of the most memorable trips I have made in a long time. Perhaps the memory persists because of the hospitality and warmth that Claudia, A. J. and her Dad, Mark Stettler showed us during our visit to the Spencer area. Our tour of the mining area was far beyond our best expectations. It was outstanding because of A.J.'s narration but also because we were not expecting a tour as there was mining going on. They actually shut down the mining activity to give us a tour. A.J. sent along the digging dates for the 2003 season. Since Bob and I enjoyed the trip so much we/I are considering trying to put together a field trip for AOS members to meet at Spencer during one of the digging dates. They are: May 24, 26, 27; June 14, 15; July 4,5,6; August 9,10, 11 and Aug 30th and Sept 1st. Please let the AOS Board of Directors know if any of you might be interested in one of these dates. I would suggest considering one of the August dates but earlier ones can be planned.

Thank you very much for the two outstanding specimens. I know we didn't see any specimens of this quality in the pink base during our visit in 2002. I can see that you have excavated into a very good pink base opal area. The American Opal Society will be proud to display these exception samples of pink-based opal from the Spencer Mines in our case of Opal from the Americas. Thank you again for your generous donations.

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Handy Hints

To clean silver, add a handful each of salt and soda to an aluminum bucket. Add silver. In a few minutes the silver will be like new. If you only have a plastic bucket, add a piece of aluminum foil. When working with a soft stone such as alabaster, marble, onyx or Petoskey stone, soak the stone in water a day or two before cutting it in oil. The oil will not soak in and when polishing it later, a better finish will result.

(Via: Cabber Gabber) *Via Rockwood Rockhound News 11/02*

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Strange Mineral Tales

A long time ago if you wanted a candle, you went to a beekeeper. His wax and your wick made a candle. In modern times candles are mass-produced from paraffin, which is a commercially refined product of petroleum. What is not widely known is that wax can also be mined! There are very few places where wax has been mined on a commercial basis because of the quantities available. A location in Austria was the only place where wax was being mined in this century until a discovery was made at Soldier Summit, Utah.

The wax is related to petroleum and is called ozokerite. It is apparently a high quality form of natural paraffin, developed from the residue of crude oil percolating through fissures in rocks. Compared to beeswax and man-made paraffin, its melting point is much greater (between 155 and 190 degrees.)

Ozokerite was sometimes found in large veins that were almost 100% pure. The majority, however, is found in a brecciated form bound up with sandstone and shale. Once mined, it must be crushed, then dumped into tanks of boiling water where the wax is skimmed and poured into molds. The "wax belt" of ozokerite covers an area of about 12 miles in Utah. Large tailing piles from the mining operation of the American Ozokerite Co. are strewn alongside U.S. 50 near Soldier Summit. (Via *The Glacial Drifter*, from the *Rockwood Rockhound News* 10/02)

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Blast from the Past

I'm presenting something new this issue - excerpts from the AOS Archives. John Hall wrote this to letter another member named Jim (not me!) back in 1976. John kindly sent me this when going through some old papers. John is still an active member of the Society and resides in Ruidoso, New Mexico. - The Editor

Dear Jim: March 31, 1976

In my continuing research on the background of Opal, I presently have at hand "A Roman Book on Precious Stones" by Sidney H. Ball taken from an Old English translation in 1601 by Dr. Philemon Holland M.D. of the original 37th volume of "The History of the World" commonly called "Natural History of C. Plinius Secundus".

Pliny the Elder (23 to 79 A.D.) was a prolific researcher and author. He made copious notes from 2000 books of his time for his Natural History.

Now quoting Mr. Ball (whose book, incidentally, was published by the Gemological Institute of America in 1950): "His (Pliny's) style is usually prosaic, but he occasionally becomes a poet, as when he when he describes the opal."

The following is quoted directly from the translation.

