New York Mineralogical Club
Founded 1886

1996
Gem & Mineral
Almanac

George F. Kunz
Founder
1995 Gem & Mineral Almanac

A Compendium Of Articles And Features For The Gem And Mineral Collector

Featuring:
- Articles Old and New
- Mineral Cleaning
- Collecting Locations
- Tips and Techniques
- Sources
- Mineral News From Around the World

Compiled and Edited by
John Betts
NYMC President
About This Book

This book is a collection of articles with information that cannot be found together in any one book. The New York Mineralogical Club publishes this information as a non-profit benefit for the members to further the hobby of gem and mineral studies and collecting. Many of the articles in this book were originally published in the monthly New York Mineralogical Club newsletter. Permission is granted to reproduce the articles for non-profit purposes only as long as club name, editor, and author is properly credited.

Acknowledgment

The New York Mineralogical Club wishes to sincerely thank all of the contributors to the monthly newsletter and to this almanac. The articles came from a wide range of contributors, too numerous to list, from within the club and from outside the club. However, a few individuals deserve special mention for their significant contributions: Vivien Gornitz, Boyd Compton, Ken Colosky, and Mike Kessler.

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New York Mineralogical Club

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New York Mineralogical Club

Statement of Objective

Founded in 1886 for the purpose of increasing interest in the science of mineralogy through the collecting, describing and displaying of minerals and associated gemstones.

Officers

President          John Betts           215 West 98 Street, Apt. 2F, NY, NY. 10025
Vice-President     Kevan Brown        70 Grove Street, Apt. 2R, NY, NY. 10014
Secretary          Nick DelRe          2725 Bath Ave., Brooklyn, NY. 11214
Treasurer          Lawrence Cohen     2615 Homecrest Ave., Apt. 3G, Brooklyn, NY. 11235

Meetings

Second Wednesday of every month (except July and August) at the American Museum of Natural History, Central Park West between 77th and 81st streets, New York, NY. The museum is closed at this time, so you must enter from the lower entrance off Central Park West or from the parking lot on the north side of the museum. The doors open at 5:30 P.M. and the meeting starts at 7:00 P.M.

Membership Benefits

Monthly twelve page newsletter
Monthly meetings with guest lecturers
Special interest study groups
Ten field trips per year
Annual gem and mineral auction

Membership Fees

$20.00 individual, $30.00 family per calendar year.
# Calendar of Past Events

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Location</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 9, 1994</td>
<td>Study Group at 5:30 Meeting at 7:00 PM</td>
<td>Room 319, AMNH</td>
<td>Phil Betancourt: - What is a Pseudomorph?</td>
</tr>
<tr>
<td>Dec. 14</td>
<td>Annual Banquet 6:00 to 9:00 PM</td>
<td>Jimmy Walkers Restaurant</td>
<td>Lawrence Conklin: Personal Reminiscences.</td>
</tr>
<tr>
<td>1995, Jan. 11</td>
<td>Study Group at 5:30 Meeting at 7:00 PM</td>
<td>Room 319, AMNH</td>
<td>Cancelled speaker due to weather. Members Forum.</td>
</tr>
<tr>
<td>Feb. 5-7</td>
<td>Three Day Field Trip</td>
<td>Tucson, AZ.</td>
<td>Arizona Mineral Collecting - Including a full day of collecting at Morenci.</td>
</tr>
<tr>
<td>Feb. 8</td>
<td>Study Group at 5:30 Meeting at 7:00 PM</td>
<td>Blum Lecture Room, AMNH</td>
<td>Michael Walter: Three Weeks of Collecting Out West.</td>
</tr>
<tr>
<td>March 8</td>
<td>Study Group at 5:30 Meeting at 7:00 PM</td>
<td>Blum Lecture Room, AMNH</td>
<td>Henry Kennedy: Chrysoberyl Mining in Brazil.</td>
</tr>
<tr>
<td>March 19</td>
<td>Field Trip</td>
<td>Sterling Hill Mine Museum, Ogdensburg, NJ.</td>
<td>Mine tour and mineral collecting.</td>
</tr>
<tr>
<td>April 12</td>
<td>Study Group at 5:30 Meeting at 7:00 PM</td>
<td>Room 319, AMNH</td>
<td>Ted Johnson: Mineral Collecting in Siberia.</td>
</tr>
<tr>
<td>April 22</td>
<td>Field Trip</td>
<td>Brookdale Mine, Phoenixville, PA.</td>
<td>One day field trip.</td>
</tr>
<tr>
<td>May 10</td>
<td>Study Group at 5:30 Meeting at 7:00 PM</td>
<td>Room 319, AMNH</td>
<td>Nick DelRe: Gems: The Good, The Bad &amp; The Ugly.</td>
</tr>
<tr>
<td>May 21</td>
<td>Field Trip</td>
<td>Limecrest Quarry, Limecrest, NJ.</td>
<td>One day collecting trip sponsored by Franklin-Ogdensburg Mineral Society.</td>
</tr>
<tr>
<td>May 27-29</td>
<td>Memorial Day Weekend Field Trip</td>
<td>Maine and New Hampshire</td>
<td>Three day collecting trip. Saturday - Deer Hill, Me.; Sunday - Songo Pond, Me.; Monday - Ham &amp; Weeks Quarry, N.H.</td>
</tr>
<tr>
<td>June 14</td>
<td>Meeting at 7:00 PM</td>
<td>Room 319, AMNH</td>
<td>Annual Gem &amp; Mineral Auction.</td>
</tr>
<tr>
<td>June 16-18</td>
<td>Field Trip</td>
<td>Hickory Hill Diamond Diggings, Fonda, NY. Collecting and Swap!</td>
<td>Joint weekend collecting trip and mineral swap with the Boston Mineral Club.</td>
</tr>
<tr>
<td>Sept. 13</td>
<td>Study Group at 5:30 Meeting at 7:00</td>
<td>Room 319, AMNH</td>
<td>Collectors Showcase: Bring in slides, photos or specimens of your recent collecting to share with members.</td>
</tr>
<tr>
<td>Sept. 16</td>
<td>Field Trip</td>
<td>Swansons Quarry, Haddam, CT.</td>
<td>One day field trip.</td>
</tr>
<tr>
<td>Oct. 11</td>
<td>Study Group at 5:30 Meeting at 7:00</td>
<td>Room 319, AMNH</td>
<td>Henry Kennedy: Chrysoberyl Part II.</td>
</tr>
<tr>
<td>Oct. 14</td>
<td>Field Trip</td>
<td>Timm’s Hill Prospect, Haddam, CT.</td>
<td>One day field trip.</td>
</tr>
<tr>
<td>Oct. 22</td>
<td>Field Trip</td>
<td>Limecrest Quarry, Limecrest, NJ.</td>
<td>One day collecting trip sponsored by Franklin-Ogdensburg Mineral Society.</td>
</tr>
<tr>
<td>Nov. 8</td>
<td>Study Group at 5:30 Meeting at 7:00</td>
<td>Peoples Center, AMNH</td>
<td>Will Heierman: Gold Mining in Africa Joint meeting with the GIA Alumni.</td>
</tr>
<tr>
<td>Jan. 19, 1996</td>
<td>Study Group at 5:30 Meeting at 7:00</td>
<td>Room 319, AMNH</td>
<td>Boyd Compton: Mineral Collecting in the Cady Mountains, Mojave Desert, California</td>
</tr>
</tbody>
</table>


Articles Old & New

Humor

Bonanza: A hole in the ground owned by a liar.
I think this may have originated from Mark Twain,
but I'm not certain.

“You might be a rockhound if .....”
1. You think road cuts are built as tourist attractions.
2. You describe your vacations by the rocks you brought home.
3. The rock pile in your garage is over your head.
5. You can pronounce “molybdenite” correctly on the first try.
6. The polished slab on your bola tie is six inches in diameter.
8. Your children have names like Rocky, Jewel, and Beryl.
9. You think you KNOW how to pronounce “chalcedony.”
10. You are thinking about giving out specimens for Halloween.
11. You planted flowers in your rock garden.
12. You purchase things like drywall compound just to have another nice bucket to carry rocks in.
13. The first thing you pack for your vacation is a chisel and a hammer.
14. Your company asks you not to bring any more rocks to the office until they have time to reinforce the floor.
15. Your local rock shops send you get well cards when you don’t stop by in more than a week.
16. The local jewelry stores & libraries give out your name for information on rock clubs.
17. The baggage handlers at the airport know you by name and refuse to help with your luggage.

18. The local university’s geology department asks permission to hold a field trip - in your backyard.
19. The city sends you a letter informing you a landfill permit is required to put any more rocks in the back yard.
20. UPS has a regular pickup and delivery schedule for your house.
21. You can debate for hours on the differences between spectrolite and labradorite.
22. You get excited when you find a hardware store with oxalic acid, 16 pound sledge hammers and 5 foot long pry bars.
23. You debate for months about whether vibrator or drum tumblers are best.
24. You can’t remember the last time your car still fit in the garage.
25. You still think pet rocks are a pretty neat idea.
26. You associate the word “hard” with a value on the Moh’s scale instead of “work”.
27. You know the location of every rock shop within a 100 mile radius of your home.
28. Your spelling checker has a vocabulary that includes the words “polymorph” and “pseudomorph”.
29. You know where Tsumeb is.
30. You begin wondering what a set of the Mineralogical Record is worth.
31. You make a backpack for your dog.

Lapidary Journal Covers NYMC Members In Several Stories

The Lapidary Journal has included several stories in their last two issues about the activities of some of our members. The April issue had great coverage of the lapidary and jewelry courses offered at the 92nd Street Y. The article gave an overview of the courses and their instructors including our members Michael Walter and Bill Mancuso.

The April issue also had an article about the gold granulation technique that our February speaker, Cecelia Bauer, spoke about. The article was mainly about the history and reinvention of the process of
gold granulation at the Kuliche-Stark Academy where Ms. Bauer studied.

Today arrived the May issue of Lapidary Journal and, like they do every Spring, it is dedicated to field collecting. Again there is Michael Walter in a story he wrote about a collecting trip to Nova Scotia with two other club members, Mike Laupheimer and Beth Zisman. They took some incredible risks, but miraculously lived to tell about it.

Field collectors should go out of their way to get this issue of LJ. There are some good maps, new locations (at least to me) including a beryl collecting site on a farm in Virginia.

NYMC Newsletter and Contributors Receive Awards

The Eastern Federation of Mineral and Lapidary Societies recently announced the winners of their annual newsletter competition. The New York Mineralogical Club newsletter was awarded a first prize for a newsletter by a new editor, a second prize for Boyd Compton’s feature article on collecting in Nova Scotia, and two honorable mentions for two Mineral-of-the-Month articles by Richard Rossi. Congratulations to Richard and Boyd. Your effort is well appreciated by the club.

Paleontology Fun

This silly letter is supposed to be a copy of a real letter from the Smithsonian...I doubt it!

Paleoanthropology Division
Smithsonian Institute
207 Pennsylvania Avenue
Washington, DC 20078
Dear Sir:

Thank you for your latest submission to the Institute, labeled "211-D, layer seven, next to the clothesline post. Hominid skull." We have given this specimen a careful and detailed examination, and regret to inform you that we disagree with your theory that it represents "conclusive proof of the presence of Early Man in Charleston County two million years ago." Rather, it appears that what you have found is the head of a Barbie doll, of the variety one of our staff, who has small children, believes to be the "Malibu Barbie".

It is evident that you have given a great deal of thought to the analysis of this specimen, and you may be quite certain that those of us who are familiar with your prior work in the field were loathe to come to contradiction with your findings. However, we do feel that there are a number of physical attributes of the specimen which might have tipped you off to its modern origin:

The material is molded plastic. Ancient hominid remains are typically fossilized bone.

The cranial capacity of the specimen is approximately 9 cubic centimeters, well below the threshold of even the earliest identified proto-hominids.

The dentition pattern evident on the "skull" is more consistent with the common domesticated dog than it is with the "ravenous man-eating Pliocene clams" you speculate roamed the wetlands during that time.

This latter finding is certainly one of the most intriguing hypotheses you have submitted in your history with this institution, but the evidence seems to weigh rather heavily against it. Without going into too much detail, let us say that:

The specimen looks like the head of a Barbie doll that a dog has chewed on.

Clams don't have teeth.

It is with feelings tinged with melancholy that we must deny your request to have the specimen carbon dated. This is partially due to the heavy load our lab must bear in its normal operation, and partly due to carbon dating is notorious inaccuracy in fossils of recent geologic record. To the best of our knowledge, no Barbie dolls were produced prior to 1956 AD, and carbon dating is likely to produce wildly inaccurate results.