"The 37th Book of Pliny the Elder"

Chapter XXI

Opal and Its Subspecies

The gem called *Opalus* (opal) differs but little or not at all from the *beryllus*; and yet opalus is something entirely different; nor is there a precious stone more admired than it is unless it is the *smarsgalus* (emerald). The land of India is then only producer of this gem. Lovers of precious stones and writers of books on precious stones have called opalus the most valuable of all precious stones, largely because of the difficulty of determining and knowing how to describe it; for in the opalus you will see the refulgent fire of the *carbunculus* (garnet), the glorious purple of the *amethystos* (amethyst), the sea green of the *smaragdus* (emerald), and all the colors glittering together mixed in an incredible way. Some *opali* carry such a play within them that they equal the deepest and richest colors of painters. Others again simulate the flaming fire of burning sulfur, yet, and even the bright blaze of burning oil. The opalus is ordinarily as

big as a filbert nut. (*The filbert nut in size is equal to a 3 to 10 carat opal.*)

And now for a story regarding this gem, worth repeating: for there is to be seen today the stone for which Marcus Antonius proscribed and outlawed Nonius, a Roman senator, the son of Struma Nonius who so got into the hair of Catullus, the poet, because he sat in the stately ivory curable chair; and the grandfather of that Servilius Nonianus who was consul in my lifetime. Now this senator, when he was forced to flee, being proscribed, took with him of all his goods only a single ring set with an *Opalus*, which is a well-known fact, had been valued at 2,000,000 Sislertii.

But as the cruel and uncontrollable greed of Antonius (who solely for a jewel outlawed and banished a Roman Senator) was astounded on the one hand, so on the other was the childishness and the incorrigible obstinacy of Nonius, strange. For he so loved the gem, which caused his proscription that rather than part with it, he permitted himself to be turned out of house, home and country. In truth, wild beasts are wiser than he, for they bit off parts of their bodies and leave them behind for the hunters, when they see themselves in danger of death."

Sincerely, John Hall

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Quartz Family Seminar

Hosted by the San Diego Gem and Mineral Society, Inc.

Dedicated to long-time member John Sinkankas

Date: Saturday, April 12, 2003

Location: GIA Headquarters, The Robert Mouawad Campus

5345 Armada Drive, Carlsbad, California 92008

Second Floor Conference Center

(Above library and museum main entrance)

Time: 9 a.m. to 4 p.m.

SDMG will host a one-day seminar on quartz. Talks on quartz will be given by Si Fraiser, John Koivula, John Stockwell, Walton Wright, Cal Graeber, Dave Hignett, and Rainer Hoffmann. Presentations will cover a wide range of topics and levels, suitable to novices as well as experts in gems and minerals. The topics include: theories on the formation of agates and thundereggs, inclusions in agates and crystalline quartz, new finds in the agate fields of northern Mexico, identification of petrified woods, and agates from Germany. This will be a casual event, and questions and discussions are encouraged. Please bring in specimens from unknown locations or with unusual inclusions or phenomena. In addition to talks, there will be display tables of various quartz varieties, books on quartz, and hand-painted pictorials and hands-on determination of whether a crystal is right- or left-handed.

Cost will be \$35 in advance, payable to SDMG. The Society encourages pre-enrollment at the Gem Diego Show on March 29 and 30, 2003, at Al Bahr Shrine Center, 5440 Kearny Mesa Rd, in San Diego (just west of Hwy. 163 at the Clairmont Mesa Blvd. exit, behind the Hampton Inn). The show is open from 9:30 a.m. to 5 p.m. on Saturday, and from 10 a.m. to 4 p.m. on Sunday. Alternatively, checks may be made out to SDMG and mailed to the Society Vice-President:

Anne Schafer, 8473 Hydra Lane, San Diego, CA 92126-1854. Checks must be received by Tuesday, April 8. Registration at the door on April 12 at GIA will be \$45. Please be advised that there is a limit of 175 attendees, so there may not be day of event registration.

Coffee and donuts will be provided in the morning, and sandwiches and drinks will be served at lunch, all of which are covered by the registration fee.

For further information, please contact the event organizer, Mr. Roger Merk, at (619) 281-1032 or merksjade@cox.net alter March 29.