Sadly, we must also deny your request that we approach the National Science Foundation's Phylogeny Department with the concept of assigning your specimen the scientific name "Australopithecus spiff-arino." Speaking personally, I, for one, fought tenaciously for the acceptance of your proposed taxonomy, but was ultimately voted down because the species name you selected was hyphenated, and didn't really sound like it might be Latin.

However, we gladly accept your generous donation of this fascinating specimen to the museum. While it is undoubtedly not a hominid fossil, it is, nonetheless, yet another riveting example of the
great body of work you seem to accumulate here so effortlessly. You should know that our Director has reserved a special shelf in his own office for the display of the specimens you have previously submitted to the Institution, and the entire staff speculates daily on what you will happen upon next in our digs at the site you have discovered in your back yard.

We eagerly anticipate your trip to our nation's capital that you proposed in your last letter, and several of us are pressing the Director to pay for it. We are particularly interested in hearing you expand on your theories surrounding the "trans-positating fillifitation of ferrous ions in a structural matrix" that makes the excellent juvenile Tyrannosaurus rex femur you recently discovered take on the deceptive appearance of a rusty 9-mm Sears Craftsman automotive crescent wrench.

Yours in Science,

Harvey Rowe
Curator, Antiquities

Fluorescent Mineral Society

We of the Fluorescent Mineral Society, Inc. invite you to join us and learn about luminescence and the minerals that show it. We are a worldwide non-profit organization, founded in 1971, including professional mineralogists, gemologists, amateur collectors, and anyone else sharing an interest in minerals that glow.

The gems and minerals we study often shine brightly when exposed to invisible ultraviolet light, in a breathtaking range of colors. Fluorescence helps us find minerals in the field, identify them, and learn something of how they formed. Luminescence has provided scientists with essential clues that have led to the discoveries of X-rays, lasers, quantum mechanics and more.

Ultraviolet lamps have become cheaper and last longer than in past years (battery-operated UV lamps the size of flashlights may be obtained for $60 or less). Many sites that have been “picked over” by collectors still contain hidden prizes for those with UV lamps. Many specimens you already have may contain unsuspected minerals and hidden beauty that UV can show you. We can help you know where to look and what you have found.

The FMS exists to share knowledge and experience in collecting, identifying, and displaying of luminescent minerals, to help organize field trips, information seminars, research, displays, and exchanges of luminescent minerals, and to encourage interests related to fluorescent minerals such as photographing them, the study of other types of luminescence, and the various uses of ultraviolet lamps.

The FMS publishes a newsletter, UV Waves, six times a year, and a technical publication, the Journal of the Fluorescent Mineral Society, annually or biennially. In 1993 we published our first FMS Advertising Supplement with ads from many dealers and manufacturers that have fluorescent specimens or UV lamps for sale. The Henkel Glossary of Fluorescent Minerals, published as a recent issue of our Journal, is an uncommonly complete list of minerals known to be fluorescent, including over 500 species. Back issues of most of these publications are available.

The FMS sponsors research in areas related to fluorescent minerals, UV lamps, and display information. The results of one of our research activities was published in the 1988 proceedings of SPIE - The International Society for Optical Engineering. It is titled “Solarization of Short-Wave Ultraviolet-Transmitting, Visible-Absorbing Filters”. The Henkel Glossary of Fluorescent Minerals, edited by Dr. Earl Verbeek and Dr. Peter Modreski, was another project. It was published as a 1988-89 special issue of the Journal of the Fluorescent Mineral Society. Each FMS member received a copy, and at last count over 900 additional copies have been sold to other collectors. At the present time three research projects are under way to: (1) develop a Fluorescent Color Standard that can be used in the field to compare with fluorescent specimens, (2) research activators that cause fluorescence in some minerals (coordinated by Manuel Robbins), and (3) publish the complete works of the late Dr. Gerhard Henkel listing fluorescent mineral locations, fluorescent colors, etc. (coordinated by Drs. Verbeek and Modreski).

The FMS has 337 members in 46 states and 18 other countries. Most of our interaction takes place by mail, both by letters and by our publications. Casual meetings are held yearly by the different regional groups in the USA and abroad.
Informal meetings are also held at shows such as the Franklin Mineral Show in Franklin, NJ, the Denver Show, or the Tucson Gem & Mineral Society Show. Monthly meetings are held in Pasadena, CA, to conduct the society’s business.

Join us at the Tucson Gem & Mineral Society show in February, 1996, where we will be celebrating our 25th anniversary with what we hope will be the best display of fluorescent minerals ever assembled in one exhibit, along with talks and field trips.

The registration fee for new FMS members is $2.00 (US $3.00 for those outside the USA), plus yearly dues of $15.00 for members in the USA, US $18 for non-USA members receiving FMS publications by surface-mail, and US $23 for non-USA members receiving FMS publications by air-mail.

For further information about the FMS, contact FMS president Dr. Rodney Burroughs, PO Box 2694, Sepulveda, CA 91343 USA; or by Internet: Doug Mitchell, 70621.702@compuserve.com. A membership info+application kit is available in the CompuServe Science forum library as FMSKIT.ARC.

Book Reviews:

**Exploring and Mining Gems & Gold in the West**
by Fred Rynerson

*Reviewed by: Richard Busch (FGMS Member)*

William Rynerson brought his family to California in 1885, when his son Fred was only 3 years old. Ten years later Fred held a gem tourmaline crystal in his hand for the first time. In 1902, a 20-year-old Fred read a newspaper account of a “Great Gem Discovery” at Mesa Grande, California, whereupon he moved to San Diego. For the next 54 years of his life, Fred Rynerson was a prospector, tourmaline/topaz/gold miner, jeweler, lapidary, oil well driller, and explorer of gem and mineral deposits in southern California and southwestern Arizona. “Exploring and Mining Gems & Gold in the West” is the autobiographical account of his adventures, discoveries, and thoughts during this latter 54-year period of his life.

These days, in the 1990s, we tend to think nothing of piling into a 4-wheel-drive vehicle and traveling to remote collecting sites in air-conditioned comfort-grabbing refreshment at our choice of various fast food restaurants along the way. None of these conveniences existed when Fred Rynerson started prospecting and mining in the early 1900s. Automobiles simply didn't exist. Roads were, more often than not, dirt trails. Rynerson relates accounts of many prospecting trips he made using horses, with or without a buckboard, and a string of burros for transportation and hauling. In later years, he acquired a Hupmobile which eased the situation somewhat—but not without some measure of additional adventure.

The difficulty and discomfort of making these trips apparently did not deter him from spending a great deal of time in the field. Although he appears to have ranged over most of San Diego, Imperial, and Riverside Counties in the search for gem material and gold, the majority of his time seems to have been spent at the major gem-bearing pegmatite mines which we know of today—the Himalaya, Esmeralda, Fano, and various Pala mines to name a few, mining relatively prodigious quantities of gem tourmaline. In his book, he describes not only the alternating thrill and tedium of mining, but also relates the rigors of living and working in isolated mining areas for months at a time. At one point he writes:

"I have heard people remark that it must be a thrilling experience to take gem crystals out of the pockets. Yes it is at first. But there's no way you can work the pocket while sitting in a chair, so you sit on the cold foot-wall until your legs itch and your joints are stiff. After several weeks of this the thrill is gone. Then a few days of making a new exploring hole, and you are ready to be thrilled again."

Some thrills were better than others, like this experience at the Himalaya Mine:

"One of my [dynamite] shots cracked a round spot right on top of the vein. Every time I dipped my hand in, I brought out one or two tourmaline crystals. This continued until I had taken out about thirty pounds of fine crystals, all pink; the largest about three inches long by one and a quarter inches thick."

When Fred Rynerson wasn't actively mining gems, he was usually cutting and polishing them in his lapidary shop in San Diego. In addition to what we would regard as "standard" gem and jewelry fabrication and repair, much of his work consisted.
of making buttons and other ornaments out of gem tournamline for shipment to China.

I found it especially disheartening to read Rynerson's accounts of his slicing up large, well-terminated crystals of multi-colored tourmaline for the express purpose of making buttons (of all things) until he noted that, in the early part of this century, no one cared much about mineral specimens. A prize watermelon tourmaline, sliced-up and made into buttons, was worth two to three times the value of the original crystal.

"Exploring and Mining Gems & Gold in the West" chronicles all this and more. The book is divided into 36 individually-titled chapters. The temptation is to select and read first those chapters for which the titles hold special interest; however, the chapters are meant to be read in order since each frequently refers to topics covered in the previous ones.

Rynerson writes in a clear, easy to read, yet articulate, style. The mental imagery evoked by his descriptions is supported by numerous, historical, black-and-white photographs presented throughout the book. Although the book was published posthumously through the efforts of his wife, the manuscript appears to have been completed before his death. Beulah Rynerson did the southern California gem, mineral, and mining community a great favor when she published this book. The only thing I would have liked would have been for it to have an index; but this omission is only a minor deficiency. This volume should find a place on the bookshelf of every mineral collector, lapidary, and historian in San Diego County.

"Exploring and Mining Gems & Gold in the West" by Fred Rynerson;

Banded Agates: Origins and Inclusions
by Roger K. Pabian and Andrejs Zarins, Educational Circular No. 12, Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, 1994, 32p.
reviewed by Vivien Gornitz, Nov. 4, 1995

Agate is a banded or dendritic variety of chalcedony, a cryptocrystalline, fibrous form of quartz. It has been fashioned into beads and seals and decorative carvings for thousands of years. While much has been written about how agate got its bands, little has been said about the environment in which agate can develop. As "agate detectives", Pabian and Zarins, in their booklet "Banded Agates: Origins and Inclusions", demonstrate the geological, geochemical, and environmental conditions that must be fulfilled before agate can form. After having examined over 15,000 agates from 18 different localities in the United States and Mexico, the authors outline a model for the origin of this gemstone.

The story begins with volcanic activity: eruptions of basaltic or andesitic lavas, or rhyolitic tuffs. The lava rocks often contain gas cavities, or vesicles. Saline or alkaline lakes eventually form on top of the weathered lavas. Later, eruptions of welded ash-flow tuffs cover the basalts. Devitrification of the overlying glassy ash-flow tuffs releases silica that collects in the basaltic vesicles. The silica does not mix well with solutions containing iron or aluminum oxides, derived from the weathering of the host rocks, or with carbonates and sulfates from the saline lakes. Contact between these vastly different components results in chemical reactions that cause the silica gel to move outward in a concentric wave-like pattern. Impurities collect at the tips of the spherulitic crystals to form bands. The centers of agates are often lined with drusy quartz, precipitated from undersaturated silica gels. Other minerals form crystal clusters in peripheral locations.

This booklet is nicely illustrated with color photographs of many varieties of agate. Some of the varieties shown include thunder eggs from Oregon, plume and dendritic agates, the latter from Montana, fire, eye, stalk, and iris agates, and agates with unusual inclusions. An agate from Chihuahua, Mexico has plumose hematite and limonite in the lower part of a polished slab, with rectangular pseudomorphs of either aragonite or anhydrite crystals in the upper section. Another specimen displays banding in between radiating blades of aragonite pseudomorphs. One of the most unusual specimens is a sand dollar encased in banded agatized coral from Tampa, Florida. These agatized corals are believed to have derived their silica from airborne volcanic ash, blown in from great distances.

This booklet is clearly-written and designed to appeal to a wide audience of mineral collectors, geologists, and gemologists.
Beautiful Opals--Australia's National Gem
reviewed by Vivien Gornitz, Nov. 4, 1995

Part travelogue and part mining lore, the book features a dazzling photographic collection of fiery opals, which have been proclaimed Australia's national gemstone in 1993. Many examples of rare patterns with intense play-of-colors are shown, including red-blue-green checkered harlequin, spectral rainbow ribbons, a blue-green "peacock's tail", yellow-green on dark blue "Chinese writing", a multi-hued "palette", and pinfire. An unusual type of opal is the "pineapple"--a crystal cluster, pseudomorphs after gypsum, from White Cliffs, New South Wales. Australian opal, having formed in sedimentary rocks on the shores of a Cretaceous inland sea, is often found replacing fossils, such as clam and snail shells, wood, bones and teeth, and even a dog shark, measuring four feet long!

The book is loosely-organized into three sections, beginning with black opals, followed by boulder opals, and light opals. Fabulous gems from many of the classic mining localities--Lightning Ridge, Coober Pedy, Andamooka, Minitabie, White Cliffs, and Yowah--are illustrated, along with a short history of each mining district and yarns about some of the local characters.