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Opal and Hyalite

I found this thread from the Yahoo Egroup Minerals & Mineralogy Australia & New Zealand (<http://groups.yahoo.com/group/eminerals>). This thread ties into the previous month's article on man-made opal. - The Editor
From 10/17/02 to 10/20/02

From: Steve Sorrell

Hi all

Reading a paper tonight on the nomenclature of the forms of crystalline and non-crystalline silica (Deane K. Smith, Prof. of Mineralogy, Penn State University).

He describes different phases of opal, "opal-Ag" (with g as a subscript to indicate that the structure is gel-like), and "opal-An" (with n as a subscript to imply a network-like structure similar to silica glass).

Precious opal and potch fall into the first category, with the "spheres" of silica gel.

Hyalite is placed in the second group as it doesn't contain separate gel spheres but does contain water, which differentiates it from a silica glass.

As it is a naturally occurring substance, presumably with a similar xray pattern to the other opal category, but with a very different structure, what stops it from being a separate species and not just a "variety"?

Regards Steve

From: Gabrielle Harrison & Paul van den Bergen

I don't know if this answers your question, but the images I have seen of opal from a CSIRO report several years ago (and I am going from memory here with a few glasses of wine under my belt) were that the spheres of hydrated silica where spherulites (sp?) - i.e. had internal molecular organisation, with the emphasis on radial rather than circumferential order. Surrounding this was the 'matrix' material, essentially amorphous hydrated silica. The degree of order of the spheres (dependant on the uniformity of size and packing regularity) gave rise, via an IR difference between the ordered and amorphous hydrated silica, to the play of colour.

Might one suggest that the difference between opal and hyalite may lie in the microstructure of the amorphous to semi-amorphous (since order is a continuum) hydrated silica? Hyalite is essentially amorphous; opal is a composite of amorphous and (partially) ordered material.

Even so, I do agree with the original thesis. There may indeed be enough difference to define species. Or perhaps opal is not a mineral but a rock type... :) Of course, it is unclear to me that hyalite does not also typically contain spherulites that are too small or too few to perturb visible light.

Paul van den Bergen

Gabrielle Harrison

848 High Street Rd, Glen Waverley VIC 3150 Australia

gabpaul@m... ph/fax. +613 9886 3160

From: annwb2@a...

I thought the IMA has put a permanent moratorium on naming "amorphous" substances. As opal and hyalite were long ago regarded as "identical", a new proposal would be required to generate a species. However, I not sure that being able to distinguish a difference makes hyalite much different from opal. While there are opals which have tridymite, cristobalite, or both as a constituents(s). Better cases could be made to elevate

polytypes to species, as they once were, but the IMA now precludes them from species status. Hence, both muscovite-1M and hyalite are still varieties. The reluctance to make everything a species is a wise choice. Certainly there is a visible distinction between gypsum, alabaster and selenite (when properly used), but not a difference - as the lawyers are fond of saying.

Van

From: mineral@g...

For those of you interested in the mineralogy of opal and in particular precious opal there is a very good article that has just been published in 'The Australian Gemmologist' journal. The article has been reprinted on the AG website. It describes how a group of Russian researchers have managed to synthesise precious opal with a very high degree of accuracy. From their results and photographs they appear to have cracked any remaining questions as to how and why these opals occur. From the descriptions I guess it will make the job of the professional gemmologist and valuer just that much more difficult to identify real from fake/synthetic!

Reference: <http://www.austgem.gil.com.au>, Important Papers: "Some Aspects of Precious Opal Synthesis", S.V. Filin, A.I. Puzynin, V.N. Samoilov Scientific Center for Applied Research, Dubna, JINR, Russia

Regards,

Tony Forsyth - Minsoc Qld

From: Rod Martin <pincha@i...>

Hi Steve I've found that paper in conjunction with a second one he wrote to be good guides to silica species - * Deane K. Smith - Evaluation of the detectability and quantification of respirable crystalline silica by Xray powder diffraction methods (2000) Powder Diffraction Journal

<<http://www.icdd.com/products/journals.htm>>

I believe that the preferred term for opal is now "X-ray indifferent" rather than amorphous as you can quantify the change in crystallinity by the size, shape and movement of the 4Å reflection (cf hump).