Among these are the miserly miner who ate lizards, the robber who ambushed a mail coach and made off with a large sack of rough opals (shades of the Wild West), the Eulo Queen who ran a hotel in the Yowah field, and as Len Cram delicately puts it, "provided the patrons with more than just liquid refreshments", and the miner, who with his partner found a fortune in opals at Lightning Ridge in the early 1900s, sold a batch of stones for around $2,400, which at today's prices would be worth $60,000,000, and who is shown as an old man in 1963, standing in rags in front of his shanty cabin.

In summary, this book is a visual treat, well-illustrated with photographs of exceptionally colorful and magnificent opal gems, full of entertaining stories about the mining history and local denizens, all of which makes one want to head straight for the opal fields. The book will appeal to the general reader, but those seeking more information on gemological characteristics or how opals form will need to look elsewhere; for example: "Opal Identification and Value", by P.B. Downing, Majestic Press, Tallahassee, FL and Estes Park, CO, 1992, and "A Field Guide to Australian Opals", by B. O'Leary, Gemcraft Publications, Victoria, Australia, 1977.

Whither Minerals and Mineralogy?
by Vivien Gornitz

Club members and friends of mineralogy may be interested in hearing about the current status of mineralogy from an academic perspective. Prof. Frank C. Hawthorne, University of Manitoba, in a highly informative article titled: "Minerals, Mineralogy, and Mineralogists: Past, Present and Future", in the CANADIAN MINERALOGIST, June, 1993, writes that minerals make up the Earth and provide a large part of the raw materials needed to sustain our industrial civilization. Mineralogy is one of the oldest of the physical sciences and has contributed extensively to the development of geology, crystallography, inorganic chemistry, physics, and materials science. He warns however, that although mineralogy has made tremendous progress in the last 30 years, it has been become fragmented into numerous non-communicating specialties. Given the pressures of tighter budgets, changing scientific priorities, and an erroneous perception that mineralogy has been stagnant, many university Earth Science departments may decide to drop courses in this subject from their curricula. Prof. Hawthorne feels that such a move would be short-sighted and would lead to the training of a new generation of earth scientists who lack a fundamental understanding of the materials with which they work. He urges mineralogists to improve the image of mineralogy before it becomes a "sunset science"!

The article goes on to survey the history of mineralogy from ancient times to the present. The observation of Nicolaus Steno, in 1669, of the constancy in interfacial angles of quartz crystals helped to establish the science of crystallography. In the 18th and 19th centuries, progress in chemistry and mineralogy were closely linked. The famous Swedish chemist, Jon Jacob Berzelius (1799-1848) devised the chemical classification of minerals (e.g. oxides, halides, phosphates, sulfates, silicates, etc.) still used today. The Bragg father and son team, in 1913, used x-ray diffraction of crystals to infer the internal arrangement of sodium and chlorine atoms.
in halite. In the following years, the crystal structures of most other mineral were described.

The last 30 years have seen the introduction of many new instrumental methods, such as electron-microprobe analysis, which can examine minute in-situ chemical variations caused by zoning, exsolution, and inclusions within crystals, and also various types of spectroscopy. The latter include such methods as Mossbauer spectroscopy for studying different valence states, particularly of iron, Nuclear Magnetic Resonance, and infra-red and Raman spectroscopy, among others. Transmission electron microscopy extends the magnification of the optical microscope so that features on an extra-fine scale such as twinning, exsolution, or phase transitions can be observed. Electron microscopy imaging can now be done on an atomic level, allowing us to “see” the actual atoms in a crystal.

Prof. Hawthorne then describes the application of these techniques in scientific research and in environmental problems, such as asbestos contamination, or acid water pollution from oxidation of sulfides in mine tailings. The chemical industry has become interested in zeolites because they possess open channels within their crystal structures that permit the passage of smaller molecules, but block larger ones; hence they act as “molecular sieves”.

One of the unsolved problems mentioned by Hawthorne that will interest mineral collectors is that of truly understanding the cause of crystal morphology. In showing a page from Goldschmidt’s Atlas of Crystal Forms, he states that a wealth of information is embedded in the morphology of crystals if only we knew how to interpret it.

Even such a lengthy and comprehensive article as this cannot cover all of the many recent applications of mineralogy. A few other areas in which mineralogy plays an important role, but omitted in the article, with which this reviewer is somewhat acquainted, include developments in crystal growth, gemology and gem synthesis, extraterrestrial mineralogy, and remote sensing of the earth, to name just a few.

Field Trip Into The Cady Mountains, California

by Boyd Compton

For a glorious spell in April, I went with my son, Ken, to the Cadys where my own father first took me more than fifty years ago.

After such a long absence, and coming by plane from New York, we were bound to plan and dream too much. The trip became a comedy of thwarted schedules, yet an experience of unexpected discovery and pleasure. We never did see the big horned sheep or explore quietly for days in the interior. It was the wild ruggedness of the country which defeated, educated and then amply rewarded us on its own terms.

Our preparations were exemplary. We had the 14 topo sheets covering the 25 x 30 miles range of the Cadys, a good five-mile-square aerial photo of our target terrain in Baxter Wash, the 1966 USGS geological maps and brief study by Dibblee & Bassett, reprints of all the old Cady rock articles, and weeks of expert advice from the BLM rangers and from Beth Pinnell of Diamond Pacific and her friends at the Mojave Desert Gem and Mineral Society.

Nothing could go wrong.

On arrival in Las Vegas, we picked up a cheap rental car (the $300. a week asked for a jeep seemed too high) and went to get our baggage. The airline had lost the big pack with all the crucial gear and maps. Three days later, they found it and sent it to Barstow by Greyhound, which forgot to drop it off. On the fourth day we had our gear and Ken got wretchedly sick with stomach flu. On the seventh day, we were ready for hiking.

I had used the waiting time for day trips to all sides of the Cadys; to Lavic in the South for good finds of jasp-agate, into the mountains around Sleeping Beauty Mt (see M.F. Berkholtz, Lapidary Journal, Jan.,’57), into the low Hector foothills, and finally onto the road from the West into Hidden Valley, which was supposed to give us fairly easy access to the center of the mountains. No such luck. Our otherwise admirable Ken got stuck in sand halfway in, so we were left with the least inviting option, to carry our gear and water in from Afton Camp Ground on the North.

The day trips had given us a good feel for the structural components of the mountain system, which the topo sheets and geological map had described in a general way. The volcanic formations are all Miocene or later, with a central core of
Mesozoic, probably Jurassic granite/monzonite surfacing by erosion in the two highest ranges. Through and over the granite are the ducts, flows and secondary sediments from very extensive volcanic activity of the Miocene, Pliocene and even very recent times: basalt, andesite, rhyolite, tuffs, breccias and secondary conglomerates.

On site, useful facts present themselves. For example the very extensive deposits of tuff are mostly overlain by basalt or andesite flows and don’t appear as “mappable” though they are seen everywhere, often on very steep hillsides almost hidden from the map’s vertical eye. Neither does the geological map prepare you for the rock formations as they are; in the North, the lava flows and tuff cliffs run on horizontally for miles, but just to the south you find a patchwork of small, lens-shaped strata which quickly pinch out and disappear.

Finally, we set out with first sun from the Mojave River into Pyramid Canyon and could find no trace of the jeep path noted on the topo sheet. If it exists, this year’s heavy rains seemed to have obliterated it. The vertical cliffs of tuff on both sides were breathtaking in their sheerness and for the color play of the pastel desert greens, buffs and oranges. By mile 4, we were above the tuff cliffs, but still no jeep road.

Directly facing us was the vertical forward face of a basalt flow, 70 feet of challenge for our 70 lb. packs. This is the problem in using maps with 40 ft. contour intervals, when you are accustomed to 20 or even 10. The 70 ft. cliff was marked by a single puny contour line, and we were not happy. Several false starts up narrow crevices led to abrupt dead ends, though we did see our first striking red veins of jasper in the rock. Finally, we retreated and found a side canyon to scramble up, glad we had brought rope to hoist the packs.

We were now in another area of ash deposit, much compacted and altered, and began to see the first signs of small chalcedony veins. We camped after eight hours and were only at mile 6. The next morning, we went around the granite shoulder of Mt. Afton and were roughly at the “headwaters” of Baxter Wash, which lies a mile due east.

Water was half gone, so we made base camp and explored. We were in the middle of interesting country! Under the andesite, near a greenish tuff, was a ten inch vein of beauty: on the outside, a hard brown jasper and chalcedony, some with little sagenite growth, then quartz, then white opal and finally terminated rhombs of calcite. A plainer vein nearby had greenish fluorite in the center of the calcite.

There were jasper veins on most hillsides, and in one hollow, Ken found a lumpy vein of clear chalcedony with green, yellow and violet-red growths; this must be the “Navajo Agate” we’d heard local rockhounds mention.

Thin veins of sagenitic chalcedony appeared frequently in the tuff to the East of our final camp, but nothing of cutting quality, though I am beginning to learn how thin a vein will produce large, flat cabochons in the hands of an expert. I don’t know exactly what mineral makes the little forest of whitish growths, and would welcome guidance from readers to professional analyses of the composition and crystallography of growths in sagenite and jasp-agate.

Our original plan had been to go in to Baxter Wash for two three day trips, the first to explore, the second to load up with intriguing rocks. But that was not to be, so we look forward to returning in mid-October to continue the quest.

Later, we circled back to Pyramid Canyon by a different route and noted that occurrences of jasper and chalcedony are more numerous a mile to the East of our entry route, and they became a real swarm of veins at just the point where the geological map shows the beginning of one of the many faults which criss-cross the area above Baxter Wash; this seems to support the proposition that silica deposits in this terrain occur with greatest frequency near fault lines.

We could find no way down the basalt cliff on the East side, so doubled back to our original ravine and were able to walk out fairly quickly. Down at “mile 3”, Ken spotted two parallel little washes coming over a steep hill, possibly the remains of the old jeep path heading off East around the obstructing basalt flow.

After Ken left, I was able to spend a day at Lavic Siding on the Southern side of the Cady’s. The rains had bared a good number of jasp-agate rocks for our larder, and I was able to get into the new ravines and see that the entire Lavic locale is a massive conglomerate, with only the top two or three feet weathered enough to say that the agates are found
“in float”. Below, they are cemented by a very tough white binder which is about 75% calcite. In a way, this explains why the famous field has been self-nourishing for decades. The cement releases its agates very slowly, but quite regularly. It also poses the old question again; how was the formation created and where did the fine agates come from, and when?

The last week-end I enjoyed the hospitality of the friendly members of the Mojave Desert Gem and Mineral Society at their Friday meeting, to which Bill Depue brought eye-popping big cabs of sagenite from the Calico Hills. On Sunday, he took three of us in his four-wheeler to a remote Calico hillside where we dug happily for sagenite with fair results.

We came away from the Cadys with vivid memories of the interior landscape: the big rattler in the wash, the myriad flowers, the slow desert tortoises, and the naked, wildly-eroded terrain, which presents the whole geological and mineralogical history of the land directly to the eye.

Out next trip will aim to map silica occurrences more exactly on mylar blow-ups of sections of the topo sheets. That should tell us a lot more about the genesis of the Cady agates and the calcite, fluorite, barite and celestite deposits of the area.

My personal conclusion is that it is not really feasible to walk into the Cadys from the North. Carrying your own water has its limits, and I can’t think of a way to plan on more than half a day of exploration between entry and exit hikes. A good mule would help! Next time, I fear we should go 4-wheel and forgo the delights which the backpacker is always going to discover just over the next small cliff.

Collecting in Manhattan

by John Betts

While walking up Columbus Avenue the other day I was reminded of all of the mineral collecting opportunities in Manhattan. There is construction all around the city. Every time the bedrock is exposed, and you can get access, there is collecting potential. Several members of the club have found interesting minerals.

Columbus Avenue is presently torn up for installing a new water main. Vinnie Miller, with a beginners enthusiasm, recently found some small almandine garnets in Manhattan Schist at 72nd Street and Columbus. She tells a wild story of struggling with a large boulder to get it to her car (or was it a taxi?).

Many members may recall seeing Michael Walter’s quartz crystals that he collected in Central Park. He found them just inside the park at 104th Street on the west side. He apparently found a vein of white/colorless quartz and worked it without arousing too much suspicion. Actually Central Park offers other opportunities especially for garnets. However, we do not encourage collecting there because it is against the law.

However, during construction projects in the park often large boulders are used and they contain collectible minerals. When they were restoring the lake in the northeast corner of the park, I found some orange radiating stilbite and black schorl tourmaline crystals to one inch diameter. On the east side of the park, tucked away off the park drive is “dump” of construction rock. This has much potential and should be checked occasionally for new material.

Finally, a year ago a member (sorry, I am terrible with names) brought into an NYMC meeting a clear double terminated quartz crystal that could easily be mistaken for a Herkimer Diamond. He had collected it in Inwood Park, at the north end of Manhattan.

So, do not be discouraged, minerals are everywhere.

The Unusual Double-Terminated Crystals of the Mohawk Valley, NY

by Mike Kessler

A crystal that terminates on both ends is rare. The most common mineral found which does this is quartz. The reason is simply that quartz is composed of the most common elements (silicon and oxygen) in the earth’s crust.

By mostly tradition or misnomer, crystals that terminate on both ends are referred to as diamonds of that locality, such as “Pecos Diamonds” of New Mexico, “Herkimer Diamonds” from New York, or “Arizona Diamonds” from North Payson, Arizona. These are all quartz in composition and certainly do not demand the value of true carbon diamonds.

Since the New York Mineralogical Club has been visiting the Mohawk Valley, we have had an
opportunity to collect these exceptionally clear quartz crystals called Herkimer Diamonds. Several questions arose. Why does this phenomenon of double-termination occur here? What makes them unusual and how can I find more crystals?

Research on double-terminated crystals reveals these conditions necessary for its occurrence:

- Space must be available. A cavity filled with mineral fluids must be large enough to accommodate the crystal’s growth.
- The availability of elements that form this crystal. A quartz crystal would require silicon and oxygen.
- A soft mineral deposit is such as carbonates, limestones, dolostones or loose sandy deposits. required (Herkimer dolostone is soft? -ed.).
- Occasionally a horizontal growth position will produce a double termination.

Most crystals collected are smaller than one inch. However several unusual varieties are occasionally uncovered. These are more rare and therefore more valuable. Here is a list:

**Enhydro Crystal** contains an inclusion with liquid inside. The occurrence of a liquid inclusion has been reported to occur once in five hundred crystals. Sometimes a bubble of gas moves inside the liquid.

**Skeletal Crystal** has parallel growth lines in depressions on a crystal face. From the opposite side, this appears tree dimensional. Sometimes referred to as “cavernous”.

**Smoky Crystal** contains microscopic inclusions of anthraxolite which gives them a darker appearance. Not a true smoky quartz

**Tabular Crystal** has two opposite crystal faces much larger than the other faces. The crystal appears flattened.

**Crystal Inclusions** may be another mineral grain inside such as pyrite, dolomite, sphalerite calcite, or garnet.

**Crystal Clusters** of several intergrown individual crystals are more rare and valuable. (The contact between these crystals are often very clean contacts of separately grown crystals and not truly intergrown. As a result they fall apart quite easily. Look for signs of glue or reconstruction before buying a cluster. -ed.)

**Phantom Crystals** show growth of other crystals inside.

On a good collecting day, I might find thirty to forty crystals, but only about ten percent are perfectly formed. No matter how many you find, Herkimer Diamonds fascinate all who view them. They are great for trading and the best quality of all the so-called diamonds that exist. And, those special occurrences when you find a rare crystal can keep you coming back again and again.

If you would like to know more details on how to locate Herkimer Diamonds ask me. I am Mike Kessler of the New York Mineralogical Club.

**Lawrence Conklin New Honorary Member**

At our September 14, 1994 meeting the membership overwhelmingly approved the making of Mr. Lawrence Conklin an honorary member. This is in appreciation for his contribution as author, collector, dealer, and past NYMC member. Specifically in recognition of his book of Kunz letters and articles for Mineralogical Record.

We will make a formal presentation on December 14 when he speaks to the club at our annual banquet.
Connecting to the Internet

by Ken Colosky

The two ways I’ve connected my computer to the Internet have been by using the services of both America Online, or AOL, an on-line service provider similar to CompuServe or Prodigy, and Interport Communications, a full-service Internet provider. In order to use either of these quite different services, you will need a computer with either an internal or an external modem hooked up and ready to run.

AOL software disks can be found in lots of places these days: in personal computer magazines or your mail, or they will send you a copy if you call them at (800) 827-3338. The software is available for both Macintosh and PC platforms and is very simple to setup and use. AOL is recommended for beginners and can help users understand what an on-line service is and the various kinds of activities you can use it for. It is a self-contained singular network, and provides a common interface in all areas, which means that whether you’re looking up stock quotes, local weather, or minerals on the Internet, the software will provide you with very easily navigable menus with a common look and feel. Most menus provide “push buttons” so that you can point and click to where you want to go. There are many interesting, fun, and educational things to do on the service itself, as well as connecting to the Internet.

One drawback to AOL is that it can sometimes be difficult to get a connection during peak usage periods, especially evenings. They are a large commercial network, which supports thousands of users across the country. Expect occasional delays if you use this service.

It is important to remember that AOL provides limited Internet access. You cannot, at the time of this writing, access Internet Relay Chat nor the World Wide Web via AOL. It can, however, allow you access to Usenet Newsgroups and mailing lists (including Rocks-and-fossils), and you can transfer files directly from the Internet to your machine by using FTP or the File Transfer Protocol utility. Web access is promised soon, as they are constantly upgrading facilities and buying up communications companies.

AOL costs $9.95 per month which includes 5 hours of “free” connect time and $2.95 per hour afterward.

The highest speed you can currently connect at is 14,400 baud. If you are a beginner and do not plan on being on-line more than a few of hours per month, or you primarily want to send and receive e-mail, this service may be for you.

If you want full Internet access within the New York City area, try Interport Communications. Interport is a commercial Internet Provider, or IP. For a modest fee of $25 per month, you will receive a dial up PPP connection, 60 hours per month of on-line time, plus your own customizable World Wide Web home page. They will provide you with a public domain software distribution kit for Windows or the Macintosh, including Electronic Mail, Network News, Mosaic, Gopher, Telnet, and FTP. This software tends to run faster and more reliably for Internet access than AOL’s. Installation is quick and painless and I rarely have trouble connecting to their server. Interport specializes in providing easy access to the Internet, so even if you are a clueless newbie, or newcomer, you can still cruise the Net in comfort.

For those who are not yet familiar, the World Wide Web (WWW or The Web) is the newest and easiest way to “surf the net” to date. It is an interlinked, free-form database of documents existing across many of the distant computers which make up the Internet. Upon starting up a web browser application such as Mosaic or Netscape, the user is presented with pages filled with formatted text and graphics. There are also highlighted links to other pages, which you simply click the mouse on to go on to that page, and so on. Many Internet services are accessible directly through this graphical interface, including Usenet Newsgroups, gophers, and FTP. This makes Internet access extremely easy for beginners, almost as easy as AOL. It is even being suggested as the new computer operating system.

Web journeys can be both educational and surprising. Some sites contain sound and movie files, which while not immediately playable in “real time” without a high speed T1 or ISDN type connection, can be downloaded and then viewed or listened to using a software player application. There are many player applications as well as other public domain software, pictures, text files, etc. available for download from various anonymous FTP sites on the Internet.

Because the Web is free-form and growing everyday, it can sometimes be a little difficult to navigate if you are looking for a specific subject.
help solve this problem, there are searchable indexes of information such as Lycos and WebCrawler as well as famous directories in the form of hyperlinked tables of contents containing information grouped under subject heading. For instance, the Yahnoff and December lists are excellent places to start an Internet search.

When on the Web, check out:
WWW.rahul.net/infodynd/rockhounds/rockhounds.html
Interport Communications is located at 1133 Broadway, New York, NY 10010 Phone: (212) 989-1128 Modem: (212) 989-1258
They provide connection speeds up to 28,800 baud, which you can bump up to 115,200 baud if your modem supports data compression. If you want fast, reliable, and inexpensive full Internet access, your own World Wide Web site, and virtually unlimited access time, give them a try.

**Internet World Wide Web Sites**

I have been saving web site addresses (url's?) from rocks-and-fossils@world.std.com; rockhounds@infodynd.com; and gmeditors@eng.clemson.edu mailing lists. I have not checked them all out, but most of them should be of interest to rockhounds, lapidaries, and collectors.

**Mineral Video**
http://home.navisoft.com/wilensky/page1.html

**Minerals from the Smithsonian**
http://galaxy.einet.net/images/gems/gems-icons.html

**On line geology and gemstones**
http://geology.wisc.edu/~jill/306.html

**Ken Colosky's Fluorescent Minerals**
http://www.interport.net/~kenx/

**Topaz Mountain**
http://cc.weber.edu/~vfuller/topazmt.html

**Surface Science**
http://sable.ox.ac.uk/~vouts/surface.html

**Software**
http://www.xs4all.nl/~mineral
http://CALweb.com/~tcsmith/ores/geology/mine

**Scenic Rocks Out West Screensaver**
Bob Keller
http://www.rtd.com/~bkeller/rockshop/rockshop.htm l

**Carolina Geological Society**
http://www.geo.duke.edu/cgsinfo.htm

**Geological Society of America**
http://www.aescon.com/geosociety/index.html

**Peerless Minerals**
http://home.navisoft.com/peerless

**Silver Pick'n**
http://www.rtd.com/~bkeller/rockshop/agpickn.htm l

**Information Dynamics**
http://www.rahul.net/infodynd/id_home.html

**Gemhut**
http://empire.na.com/gemhut/gemhut.html

**Mineral Club of Antwerp**
The Virtual Quarry
http://www.xs4all.nl/~mineral/vq.html

**French Association of Micromineralogy**
http://cri.ensmp.fr/afm

**Mineralogical Society of Southern California**
http://www.treasure.com/mssc/mssc.htm

**Fred Sias**
http://www.eng.clemson.edu/~frsias

**1996 Tucson Show**
http://www.rtd.com/~bkeller/rockshop/theshow.html

These are all the URL's I have collected to date. If you have one you would like to have included on my list, email me direct (jhbnych@aol.com).
New Computer Bulletin Board for Mineral Collectors

Mr. D. E. Russell of Glen Cove, NY has started a computer bulletin board (516-671-2337) dedicated to mineral collecting. It allows anyone with a computer and a modem to connect to the bulletin board to share information with others.

- Micromounting
- Thumbnails
- Fluorescents
- Mining History
- Swap Shop
- Books (Used and Rare)
- Franklin, NJ

For further information contact Mr. Russell at 516-671-1677 after 6 PM.

Mineral Collecting in Baja Mexico

By Mike Kessler

If you are interested in an ideal place to hunt for minerals and fossils, I came across a place on my trip to San Lucas, Mexico. I was visiting my friend Bob who introduced me to the eastern coast area of Santa Rosalia. This locality of conglomerates, sandstones and clays has been disrupted by several intrusions and ash flows. To add to this picture, the area has been submerged into the sea as many times as it has been uplifted, which accounts for the many layers of gypsum and interesting mineralogy produced.

Bob, who was working in this area as a mining technician, advised me to explore the nearby arroyos or canyons. I made four trips into an array of canyons just off the seashore. It was wonderful. I marked my trail each time. Wandering the tailing piles of several old copper mines, I collected specimens of chrysocolla, red jasper, manganese nodules (formed on the ocean floor), chalcedony, azurite, malachite, two kinds of gypsum, and the famous and rare “boleo”, a rounded habit of mineral growth. After my return home, I discovered that many of these boleos were microscopic in vugs of my specimens, and the boleos can be in profuse variation together.

In the evenings I was able to look over some of Bob’s library. Previous research in the area had additionally produced epidote, pyrolusite, selenite, native gold, and actinolite.

My excitement peaked when I came across an ancient submarine volcanic vent. The chrysocolla in this structure had a beautiful glassy texture. The mineralogy of these specimens is presently under investigation. But I foresee some beautifully polished gemstones in the future from this material.

Since I was alone on these trips, I did not enter any of the mines or air shafts that dotted the landscape. There really is so much to do here. South of Santa Rosalia is virtually unexplored for exciting mineral collecting.

For further information contact my friend Bob at Terra Trek at 619-473-8752 or me at 718-646-7382.

Nova Scotia: Bay of Fundy- August, 1994

By Boyd Compton

The fine zeolites and agates of Nova Scotia are found in amygdaloidal cavities, veins and vertical pipes in the volcanic trap rock on both sides of the Bay of Fundy. Occurrences are concentrated in zones five to 10 meters thick near the contacts of old lava flows, and are found in a five mile wide swath which runs without interruption 110 miles along the Southern shore and, sporadically, for about forty miles on the Northern shore.