There are various papers around detailing the progression from "X-ray indifferent" opal-A through opal-C, opal-CT and finally to Quartz, based on combinations of time, temperature and pressure(?).

But, I would mention that there is some historic opaline silica that has still not changed to quartz after some considerable length of time and exactly where precious opal (opal-Ag) fits into the scheme of things I'm not sure (will all our opals turn into quartz in the next few thousand or million years?).

NB Thanks Tony for the link to "The Australian Gemmologist"

<http://www.austgem.gil.com.au/>

Regards Rod --

<http://homepages.ihug.co.nz/pincha/HOMEPAGE.htm>

"Geology is a capital science to begin with as it requires nothing but a little reading, thinking and hammering." Charles Darwin, 1835

From: "Alan Swatland" <alrob@p...>

Dear Group, What is the Origin of Hyalite? For example, I have a specimen of Hyalite on a peice of very vesicular mafic basalt.

Regards Alan S

From: annwb2@a...

Glad to know about the latest research. I had never heard that quartz had been found in any opal, anywhere in the world. Did they give locations? I would suspect that any quartz in opal guise would have been a pseudomorph after tridymite or cristobalite-bearing opal.

Thanks.

Van

From: "barry.middleton" <barry.middleton@p...>
Opal. SiO₂nH₂O Amorphous. Opal is a hydrous submicrocrystalline form of cristobalite and a subsidiary of quartz.

From: annwb2@a...
You're right. As far as I know, opal has never contained the mineral quartz, it does contain silica and polymorphs of quartz, however. Opal doesn't contain silhydrite, as far as I know either.
Van

From: "Ralph Bottrill" <rbottrill@m...>
Hyalite differs from other opals in being formed by vapor-phase chemical transport, accounting for it being usually formed in volcanic rocks. It is still chemically and structurally closely related to opal-Ag and silica glass, so it cannot be considered a new mineral (although it is structurally distinct from opal-C and opal-CT). There is also the problem mentioned by Van, that the IMA-CNMMN do not like amorphous minerals, as there is no definite crystal structure and they could be mixtures, and this is certainly the case for opal (more like a rock, as stated by others). Opal, as Rod noted, can change structure over time or with heating etc., apparently eventually forming quartz (although heating opal forms cristobalite). As I recall diagenetic opal is common in many sediments but becomes rarer with age and is almost unknown past the Cretaceous or so(?). However it is rare to see intermediate mixtures of opal and quartz in chert or chalcedony - or maybe we just ignore the amorphous background material when we see something crystalline on our XRD traces?
Ralph

From: minerals of OZ <magnetstogo@y...>
I have had specimens of opal in quartz from Andamooka, S.A. but never the other way round. I may still have a small piece somewhere.
Gus.

From: Dr. Walter S. Bowser <geologo@e...>
Is it possible that opal filled a cavity in which quartz had been growing?

From: John Carroll <jczebra@y...>
Possibly what Gus had was opal filling cracks in quartz pebbles, or coating quartz pebbles, as the occurrence is sedimentary. Another occurrence of opal in fractures is in quartzite - known in the trade as "Painted Ladies".

From: annwb2@a...
Dear Gus,
Thank you for the information. Quartz can coexist with opal in many places. My comment was that no opal has ever been shown to be quartz. Sorry for the imprecision of my words. For many years, late 19th century to 1950's, the mineral collector's literature occasionally had the erroneous conclusion that opal was fine-grained quartz. This was partly due to an effort to simplify mineralogy for the beginning collector. The analogy was made that opal was essentially quartz plus water and the problem perpetuated itself.
Van

From: minerals of OZ <magnetstogo@y...>
I'm going to have to find the opal in quartz, if I still have it, and also put some photos of the 'Painted Ladies' alongside. The opal in fillings in 'Painted Ladies' are obviously in cracks and fractures in the quartzite. Interestingly, there were so many

'Painted Ladies' found that one has to wonder at how much activity occurred for so many quartzite boulders to become cracked and crazed in the conglomerate mix which occurs in the opal level at Andamooka. The quartz with the opal had both cracks and cavities filled with precious opal. I only ever saw the one batch of this material.
Gus.