There is lively debate on the exact origin of the relatively low-temperature hydro-thermal deposits, but it is intriguing to note that zeolites are also found in the sandstones immediately above the lavas.

I followed the local custom and collected mainly on the beaches, where specimens can be found as beach pebbles, in rock slides or embedded in the cliffs, which tower to 500 feet at their highest, and can trap you in the thirty-five foot tides, which totally immerse many of the best collecting coves.

I got in six days of collecting, and the results could be called "fair", or perhaps "good" if you allow for a newcomers extravagant hopes.

Each mineral offers it's frustrations. Heulendite, for example, is plentiful, At Bennett Bay, you can see thousands of orange clusters in the basalt boulders,
and many of the cavities are four or five inches across, with wonderful crystals.

But you need a heavy sledge hammer to break the boulders, and the blows dislodge the loosely embedded crystals or shatter them. Most mineral deposits in Nova Scotia sit "naked" in their cavities and do not have the hard nodule shell of altered basalt which we are accustomed to find in New Jersey.

The same thing accounts for my slight disappointment in the famed chabazite of Wasson Bluff, which occurs as long veins in the basalt. The crystals are plentiful and good, but they do not have that fine-etched perfection of chabazite found in nodules in the Watchungs. Sometimes the veins come together and you find a remarkable, large cluster of crystals.

A fascinating new mineral for me is a variety of thompsonite called lintonite, which is a hard, compact for which is like clear chalcedony, but retains visible radiating fibers, like a ghostly fan. Nice gem for cutting!

My good lintonite bounced out of my pocket while I scrambled up the 500 foot cliff at Amethyst Cove. This is a dangerous climb, and requires a lot of arm strength through two nearly vertical sections of about forty meters each.

You should have your hands free, a snugly fitted pack, and avoid my idiotic decision to take along my 16 lb. sledge.

One way to do Amethyst Cove properly is take along a good 30 meter rope, then lower and raise your gear from safe perches along the path. That way, you could camp at night on a tiny knoll at the bottom, and get in at least ten hours of collecting, rather than the two hours I had.

How good is the collecting in Nova Scotia? Apart from my somewhat limited efforts, with many hours spent getting oriented, it can be very good. I spent two hours in the back rooms of the museum in Halifax with the mineral curator, and saw remarkable specimens of all the zeolites, and was especially bowled over by the analcime and apophyllite. The minerals are there, as well as a good assortment of agates.

There are some lessons to learn, however:

1. By August, beach specimens have been picked over and there is little beach "turnover" in the gentle tides of summer. You have to go in April and May to get to the new rock slides from the previous winter. That's when the many amethyst hunters come out.

2. Do sledge hammer work (16 lb. minimum) on the boulders and cliffs. (Cliff hacking at Wasson Bluff is forbidden because of the dinosaur fossils in the adjacent sandstone).

3. Search the "vaults" (deep canyons) along the shore. They are hard to explore, but generally ignored.

4. Get the two good, paper-bound books by Ian Booth: Rockhounding in Nova Scotia, and Zeolites of Nova Scotia. (Government Printing Office, 902 424-7580. $10. each.) Ian is the expert on Nova Scotia zeolites and has a claim at the Arlington Quarry to mine a form a heulandite which absorbs enormous amounts of ammonia. If we find a way to do a late Spring or early Summer trip, we should engage him s guide for a day or two. He is generous and very well informed (902 492-3805).

5. Prepare for frustrations! Ian says in his book that "vivid fortification agate fills vugs in the basalt West of Baxter Harbor." True, but don’t assume that you can extract them. In one stretch, they are wonderful agate geodes exposed in tidal cavities everywhere you look, but the basalt is so hard that a sledge hammer makes almost no mark. A higher power obviously meant this glorious spread to be seen and not hacked up.

6. The petrified wood West of Bennett Bay is remarkable. I found one stretch of exposed sandstone at low tide, with two small tree stumps and one fallen log. The material is a somewhat fractured jasper which looks quite cuttable where it turns red.

7. Expense. The main expense is the time it takes to drive the 1500 mile round-trip. The ferries from Portland (overnight) and Bar Harbor (6 hr.) can cut that time. Tent sites at camping grounds are about US $8, and there are good, inexpensive supermarkets in most of the small towns. Motels and restaurants are inexpensive.
(Specimen list: five good stilbite, one a nice five pound piece. About 20 excellent scolecite massive specimens. A number of heulandite crystal clusters from the boulders. Small chabazite and gmelenite pieces from Wasson Bluff. Beach pebbles to 2’ size of thompsonite and stilbite. Many beach agates from one inch seams, and a few good larger pieces from the cliffs.)

A Field Guide To Mineral Collectors

by John Betts

Many of you reading this are new members and new to collecting on club field trips. As you go collecting how do you know who to ask for advice?

Here is a field guide to mineral collectors and how to spot the people that know what they are doing and those that do not. I apologize in advance that, for the purposes of this guide, all gender references will be male. Perhaps in the future we will have a female equivalent.

All characters are fictitious. Any resemblance to real persons is coincidental.

Mr. “What did you get?”

This collector goes around all day asking “what did you get” in the hopes that you will ask him the same question. This gives him the opportunity to pull out either a piece that he discovered with beginners luck, or a piece you threw away two hours ago or a piece that he picked up at the mineral store down the road and now he claims to have found it. This collector is often new to field collecting and has not been humbled by collecting next to real collectors.

Indiana Jones

This is a real collector. Did you ever wonder how these locations we visit were discovered? It is this guy. He searches out old locations or breaks ground at a new location, a true prospector. They can be spotted because they have the right tools for the job and know what they are looking for in advance. We do not have many of this type in the NYMC anymore. You can spot them on a dig because they are not talking, and have their head in a hole. They have been in pockets that they could stand in and know what pocket mud is (and pocket mud can be found under their finger nails). You never know until the end of the day what they have found because they don’t advertise their finds out of fear that a claim jumper (see Leech) will try to move in.

Sight Seer

This person is using the trip to get out of the city and doesn’t really care about collecting minerals. He thinks the NYMC is a travel agency to arrange his vacation. Often the loudest complainer, the first to suggest quitting for the day, and most likely to get lost because he was wandering away from the collecting location.

Paul Bunyan

This is the biggest and baddest (in the good sense) of all collectors. He swings the biggest hammer you ever saw. You are not worthy of carrying his tools. He cannot walk by a construction sight without dreaming of pneumatic jack hammer, back-hoes and 100 ton hydraulic jacks. No rock is too large to tackle, even if it is barren. This collector play the odds, knowing that one trip in ten he will break into a good pocket and the pocket will have twenty times the quantity and quality of the junk the rest of us are picking up off the ground. At night this collector can be found at the nearest pizza parlor with a large supreme pizza and a six-pack of beer planning out the next days work.

Borrower

This collector thinks that the list of tools prepared for each trip is a multiple choice. He brings only half of them. Can usually be spotted adjacent the field trip director so that he can borrow his tools. Has a habit of quickly disappearing after breaking a sledge hammer handle or bending a crow bar. Chronic amnesia causes this collector to never offer to pay for damages, never remembers what tools he needs to get for the future, and always forgets to say thank you.

Pebble Pup

Always the youngest person on the trip and always the one to get the best specimen, usually lying on the surface where it was kicked by all or the other members on the trip.

What’s This?

Total lack of preparation and research causes this collector to have no idea what he is looking for or what he has found. Forgets to bring a field guide or the field trip announcement so he can figure it out for himself. Instead he can be seen lurking near the field trip director asking “what’s this?”

20/20 Hindsight
This collector has many years of collecting experience and they were all better than the trip he is on now. At least that what he thinks. He is fond of talking about collecting locations that are now built over by condominiums or super-highways. Does not recognize the passage of time. Never looks at his old specimens that he has boxed up in his garage to see if they really are as good as he remembers.

Golden Pick
He has a backpack filled with credit cards used to purchase minerals at the local rock shop. Breaks into a sweat easily at the thought of swinging a hammer. His criteria for a good field trip is a pool and remote control TV at the motel.

Braggart
Again, this collector has not been humbled by collecting next to a real pro. He walks around and, without you asking, will pull out to show you hundreds of fragments of crystals that you threw away two hour ago. The braggart does not collect quality, he collects quantity. Can often be heard saying “well it’s not much, but it counts”. The braggart thinks he is in a competition, but in a real competition, he would not last until lunch.

The Workhorse
Motto is run silent, run deep. Slow and steady. He starts in at one spot and sticks to it throughout the day. If there is a specimen to be found he will get it.

First Timer
Expects the location will be littered with 1” gemstones. After the inevitable beginners luck discovery of a 1” gemstone, he finds it is all downhill. Becomes a poker.

Poker
Plants himself on the ground and pokes around usually with a stick he found at the site. Always comes away empty handed and is usually the most vocal about the failure of the club to plan good trips.

Got it, Done it, Been there
This is truly the hardest type of collector to spot because he seldom actually goes collecting. He was there twenty years ago and collected 5 pounds of stuff then. It was crap then and he does not need more crap, even if there was a major recent discovery. When the Plumbago mine discovery was made at Newry, Maine you could hear a collective “Ha, there ain’t nothing up there!” from these guys all over New England. When confronted with specimens from new discoveries exclaims loudly that they were better in the old days.

Pseudo expert
No, this is not a collector of pseudomorphs. This is the guy that that looks over your shoulder (often while poking the ground with a stick - see poker) and tells you that you are using the wrong tool or working the wrong zone. Often has odd theories about pocket zones involving the Coriolis Effect, left hand quarks, or cold fusion. No amount of factual articles can sway this guy from his theories. And he never actually does any collecting, he prefers to direct others.

Vampire
This is the rarest collector of all to be seen in the field. He is a nocturnal collector that only collects in active quarries at night. Can be spotted with essential camouflage outfit, flashlights, lawyers phone number and bail bond card. Never collects at any location open to the public. Only knows the back entrance into a quarry and has memorized the work hours of each quarry. This collector always has the best specimens.

Leech
This collector attaches himself to the side of any successful collector in the hopes of benefitting from their hard work. Can easily spotted saying “Let me squeeze in here”. When dump digging is fond of rubbing shoulders with the collector he is attached to. This collector never actually finds anything except Leaverites (as in “leave it right there”). His bad habits comes from being used to parallel parking in the city.

Field Trip Director
This guy is the collector most likely to loose his patience and temper, especially after being asked the same question that he just answered ten times. Often
mistaken for a travel agent by other members too lazy make their own arrangements. Can be identified by the bags under his eyes resulting from members calling his home late at night and early in the morning.

NYMC Member
This is the ideal collector (“low maintenance” in field trip director lingo). He understands that this is a group effort and does not think of himself first. He can be spotted giving away crystals to others, sharing food and water, lending a hand to others to move large rocks. He never complains to the field trip director when it is too late to change the situation. He brings everything on the tool list, nothing missing, nothing extra. He knows his physical limits and only participates at locations that are appropriate. He arrives early at the meeting location, collects steadily all day, he maintains his interest past 2:00 P.M. and is the last person to stop collecting. He has a car and always bring another member who doesn’t with him knowing it is an opportunity to make a new friend. Always thanks the van driver and field trip director at the end of the trip.

Is It Amber or Is It Fake?
by Richard Busch, FGMS
In an article which appeared on the front page of the July 7, 1993, issue of The Wall Street Journal, Warren Getler described the piece of amber he bought for $800: “The eyes of the entombed lizard glared defiantly as I marveled at the critter’s near-perfect state of preservation, its features frozen in time for 30 million years in a sneaker-sized chunk of glossy amber. I loved that lizard. It was a paleontological beauty, the kind of piece amateur fossil collectors like me dream of owning.”

Mr. Getler went on to describe the results of an analysis of his piece of amber that was performed at the American Museum of Natural History. In addition to the lizard, the amber contained an anachronism—two strands of human hair. The specimen was significantly less than 30 million years old. The lizard, it was determined, was a modern Caribbean tree climber known as an anole. The final insult: The “amber” was revealed to be made of nothing more than the unsaturated polyester used to repair fiberglass speedboats.

Getler purchased his speedboat resin, as amber, from a New York gem and mineral dealer. Did the dealer know the “amber” was a fake? Perhaps. Perhaps not. Amber fakes continue to get better while the demand for amber continues to increase. As a result of this fall’s release of Jurassic Park on videotape, the demand for amber is expected to skyrocket—along with the availability of fakes. Mr. Getler quotes Francis Huber, Curator of Paleobotany at the Smithsonian Institution: “A good 80% of the stuff brought to me is fake.”