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DID YOU KNOW?...

During the Upper Pliocene Epoch, 5 to 7 million years ago, the Los Angeles Basin was mostly under water. Some islands protruded above the shallow bay, such as areas that we now know as the Palos Verdes Hills, Beverly Hills, Baldwin Hills and Signal Hill. Bay waters supported a varied marine life, including many mollusks. Shells of these early mollusks can still be found throughout the Basin, if you know where to look.

As the bay receded millions of years ago, shells along the water's edge were covered with soil and gravel debris, which was carried down mountains by rainstorms and landslides caused by earthquakes. This material of shells and debris was cemented together through a limestone process over millions of years, into beads of rock filled with fossils shells. You need to know where to look for exposed remnants of these ancient fossil beds in the Los Angeles Basin.

Major fossil beds have been discovered in downtown Los Angeles in excavations as deep as 80 feet below street level during foundation diggings for high-rise buildings. One such bed was unearthed in 1969 during construction of multi-story buildings at Sixth and Flower Streets. A paleontologist retrieved tons of "fossil stone" from the excavation site. Much of the material was turned into highly polished tabletops, bookends and other objects. Very little rough material remained.

A specimen of rough material from this site will be on display during the 2001 CFMS Show in Paso Robles, June 22-24. Attend the show and view this remnant of an ancient marine environment. It is a part of California's natural history you won't want to miss.

From Bea and Sherm Griselle, Santa Lucia Rockhounds via CFMS Newsletter 1/01

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Synthetic Opals Are Not Imitation, Naturally

By Victoria Gomelsky

Minneapolis (March 15, 2001) - In early March, federal authorities in Minneapolis arrested an Australian man on charges of selling more than \$2 million worth of imitation opals that he claimed were rare, natural specimens from Down Under. According to a criminal complaint, Robert John Kane sold his victims more than 50 nationwide jewelry distributors rights to territories along with an inventory of "fake" opals through newspaper ads that promised profit margins between \$324,000 and \$810,000 per year.

The opal scam, which evokes age-old swindles like selling low-cost beachfront property in Montana, is a typical example of how an unscrupulous person might take advantage of a gullible gemstone buyer, say reputable opal dealers. But far more problematic is the industry-wide confusion surrounding what constitutes an imitation opal versus a synthetic opal.

"This is a very difficult area in terms of definition," said Kenneth Scarratt, lab director of the AGTA's Gemological Testing Center. "There are synthetic opals out there and there are imitation opals with close properties to synthetics."

The issue boils down to marketing terminology. A synthetic stone has "virtually identical physical, chemical and optical properties to its naturally occurring counterpart," says Gerry Manning of Manning International, the oldest opal dealer in the country. "In other words, a synthetic gemstone is almost identical to a natural

gemstone of the same type, but for the fact that it is made in the laboratory and not in the earth."

But with opals, it's not unusual to find synthetics that contain a high plastic content, so much so that they display different chemical and physical properties from their lab-grown counterparts. These gems are probably closer to being classed as simulants, or imitation opals, because they will not meet the FTC's strict requirements for labeling something a synthetic. Trouble is, without an in-depth laboratory analysis, many buyers will find it very difficult to identify these pseudo-synthetics.

"Any lab that gives a cursory examination and calls something a synthetic without actually looking at its molecular structure is doing a major disservice to the industry," said Manning. "Empirical testing has great limits. It does not yield the info necessary to determine if something has plastic or a super-silica product."

Manning said the problem has been worsened by the popularity of marketing gemstones on television, where "an unnatural demand has created an unnatural supply." While exact numbers are impossible to pin down, industry sources say there are far more natural and imitation opals in the marketplace than true synthetics, which are produced by only a handful of reputable companies, including Gilson and Inamore, both based in Japan. "The imitation synthesis of opal-there are no bounds to its production," said Scarratt. "You can go on producing it forever. The volume is as large as you want to make it."