So, with a significant amount of phony amber in the marketplace, how is a potential purchaser able to answer the question: Is it amber or is it fake? In general, no single test is absolutely conclusive. However, the results of several tests, taken together, can tell you whether the specimen you cherish was made 25 or more million years ago by the forces of nature, or last week by an unscrupulous person in their garage.

Specific Gravity: Dissolve two tablespoons of table salt in eight ounces of water. Remove the “amber” from any mountings and drop it into the solution. If it sinks, it is not amber. If it floats, it may be amber.

Hardness: Try scratching the “amber” with your fingernail. Real amber has a hardness of approximately 2.5 on the Moh’s scale. If you can scratch the specimen with your fingernail, it is not amber. If you are unable to scratch it with your fingernail, it may be amber.

Static Electricity: Place some small pieces of tissue on a flat surface. Rub the “amber” vigorously against a piece of velvet until it is warm and hold it about one-half inch above the tissue pieces. If the pieces of tissue are not attracted to the specimen, it is not amber. If tissue is attracted to the specimen, it may be amber.

Smell: Rub the specimen briskly on a piece of cloth until it gets warm, then smell it. If the specimen emits a plastic or chemical smell, it is not amber. If it emits a mild pine or turpentine odor, it may be amber. Look out for the possibility that the specimen might be copal, which we will discuss later.

Refractive Index: Drop the specimen into a glass of mineral oil, such as Johnson’s Baby Oil. The oil has a refractive index very close to that of amber -- 1.54. If the edges of the specimen are easily distinguished from the oil by either a dark outline or light halo, the
specimen is not amber. If it is difficult to discern the edges of the specimen, it may be amber. Note: This test may be difficult to perform if the amber is exceptionally dark. Try to disregard the color difference between the specimen and the oil.

**Taste:** Wash the specimen in mild soapy water, rinse it thoroughly, then taste the specimen. If you detect anything other than the mildest taste, especially if you notice any strong, unpleasant, or chemical taste, the specimen is not amber. If the specimen has no taste (or one that is very subtle) it may be amber.

**Entomology or Paleontology:** If the “amber” contains an insect or other animal, try to have it identified. Most insects and animals found in real amber are extinct. If the animal is not extinct, or if it does not match those found in amber documented from the same location, the specimen is very likely not amber. If the animal is extinct and matches an animal found in amber from the same location, the specimen may be amber. Beware! There have been instances in which an insect has been manually inserted into a piece of real amber.

There are several additional tests which are (or may be) destructive to the specimen. Not everyone may let you perform these tests on a piece of “amber” that you are considering purchasing. However, if you have a specimen of questionable pedigree in your collection, you might consider the following tests:

**Hot Needle:** Heat a needle until the tip is red hot, then place the point into the specimen. If the needle goes in easily, or if a bad smell is emitted, or if the needle leaves a black mark on the specimen, it is not amber. If the needle enters the specimen slowly and the specimen emits a pine or turpentine smell, it may be amber.

**Solubility:** Place a drop of acetone, ether, or 95% ethyl alcohol on the specimen. If the area dissolves or if the surface becomes tacky, the specimen is not amber. If the surface remains intact, it may be amber.

**Melting Point:** If you have an oven or other heating apparatus with an accurate temperature indicator, place the specimen in the oven and heat it. Increase the temperature slowly over time to determine its melting point. If the specimen melts below 390 degrees Fahrenheit, it is not amber. If its melting point is in excess of 715 degrees Fahrenheit, it is also not amber. If the specimen melts between the temperatures of 390 and 715 degrees Fahrenheit, it may be amber.

If you encounter a specimen that looks like amber and passes some, but not all, of the tests mentioned above, you might be dealing with a specimen of copal. Copal is best described as “young” amber. Copal, like amber, is formed from the resin of trees. However, unlike amber, copal is only one-hundred to three-million years old. Copal from Kenya and Colombia is frequently marketed as “amber.”

There are several tests that can be performed to distinguish copal from true amber. Copal is softer than amber; it has a hardness of about 1.5 versus amber’s 2.5 on the Moh’s scale. Thus, copal can be scratched with a fingernail. Copal is generally brittle and sensitive to heat or sunlight. It is difficult to cut and polish, and will develop a crazed surface in a few years. Copal has a much lower melting point than amber, about 300 degrees Fahrenheit, and is soluble in acetone. When subjected to short-wave ultraviolet light, copal does not fluoresce. Additionally, the insects in copal are recent—those in amber are generally extinct.

When trying to distinguish real amber from a fake, many collectors frequently overlook perhaps the most important indicator of all . . .

**Common Sense:** Mr. Getler should have known better. If his 30 million year old lizard in amber were authentic, it should have carried a price between $10,000 and $40,000, depending upon its condition. In his article, Getler mentioned that he thought he had gotten it “for a steal.” Well, there was a steal involved. Unfortunately, Mr. Getler was on the losing end. It has been said: If it seems too good to be true, then it generally is too good to be true. This homily applies especially to amber dealings. Even if the situation seems reasonable, the specimen still might be a fake. It is wise to be skeptical these days when purchasing amber. The best bet is to insist upon a return privilege from the seller.

Despite your best efforts, you still could wind up purchasing a fake. If that happens, rest assured you are in good company. Recently, the British Natural History Museum discovered that what it believed to be the oldest specimen of a particular species of bee in amber was, in reality, a fake. The specimen was made of genuine amber. However, someone had
drilled a hole, inserted the bee, and refilled the specimen with melted amber. The specimen was actually less than 150 years old.

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Collecting at the Millington Quarry, New Jersey
Tips and Techniques

Rules of Safety and Conduct for Mineral Collecting Field Trips

- Obey your field trip coordinator. His priority is your safety and the safety of others. Never make him ask twice.
- Do not do anything that will cause personal injury to yourself or any member.
- Do not antagonize the property owners by damaging their property, leaving gates open if they were found closed, cutting down plants, leaving behind a mess, or not back filling holes. Our trips are dependent on owner’s permission to allow us legal access. Always thank the property owners when leaving and offer to share any new finds with them.
- It is the parents’ responsibility to supervise children at all times. They should be supervised so that they do not bother other members, do not injure themselves, and do not cause hazardous situations.
- Do not hold up the trip by being late to arrive or late to pack up and leave. Never stay alone after everyone else has left.
- Stay in the collecting area with other members. Do not wander off into unknown or out-of-sight areas.
- Treat other members as you want to be treated. Do not crowd too close to other members unless they invite you. Do not try to move in on somebody else’s discovery.
- Don’t borrow tools. Bring along all of the tools required. Only use another member’s tools if they are offered. If you damage someone’s tool, pay to replace or repair the tool.
- Bring maps, food and water.
- Do not litter. Take out what you take in.
- Stay away from edges of cliffs or from the face of quarry wall. A good rule of thumb is to stay 10 feet away from any wall or cliff edge.
- Remember, only you are responsible for your safety.

Tips and Techniques for Mineral Collecting Field Trips

Following are some proven methods for successful field collecting.

- Dig deeper than everyone that was there before you.
  Remember that many other collectors have looked over the surface material before you. New stuff is usually at least three feet down.
- Know the minerals that you are looking for.
  Find out what minerals can be found, what color they are, what associated minerals are good signs.
- Stay alert.
  Stay focused on collecting. If you are talking, you are not looking.
- Do not forget food and water.
  Dehydration and low blood sugar will keep you from focusing on the minerals. Keep up your water and food intake.
- Use the right tool for the right job.
  Do not use tools that are not intended for rock work. They will break and be useless.
- Get Dirty!
  You have to get down into the hole you dig to get the good stuff. Do not go collecting if you don’t want to get dirty.
- The best specimens are often “made”.
  Good crystals are often exposed after you get home with careful chipping away the surrounding rock or the use of acids.
- Use the largest hammer you can.
  The size of the pieces you take home is proportionate to the size of hammer you use and the size of rock you can break.
- Hard work pays off, keep looking.
  Collecting good specimens is 1% luck / 99% hard work.
Gear and Supply Checklist for Field Trips

This list is the absolute minimum required for most field trips!

**Clothing**
- **Hiking Boots**
  - Rei
  - Reinforced toes*, Vibram soles, waterproof.
- **Clothing**
  - Dress in layers, light colored clothes to spot ticks and keep you cool in the sun.
- **Eye Protection**
  - Sunglasses, prescription glasses, or safety goggles.
- **Gloves**
  - Leather work gloves protect against sharp rocks.
- **Hard Hat**
  - Available in any hardware store.
- **Rain gear**
  - Tuck away a poncho or raincoat.

**Outdoor Gear**
- **Backpack**
  - Or rucksack for carrying tools in and rocks out. Get one that is heavy duty with lots of pockets.
- **Insect Repellent**
  - DEET based. 12% for on skin, 100% on clothing.
- **Sunscreen**
  - To prevent sunburn from ruining a good trip.
- **Maps**
  - The club map to the site plus a road map.
- **Food and Drink**
  - Minimum: a quart of water per person, plus lunch.
- **Toilet Paper**
  - There are no bathrooms out there! Plus toilet paper is great for wrapping small crystals.
- **Optional Items**
  - Band-Aids, camera

**Collecting Tools and Supplies**
- **3 lb. Hammer**
  - The single best tool to have.
- **Box or Bucket**
  - To carry all your stuff in. A heavy duty 5 gallon bucket found at construction sites and hardware stores is best
- **1" Chisel**
  - Sometimes handy, but not absolutely essential.

18-24" Prybar
- The 22" prybar from Estwing tools is best.

Newspaper
- To wrap large specimens from getting damaged.

*Field trips to operating quarries require hard hats and hard toe hiking boots be worn. You will nor be admitted without them. NO EXCEPTIONS!

**Tick Prevention**

The ticks this year have been pretty bad for some reason. As we start our fall field trip season it is worth reminding all members of the basic steps to prevent tick bites.

1. Wear light colored clothes so you can spot the ticks before they bite. No jeans.

2. Before dressing apply 8-15% DEET repellent to your skin at the ankles, waist, neck, and arms. Children should never use more than 10% DEET repellent.

3. On your clothing apply 100% DEET repellent at the same areas.

4. Tuck your pants into your socks. The ticks tend to climb up and this will keep them from going under your pants cuff.

5. Wear a hat with 100% DEET repellent to prevent the ticks from getting in your hair.

Remember ticks do not usually bite for 12 hours. So the best prevention is a change of clothes and a shower (the sooner, the better). Our next two field trips are in tick territory, do not take this warning lightly.
Collecting Tips
from Ed Harvey, Maine Mineralogical and Geological Society

Mr. Harvey pointed out on our club field trip to the Ham and Weeks Quarry in Wakefield, NH. that when you are collecting at a mine dump with lots of mica that your clothes reflect off the mica flakes. This results in seeing flashes of color where color does not exist.

His tip is to wear neutral colored clothes to these locations. If you are looking for blue beryl, as we were, you certainly should not wear blue jeans and other blue clothes. Of course you still have to deal with mica reflecting the blue sky.

from Henry Kennedy

Mr. Kennedy repeated a collecting hint that I learned years ago. He told us at his recent lecture that the best collecting tool is a screwdriver. This is especially true if you collecting where there are pocket formations such as pegmatites, miarolitic cavities or Herkimer diamond locations. In pegmatites, the cavities are often collapsed and the crystals are loose in the pocket. A screwdriver is perfect for probing the pocket clay and removing crystals. And, as you clean out the pocket, it helps you pry out crystals in the back of the pocket, especially if your hand does not fit in.

The owner of the Hickory Hill Diamond Diggings, Bill Petronis, uses a screwdriver to probe the Herkimer pockets. He can tell by sound or touch whether there are any crystals in the anthraxolite.

Other tools can also be substituted. Ice picks, coat hangers, etc. can come in handy. If you are going to buy a screwdriver get a long one (>9”) with a small tip. Considering the small size and weight there is no reason that you should not have a screwdriver in your back pack.

from John Betts

Keep your area clean.

The seams and pockets in the hard rock at Fonda have loose crystals often in with pocket soil. When breaking up the ledge or boulders the soil falls out, often with crystals in it. The crystals that you pick up off the ground comes from this soil. With this fact in mind, when working the hard rock you should carefully screen through the pocket soil with a 1/8” mesh screen.

You should always start your day by scrupulously cleaning the area you are working. Then as you move the large blocks of ledge rock and break them open you know that all of the soil is a result of your effort and is fresh. You can screen with the confidence that the odds are in your favor that it contains crystals, often from a single cluster that can be restored.