So how can you protect yourself from being duped into buying imitations that are passed off as synthetic, or even natural, opals? If you're not willing to go through analysis to get yourself a comprehensive lab report, use the following guidelines:

- Look for the telltale "lizard-skin" or "chicken-wire" patterns on the opal to determine whether it's been manufactured in a lab.
- The easiest way to determine origin is by price. "If it's too cheap, it's got to be imitation," said Manning. Simulated opal is generally about 100 to 1,000 times cheaper than comparable color and quality natural material, while a true synthetic sells for about 10 to 100 times less than natural. (Kane paid between 50 cents and \$1.50 per carat for his opals.)
- "If it's sticky to the touch, that's another indication that it's an imitation," said Manning.
- Try this experiment: Hold the sample in a pair of tweezers and light a match under it for about 20 seconds. "If it carbonizes quickly, that will indicate a high content of resins," said Manning. "Hold it longer and if you get an odor, that will indicate that it's glued"-and therefore imitation.

From the National-Jeweler.com. Reprinted for educational purposes under the "fair use" provision of the U.S. Copyright Act.

Oh, Those Calcite Eyes

By Gary Raham

Calcite (CaCO₃) breaks the rule that something beautiful must be delicate and uncommon. Builders create monuments from limestone and marble. Sea creatures build sturdy shells out of the stuff. Cave explorers risk their lives to see it in the form of stalagmites and stalactites. Rockhounds admire its rhomboid crystal shapes--either clear, milky, or with a host of colorful impurities. But only one group of creatures has ever used it as building material for their eyes: my favorite Paleozoic bugs, the trilobites.

The animal origin of eyes is lost in deep time, before animals learned to use calcium carbonate to make their shells. Over 500 million years ago trilobite eyes existed fully formed and complex. Their mysterious stare from ancient seabeds may be one of their most appealing features.

The simplest kind of trilobite eyes (called holochroal eyes) consisted of hundreds or even thousands of calcite crystals packed together in hexagonal arrays. The individual crystals, a few tens of thousandths of a millimeter across, resemble the modern, faceted eyes of insects and some other arthropods. Functionally, they may have operated in a similar way, with a receptor at the base of each crystal that would send a message to the brain when stimulated by light. Eyes of this sort may have given their owners a "grainy" sort of image and most certainly would have been good at detecting motion in their environment.

The key to using calcite as an eye is aligning the crystal so that the c-axis--the crystallographic axis--is parallel to the incoming light. Light entering the crystal from the sides is either split, forming double images, or internally reflected in the crystal.

Euan Clarkson from the University of Edinburgh measured the field of few of many trilobites by extending the c-axis of each crystal lens. Not too surprisingly, most trilobites saw best to either side, straight ahead, and a little backward. This is consistent with a creature spending its life crawling in the mud at the bottom of the ocean. It could detect its enemies and find food.

A few species had large, wrap-around eyes and a nearly 360 degree field of view. These were the trilobite species that were most likely active swimmers and had to see in all directions to survive.

Phacops rana and other trilobites had a more complex and impressive eye called a schizochroal eye. A Phacops eye looks like a regular arrangement of ball bearings set in individual bowls. The "ball bearings" are tiny marbles of pure, clear calcite. If you were to look through such a marble, however, you would see an inverted and very distorted image.

In 1972, Kenneth M. Towe at the Smithsonian Museum was able to take photographs through a schizochroal trilobite eye. He got very passable images of the FBI building and a smiley face button! How was that possible?

Mr. Towe and Riccardo Levi-Setti, a nuclear physicist at the University of Chicago and a trilobite enthusiast, were able to show that the schizochroal eye was actually made up of two portions: a nearly pure calcite sphere and a bowl portion that contained enough magnesium atom impurities to change the refractive index of the calcite so that incoming light beams were bent to a common focus. In essence, trilobites invented the "doublet" lens about 400 million years before Christian Huygens and Rene Descarte discovered it in the 17th century.

Whatever useful and beautiful things we may create from calcite, trilobites used it first to fashion their elegant and highly functional eyes.

From the Ft. Collins Rockhounds "The Lodestone", 2/2001

Cleavage In Crystals

by Ruby Lingelbach

Crystal cleavage is a deeper subject than most people think. It is also one of the first things to look for when identifying a mineral.