If when you start at a new location you are unsure of whether the soil was previously screened, then take the time to screen it again. Two man teams work well in these situations, one person screening the other digging.

I learned this one the hard way. While collecting at Hickory Hill in June I had opened up several small pockets and was getting lazy about screening the soil. A young collector watching from the ledge above spotted a flawless 3/4” crystal in the soil that I left in my hole. She found it, she got it. And I vowed to never let another crystal to escape so easily.

Herkimer Diamonds

When hunting Herkimer Diamonds, try working hard rock. Because the best you can ever hope to get when looking on the ground is single crystals. And if they are larger than 1/2 inch then they are likely dinged someplace.

But when you work hard rock you have the potential to open a fresh pocket and collect a complete cluster of crystals. Often the cluster needs restoration, but you have all of the pieces. Also, you are the first person to ever touch these crystals and they are unlikely to have any damage or dings.

It is strictly a gamble though. But when it pays off, the crystals can be spectacular.

Polishing Jade

Any Piece of Jade Will Take a Polish

by Tom Leedham from Fossil Trails 10/94

Jade varies from piece to piece in characteristics that affect grinding and polishing. If one system fails a person must try alternatives that eventually will result in a creditable polish. Grind and polish as you
would an agate. Remember jade is softer and more fibrous. Take the following precautions:

1. Trim saw your piece out of the slab without pushing. Take your time. If you try to push the sawing you may start small edge fractures that will show up in the final stone.

2. Grind to size using plenty of water. Don't push hard or you may get a "white spot" or spread the edge fractures.

3. Grind to shape using a steady turning of the stone on the wheel so that you are taking off the unwanted material without danger of enlarging any small edge fractures. Don't zip back and forth. Be on the lookout for potential hard spots. If they show up carefully take them down.

4. 220 sand with uniform strokes - steady, but light. Check frequently. The grinding marks will disappear quickly. The shaping of the stone is the main thing.

5. 320 sand the hard spots if any will start to show.

6. 400 sand - work the hard spots down. Finish sanding lightly and complete the shape.

7. 600 sand - light steady pressure.

8. Polish on a leather disk. First clean off the buff with a wad of wet paper toweling and squirt water on at the same time. Get rid of all the old tin oxide and crud that you possibly can. Polish the stone on the leather near the center of the disk. In other words, use slow speed. Use a squirt of water on the buff. put a little dab of tin oxide on your stone - not on the buff. When the buff starts to dry you will get the best pulling action. You can use pressure but get the pulling action.

Jade takes much longer to polish than agate. Don't give up!

If the stone winds up having irregular marks, orange peel, lumps, or hard streaks, you will have to try something else. The best alternative is a system of hand finishing.

Hand Finishing

1. Go back to the 400 grit drum and try to get a good looking shape and contour. Maybe you will have to go to 320 if it is an old belt then to hand finishing.

2. Alternatively - use the hand finishing sequence. This requires "wet-or-dry" sandpaper. It may be available in hardware stores, lumber yards or home improvement center. It is always available in stores that have material and equipment for the auto body repair trade.

Get 320, 400, 600, 1200 (or ultra fine). The sheets cost about $.85 for an 8-1/2 x 11" sheet. but the sheets (or fold and tear) to 1/8 size (23/4" x 4-1/4"). This size fits comfortably in your hand. Also, you should have a flat piece of wood (paint paddle) about 5" long.

Leave your stone on the dopstick.

1. To remove streaks or lumps lay a piece of 320 on your stick. (Better yet, glue the sandpaper on the stick and use as a file.) Hang on to the paper and stick with one hand. Wet the stone. (You need a cup or small container of water.) Dip your stone in water and precisely and carefully sand off the high spots. Actually sand them slightly below the surrounding surface.

2. Take the 320 paper in your hand. Wet the stone. Sand the stone by turning in the paper in the palm of your hand. With a bit of trial and error you can get a good contour.

3. Go to 400, 600, and finally 1200 in your hand. Be careful not to recreate the streaks, lumps, etc. By 1200 the stone should have almost a polished look.

4. Use a piece of leather to polish by hand. I have a piece of old leather from a dining room chair seat. use the "inside" of the leather. Again, put the leather over your hand, put a dab of tin oxide on it. Wet your stone and rub it on the leather. As the leather dries you will feel the pulling action. Keep at it!! Obviously this is slower than a machine buff, but you will get good results.

4A. Alternatively you can try your powered leather disk with light pressure in #1 speed position with a little tin oxide and quite dry.

Shop Hints

from THE ROCKY ROAD via many bulletins

Brighten Tiger Eye and other iron containing rocks by boiling slabs or cabs in oxalic acid. One tablespoon acid crystals per cup of water is needed. Let stand several hours. Or soak cold for several days or weeks. This removes the iron oxide in the rock.

Oxalic Acid
Q: Someone suggested Oxalic Acid to clean up the brown stain on mineral specimens that I have collected. Does it work? How do you use it?

A: The brown stain on minerals is an iron oxide sometimes called limonite. It is easily dissolved with oxalic acid. It works well on quartz, beryl and other pegmatite minerals but because it is acidic you should test other minerals before trying it on all your pieces. (It is not recommended to use oxalic acid on zeolites or calcites.) As long as you do not boil it there are no fumes to worry about.

You can purchase a 16 oz. box of Rainbow brand oxalic acid at the hardware store. It should be mixed with one gallon of hot water. Always use a glass or plastic container. I usually mix up a two or three gallon batch and keep it in a five gallon bucket commonly found at construction sites or hardware stores. These buckets have snap on lids that really seal the solution in.

You can soak minerals in it at room temperature or heat it to bath water hot - NEVER BOIL IT. The action of the acid depends on the amount of iron oxide to be dissolved and the temperature of the acid. Smoky quartz from New Hampshire cleans up in about fifteen minutes if the acid is hot but may take a day at room temperature.

Oxalic acid is highly toxic so be careful. It can be absorbed through the skin and apparently accumulates in the liver causing damage. Always wear gloves.

After your minerals have soaked, wash them thoroughly in hot water for several hours. Some people add baking soda to the wash water but I feel that is only necessary with more active acids like hydrochloric.

Your one gallon mixture will last for quite a while. It will change color as it absorbs the iron and will eventually turn a dark brown when it is exhausted.

Q: You said we should wash our minerals in water in running water for three hours after cleaning with oxalic acid. Three hours is a lot of water to waste. Are you sure?

A: Three hours is the minimum time. However the water just needs to be little more than trickling, not full flow. The idea is to constantly dilute the water as the acid leaches out of your minerals. Also since the acid is heavier than water it is more efficient to arrange for the water to flow out through the bottom of the container. Many photographic darkroom print washers work on this principle. But a small hole in the bottom with an equal flow to the water in from the top will be adequate.

Insurance

Q: I understand that club members are covered by an insurance policy while on club field trips. What are the details of the policy?

A: You are close but not exactly correct about the insurance. Club members are not covered for personal injury. You should have your own health insurance, auto insurance, and personal liability policy. The club is covered for up to one million dollars for any damage members may do to private property that the club is collecting on or to injury of others caused by a club member. Ironically, if a guest (non-member) is injured by the actions of a club member they are covered under the policy, but the member is not. So please be careful on trips and please make sure your own insurance is in order.

Ken Colosky and Zach Silver collecting at the Brookdale Mine, Phoenixville, Pa.
Collecting Locations

Following are locations that the club has visited on past field trips. Unfortunately, the status of each cannot be checked and changes often. Inclusion in this book does not give an individual the right to trespass. ALWAYS ASK PERMISSION prior to entering a collecting location. ALWAYS RESPECT THE PROPERTY OWNER, you are his guest. When in doubt, do not enter.

Selenite Diggings, Kerhonksen, N.Y.

Minerals: Double terminated crystals of Selenite to 3 inches long.

Description: Clay bank exposed in side of hill. Dig in clay looking for clear to muddy selenite. Larger crystals tend to be near bottom of bank

Bring: Shovel, hand tools, water to clean specimens, clean change of clothes

Directions: Take Rt. 17 from Middletown to Rt. 209 North (East). Near Kerhonksen watch for exposed clay bank in hill side on your left. Park opposite clay bank at small video store.
Hickory Hill Diamond Diggings, Fonda, N.Y.

Minerals: Flawless double terminated quartz crystals (Herkimer Diamonds)
Description: These mines are famous for water-clear, Herkimer diamonds (double terminated quartz crystals.) Pockets can contain hundreds of these beautiful crystals often in clusters and occasionally containing water or bubble inclusions. Last year while they were digging a pit for an outhouse they dug up grapefruit sized crystals just in the topsoil! This site offers hard rock collecting for those that have the energy. For the less energetic you can screen through the soil and find crystals that have weathered from the rock.

Bring: Screens, hand tools, prybars, sledge hammers, insect repellent.

Only open three weekends a year (Memorial Day, July Fourth, and Labor Day.)

Margaret Hastings Diamond Diggings, Fonda, N.Y.

Minerals: Flawless double terminated quartz crystals (Herkimer Diamonds)
Description: This location is open year round. For a fee (annual or daily) you can stake a claim for your exclusive use. All types of tools are allowed, including hydraulic and pneumatic.

Area Motels: Clover Leaf Motel - 518-853-3456
Riverside Motel - 518-853-3314
Gore Mountain Garnet Mines, North River, N.Y.

Minerals: Large almandine garnet to 12 inches diameter.

Description: You can tour and collect at the Barton Garnet Mine on top of Gore Mountain near North River, N.Y. With prior arrangements, clubs can collect all day. This is the world’s largest garnet deposit. Crystals of garnet here are as big as 20” across. Collecting facet grade material is very easy, requiring little more than a hammer to break open the crystals and a watchful eye. Specimen collectors need to take more time to collect crystals intact. The mine is about four hours from New York City.

Bring: Hand tools, shovels, prybars, sledge hammers, insect repellent.

Directions: From NYC, take Rt. 87 to Lake George. At exit 23 take Rt. 9/Rt. 418 West to Rt. 28 North. About 25 miles north on Rt. 28 is North River. Look for Barton Mines Road on your left and take it to the mine office, visitor center.

Fees: $2.00 per person/$1.00 per pound of garnet (paid to the quarry).
Bear Mountain Bridge Area, Cortlandt, N.Y.

Minerals: Epidote, clinochlore, pyrite, stilbite, natrolite, feldspar (this is a cuttable grade that could be considered moonstone)

Description: In 1992 the New York Dept. of Transportation widened a narrow road cut and falling rock hazard on route 6. The blasted material was dumped nearby and is easily accessible to collecting.

Collecting is on very steep slopes, only those people comfortable with collecting under these difficult and possibly dangerous conditions should visit.

Bring: Hand tools, prybars, sledge hammers, insect repellent, food and water.

Directions: From Manhattan, take the George Washington Bridge to the Palisades Parkway north. Stay on the Palisades until the junction with Route 6. Take Route 6 east to the Bear Mountain Bridge and pay $.75 toll. Stay right over bridge and go east on Route 6 for about a half mile to a scenic overlook. Park here. The collecting area is east of the parking area down the hill from the road.
Essonite Garnet Outcrop, West Redding, Ct.

Minerals: Essonite Garnet

Description: Small outcropping on southeast side of road 1/2 mile from train station. The rock is very hard, heavy tools are recommended.

Bring: Hand tools, prybars, sledge hammers, insect repellent, food and water.

Directions: From the West Redding train station follow road along railroad tracks to the southwest. 1/2 mile from station look for rock outcrop on your left. There is a very small area for one car to park at the foot of the outcrop. Park here, and collect above.
Swanson’s Quarry, Haddam Neck, Ct.

Minerals: Fine to coarse grain purple lepidolite, muscovite, green to yellow beryl, green tourmaline

Description: This is an old pegmatite quarry with very extensive workings. There are several dumps for collecting as well as nearby prospects for hard rock collecting. It is not easy to find without a. It is an easy, level hike to the quarry. There are no restrooms or food service at this location, come prepared.

Bring: Bucket, hand tools, prybars, hammers, insect repellent, rain gear, food and water.

Directions: From NYC take the Merritt Parkway to the Wilbur Cross Parkway (both CT 15), in Meriden exit to CT 66 east. Follow 66 through Middletown and over the Connecticut River (watch out after the bridge, Rt. 66 takes a right turn) and to the town of Cobalt, turn right onto CT 151 south. Go 3.5 miles to Haddam Neck Road on right (clearly marked turn for Haddam Neck), go 1/2 mile to firehouse on left. Park out of the way of the fire trucks. Hike west under the power lines along the well used utility road. You will go by several other pegmatite prospects. As the trail starts to head up a steep hill turn right and head into the woods (north). You will see dumps scattered in the woods to the east and west. Take time to explore the whole are before choosing where to dog.
Biermann’s Quarry, Bethel, Ct.