Cleavage in a mineral is when it breaks along definite planes when it is hit sharply with an object, such as a hammer. The cleavage plane occurs where the atomic structure in the crystal is the weakest. The direction of the cleavage plane is always parallel to a possible crystal face. The ease with which a mineral cleaves is said to be "eminent" or "perfect" if the cleavage surface is very smooth and it cleaves readily. "Good cleavage" has surfaces that are not quite so smooth. "Poor" and "imperfect" are even less smooth and the crystal does not cleave so readily.

Some minerals have one cleavage plane, others have two or more. Mica has one perfect cleavage plane, which gave it the

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chance to become windows in early day cars, buggies, or in fancy woodstoves because it cleaved off into large thin sheets. A piece of mica showing the cleavage planes is called a "book" of mica. Mica cleaves so well that any other mineral forming thin, flat, and easily separated sheets is said to have a micaceous habit.

Selenite crystals are the crystal form of gypsum. Selenite has three cleavage planes, but only one is perfect. This is why a lot of your selenite crystals splinter off lengthwise if you are not careful.

Calcite has perfect cleavage in three directions, making a rhombohedron form. This particular cleavage brought about the first speculation regarding the internal structure of crystals. In *Minerals and Man* by Cornelius S. Hurlbut, Jr., we read, "In 1782, Rene Just Hauy, a Professor at the University of Paris, was horrified when a friend accidentally shattered a prized calcite crystal by dropping it on the floor. However, the accident had its rewarding side, for Hauy noted that both large and small fragments had the same shape. He suggested that the cleavage rhombohedron is the primitive form out of which all calcite crystals are built."

Galena and halite (salt) both have three-directional, perfect cleavages. Fluorite has a perfect cleavage showing four cleavage planes. Topaz has perfect basal cleavage, which helps distinguish it from quartz. Quartz has an indistinct cleavage, but sometimes the cleavage planes can be observed in a clear crystal as the little "rainbows" or layers of tiny, lustrous surfaces.

Cleavage is the culprit in many a faceter's difficulties. Diamond is very hard, but a stone can be made worthless by a misjudgment of where the perfect octahedral planes are located. Stones like topaz, with its basal plane cleavage, can cause problems. In order to overcome this, it is necessary to facet the stone so that the table is tilted a few degrees off the cleavage direction. It is also often difficult to obtain a good polish if a facet is oriented parallel to a cleavage direction.

Sources used:

- Encyclopedia of Minerals and Gemstones*, edited by Michael O'Donoghue
- Dana's Manual of Mineralogy*, 28th Edition, updated by Cornelius S. Hurlbut, Jr.
- Minerals of the World*, by Charles A. Sorrel
- Field Guide to Rocks and Minerals*, 3rd Edition, by Frederick H. Pough
- The Audubon Society Field Guide to North American Rocks and Minerals*, edited by Charles W. Chestnennan
- The World of Rocks and Minerals*, by Benjamin M. Shaub (from *The Rockhound Gazette*, 4/02)

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WINKEN, BLINKEN, and POOF! A PLANET?

A young star in a faraway galaxy winks in a unique regular pattern. Scientists are trying to read the winks, which change in

intensity every 18 days—too long for the cause to be an ordinary eclipse.

It appears that the blinks are caused by waves of dust, rocks, and possibly larger objects that swirl about the sun-like star in a broad disk. This is the stuff out of which planets are made, and these unique eclipses could reveal the dynamics of planet evolution on time scales of weeks and months, not millions of years.

(Summarized from *San Jose Mercury News* 6/20/02 by Breccia, in *Breccia* 8/02)

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GEOLOGY OBSESSION: You judge a restaurant by the type of decorative building stone they use rather than by their food.

(From *The Pegmatite* – 11-2002)

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April Gem & Mineral Shows

Apr. 4-6, Santa Monica, CA - Gem & Jewelry Show, Inc. Santa Monica Civic Auditorium. 4th, 12-7; 5th, 10-6; 6th, 11-5. 301-294-1640, fax 301-294-0034, www.intergem.net.

Apr. 4-6, Eureka, CA - 2nd Annual Lost Coast Jewelry, Gem, Bead, & Mineral Show. Redwood Acres Fairgrounds, 3750 Harris St. 4th, noon-7; 5th, 10-7; 6th, 10-5. 707-839-1358, kaseyent@jps.net.

Apr. 5-6, Angels Camp, CA - Calaveras Gem & Mineral Society, Inc. 27th Annual Show. Exhibits of Natural Wonders. Calaveras County Fairgrounds. 5th, 10-5; 6th, 10-4. Earl Klein, 510-632-9373.

Apr. 5-6, Mariposa, CA - 3rd Annual Mariposa Mineral & Gem Show. The California State Mining and Mineral Museum. Mariposa Fairgrounds. 5th, 10-5; 6th, 10-4. 209-742-7625, mineralmuseum@sierratel.com.

Apr. 5-6, Hacienda Heights, CA - Magic in Rocks Gem & Mineral Show. Puente Hills Gem & Mineral Club. Steinmetz County Park, 1545 S. Stimson Ave. 10-5 daily. Bob Hess, rpsthes@earthlink.net, www.puentehillsgemandmineralclub.com.

Apr. 12-13, Boron, CA - Mojave Mineralogical Society, Inc. 45th Annual Boron Rock Bonanza. Boron High School, 26831 Prospect, 93516. 12th, 9-7; 13th, 9-4. David Eyre, 760-762-6861, david_eyre@mail.com.

Apr. 12-13, Portland, ME - Maine Mineralogical & Geological Society. 20th Annual Rock & Mineral Show. Finley Gym, 716 Stevens Ave. 10-5 daily. Wes Baker, 207-784-1738, wesbton@adelphia.net.

Apr. 12-13, Springfield, OR - Springfield Thunderegg Rock Club. 45th Annual Rock & Gem Show. Gateway Mall, 3000 Gateway St. 12th, 10-9; 13th, 11-6. Peg Burdge, 541-736-1699, fax 541-736-1701.

Apr. 17-20, Alpine, TX - 14th Annual Texas Big Bend Gem & Mineral Show. Alpine Civic Center. Donna Trammell, 915-837-5353, ocotillo@overland.net.

Apr. 25-27, Grants Pass, OR - Rogue Gem & Mineral Club. 18th Annual Gem & Mineral Show. 1451 Fairgrounds Rd. 25th, 9-4; 26th, 10-5; 27th, 10-4. Susan Brown, 541-476-8299, sbrown@internetcds.com.

Apr. 25-27, San Diego, CA - Gem Faire. Scottish Rite Center, 1895 Camino del Rio South. 25th, noon-7; 26th, 10-7; 27th, 10-5. All Van Volkinburgh, 760-747-9215, gemfaire@aol.com, www.gemfaire.com.

Apr. 25-27, Denver, CO - Gem & Jewelry Show, Inc. Holiday Inn - Best Western. 25th, 12-7; 26th, 10-6; 27th, 11-5. 301-294-1640, fax 301-294-0034, www.intergem.net.

Apr. 25-27, Denver, CO - Spring Show in the Rockies. GeoExpositions. Holiday Inn-Denver North and Best Western Central. 25th, 10-7; 26th, 10-6; 28th, 10-5. 303-278-1218, rockclub@earthlink.net.

Apr. 26-27, Santa Cruz, CA - 51st Annual Santa Cruz Mineral & Gem Show. Santa Cruz Mineral & Gem Society. Civic Auditorium, corner of Center & Church Sts. 10-5 daily. 831-688-8086, hmdrake@pacbell.net.

Apr. 26-27, Lancaster, CA - Antelope Valley Gem & Mineral Show. A.V. Fairgrounds, 155 East Ave. 9-5 daily. Olan Flick, 661-943-3882, av_gem@yahoo.com, www.geocities.com/av_gem/spring.html.

Apr. 27, Culver City, CA - Los Angeles Bead Society Bazaar. Veterans' Memorial Auditorium, 4117 Overland Ave. Judie Davis, 310-783-3271 or 818-508-6284.