Description: This is an old pegmatite quarry that was mined for muscovite and feldspar. It has been closed for 40(?) years but has extensive dumps to collect on. There are two areas worth collecting.

Minerals: Dravite tourmaline can be found as double terminated black crystals to 4” long by 1.5” thick in the ledge and boulders west of the quarry. These crystals are quite lustrous when cleaned up. The quarry dumps have beryl and unique bertrandite pseudomorphs after beryl. Bertrandite can also be found as crystals in between plates of cleavlandite. Many of the crystals of bertrandite are twinned on the C axis and vary in size between 1/32 and 1/4.

Bring: Screens, hand tools, shovels, prybars, sledge hammers, insect repellent.

Directions: From NYC it is 1 hour 45 minutes to the parking area. Take the Merritt Parkway to Rt. 7 North. Follow Rt. 7 to Rt. 107 near Georgetown. Take Rt. 107 North all the way until it ends at Rt. 58 near Putnam Memorial State Park. Turn right on Rt. 58 (South), go .1 mile past the two park gates on left to Pocahontas Rd.. Turn Left, go for 1 mile (bearing left at fork with Wood Rd.). At intersection with Sunset Drive Rd. go right for .1 mile and turn left on Old Dodgington Rd.. Follow this past the small ponds on the left and right to the parking area.
Topaz and Emerald Site, Trumbull, Connecticut

Minerals: Topaz, fluorite, calcite, fluorescent scheelite, beryl, pyrite, almandine garnet.

Description: A new construction site in Trumbull, Ct. is producing a number of great mineral specimens. Among the finds were double terminated topaz crystals, purple and green fluorite octahedral crystals, gemmy red (almandine?) garnets in calcite, pyrite crystals, and most importantly the first(?) documented occurrence of emerald in calcite pods in schist.

Nearby is Old Mine Park where there are several collecting locations. Inquire with the park personnel for more information.

Directions: The site is being cleared and leveled for the construction of an office building and is just west of the old tungsten mine. You can reach it by taking the Merritt Parkway to Rt. 25 North to Rt. 111 North in Trumbull. After turning right on Rt. 111 go two lights and you will see the site on your right. Turn in and drive up and all the way around the back on the north side of the site you will see others parked and collecting.

Many of the most productive areas are covered with broken rock so you may have to do some clearing. Look for calcite veins. That is where the fluorite and other sulfides are found. The emerald, if you can find it, occurs as small pods of white calcite in the schist, and the green color is unmistakable. The topaz area seems to be deeply buried and probably not accessible until they excavate further for the building foundation.
Timm’s Hill Prospect, Haddam, Connecticut

Minerals: Double terminated schorl crystals in albite matrix, lapidary grade iolite

Description: This is a small collection of prospect pits scattered in the woods and heavily overgrown (yikes! ticks!). The location is a ridge to the east of a boy scout camp. It is not easy to find without a guide. There are no restrooms or food service at this location, come prepared.

Bring: Bucket, hand tools, prybars, hammers, insect repellent, rain gear, food and water.

Directions: From NYC take Interstate 95 east to CT 81 north (exit 63?). Follow 81 north past the junctions of CT 80 and then CT 148. Go 2.9 miles past the junction of 148 to a right turn onto Parker Hill Road. Then take a quick (1/10 mile) left onto Beaver Meadow Road. Go approximately 4 miles to a four way intersection at a small bridge, turn left onto Hayden Hill Road. Follow to Timm’s Hill Road, turn left. Go Approximately 2/10 mile up hill to where Timm’s Hill Road makes a sharp right turn, you will see the scout camp entrance on your left. Park here. Walk in to the scout camp on your left (southwest) following the main road. Turn left before the pond and pass over a small bridge. Continue up hill on the trail to the camp sites. As you reach the first sites, bear left off the trail, through the camp into the woods (east-southeast). Start bushwhacking down a gully and up again to a low ridge. This is heavily overgrown. The collecting is along the ridge at several locations. Look for where other people have dug.
Case Quarry, Portland, CT.

Description: This is a well known location for blue beryl. You can see crystal casts of beryl crystals to 15” diameter. Unfortunately the trench that all of the big crystals comes from is very narrow, this makes work extremely difficult. Also the beryl is in a pegmatite vein, you must hammer and chisel the beryl out of solid feldspar.

There are dumps at the site where smaller beryls can be found. But the area has been thoroughly scoured over the years, so you must dig down.

Bring: 3 lb. hammer, chisels, gad, prybar, food and water

Directions: Take the Hutchinson Parkway, turns into the Merritt Parkway and that turns into the Wilbur Cross Parkway also called Route 15 East. North of New Haven about 20 minutes you will come to an exit for 91 North and Rte. 66 East. Exit on 66 East and follow all the way into Middletown.

Keep following 66 over the bridge into Portland.

In Portland stay straight off the bridge following the signs for Route 17A that will take you by the river on your left. You will come to a stop sign at the junction with Route 17. Go Straight, continue past first left, turn left at the “T” onto Old Marlborough Road (road names often are renamed in this area, so cross your fingers) Follow Old Marlborough Road around to the north, turn left on Thompson Hill Road. You will cross underneath the power lines. Take the next right onto Cotton Hill Road. Follow until you are under the power lines. Park here.

Follow the path to the left (north and uphill) that is under the power lines. The path goes low and swampy at first and then climbs up. Keep going past the first crest, you will go up a second hill. At that crest you will see the mine dump on your left (lots of broken up quartz/feldspar rocks). This is the first pit. Back in the woods 100 yards is the second pit.
Garnet Mines, Roxbury, Ct.

Description: Greens Farm Garnet Mine is an old, classic location. Large almandine garnet crystals to 1” across can be found in both hard rock or loose in the soil. The old mine dumps are also scattered around the woods and provide loose crystals without much work. The garnet is a dark wine red to black color, and commonly dodecahedral crystals in a schist matrix. Much of the matrix is very soft, but the best garnets are found in the harder schist. The mine is located in a rural area of northwest Ct. and is an enjoyable drive from the city.

Minerals: Almandine Garnet, Staurolite

Bring: Hand tools, prybars, sledge hammers, insect repellent, food and water

Directions: From Manhattan, take the Saw Mill River Parkway or Interstate 684 North to Brewster. Then get on Interstate 84 East to Route 7 North. Take Route 7 to Brookfield and turn right on Route 25 South. Follow Route 25 for about a mile to Brookfield Center and turn left on Route 133 North. Follow Route 133 for about 6 miles, before you reach Bridgewater, as you go up a small hill, look for Stuart Rd. on your right. Turn on Stuart Rd. (East) and follow it, it may turn into Treat Rd. or Minor Bridge Rd.. After it crosses the Shephaug River it will come to a "T". Go right to Roxbury Falls (a small group of building with River Rd. branching off to the right). Stay left through Roxbury Falls, as the road turns left and goes up a hill you will see Perkins Rd. on your left. Turn on Perkins Rd., take it all the way around a left curve and straight into the old farm. Do not turn right after the left curve. The farm is straight ahead and there is a newer house to the right, you can park near the house and pay the owners the $2.00 fee.

Fees: $2.00 per car.
Kyanite Prospect, Judd’s Bridge, Ct.

Minerals: Kyanite, staurolite, milky quartz.

Description: This is a small prospect pit that has produced some deep blue kyanite in milky quartz. It is a small prospect though with very little room to work and often flooded during the wet season. The kyanite is in solid quartz, very heavy tools are required to work the rock. There may be some other prospects worth exploring.

Bring: Hand tools, heavy hammer and chisel.

Minerals: Grass green pyromorphite, galena, wulfenite, cerrusite, quartz crystals.

Description: The Brookdale Mine and the other area mines are famous classic localities for mineral collecting in the northeast. They are known for the lead minerals that it produced. Presently the Pickering Valley Golf Course occupies the site. But the owners have been careful to preserve the site of the mines for collecting.

Because the mines has not operated in many years, dig in the mine dumps, where the unused rock was deposited. You will need digging tools and should dress in old clothes. You can easily collect quartz crystals here, the old timers would throw away any crystal smaller than a coke bottle! But the real prize are the pyromorphite crystals on quartz. These are grass green and show typical barrel shaped crystals. Other minerals listed below are rarer and much harder to find.

There are two mines on the golf course, we will start the day at the Southwest Chester Mine. This is north of the green of the thirteenth hole. Because you will be disturbing the golfers, stay together as a group at all times. At all times respect the golfers who are using the course, stay off the grass and keep to the cart paths.

Bring: Hand tools, shovel, garden tool for digging, insect repellent, food and water, sunglasses,

Directions: Driving Time From NYC: 2 Hours
Limecrest Quarry, Sparta, N.J.

Description: The Franklin-Ogdensburg Mineral Society sponsors a field trip to this quarry twice a year, open to all Eastern Federation clubs, that includes our club (you must have your club membership card to get in.) Collecting is allowed only during these field trips, otherwise no trespassing. This is an enormous working quarry located in the Franklin Marble belt in northwestern NJ.

The collecting is usually on the lower two levels of the quarry, and you must walk all the way in. No vehicles are allowed. You must stay away from the quarry walls by at least ten feet. But there are lots of large boulders and fresh blast material to collect from. In the past when there has been special material of interest to collectors (like the galena, sphalerite, barite). Every time we have a trip here somebody finds a unique or special specimen. There is no predicting what you will find.

Minerals: Corundum, graphite, tremolite, galena, fluorite, sphalerite, spinel, barite, calcite, brown tourmaline, fluorescent norbergite, tremolite.

Bring: **hard hat, hard toe boots, membership card**, hand tools, prybars, sledge hammers, insect repellent, food and water, sunglasses, rain gear (the trip is rain or shine).

**NOTE** This is an operating quarry. They are required by law to enforce the hard hat and hard toe boot rules. You must have this equipment in order to be admitted.

Directions: Take George Washington Bridge to Route 80 west. Near Dover, exit to Rt. 15 north. Stay on Rt. 15 through Sparta. After Sparta the road narrows to undivided highway. About 1/2 mile beyond look for a flashing light at an intersection, turn left. Follow this road around to the quarry (it will jog right around the north end of the quarry) The entrance is around on the south side. You will see a line of other cars waiting. The gate is opened at 9:00 a.m. Arrive early to avoid the line to sign in.
Amber Location, Sayreville, N.J.

Description: The April 1995 issue of Lapidary Journal had a four page article about a new find of amber in New Jersey. The article tells in great detail the story behind the amber and of recent collectors finding 5000 pieces during a three week dig. But, they did not tell you where it is found. Here it is. Amber occurs in areas of black lignite, they are the remnants of four ancient forest floors. The amber is in the lignite and in the associated marcasite/pyrite nodules. Much of the amber fluoresces bluish-white. Most amber occurs as find BB to pea size pieces. Only rarely do they get larger.

Bring: Take a change of clothes because it is extremely muddy.

Directions: See map below. I prefer to park at Lakeview Drive and cross north over the railroad tracks to the collecting area. It is private property so do not upset the owners.

Warning

This map is published for information only. No collecting is allowed! The American Museum of Natural History has been conducting research at this site for the last four years and will continue in the future. Do not trespass. Do not disturb any of their work. If you find an insect in amber, please notify Dr. David Grimaldi at the AMNH, 212-769-5100.
Sterling Hill Mine Museum, Ogdensburg, NJ

Description: The Sterling Hill Mine Museum is at the site of the old Sterling Hill Mine. Purchased by the Hauck brothers and turned into a museum, the museum offers tours daily and dump collecting on the fourth Sunday of the month. This is a world famous location for mineral collectors, especially fluorescent minerals. Over 300 different minerals are found there. The tour goes underground at this famous zinc mine. You get to see the workings, the shops, and the famous rainbow room where there is an amazing display of the different fluorescent minerals and the ore body. There is also a museum display of minerals and mining.


Bring: Hand tools, food & water (though there is a snack bar), camera.

Collecting: There is a $10.00 fee for the first ten pounds and $1.00 per pound for anything over ten pounds.

Franklin Mineral Museum, Franklin, NJ

Description: The town of Franklin built this great museum to educate visitors about the town heritage and history. There is a large collection of minerals from Franklin and around the world on display. The museum is built on the Buckwheat Mine dumps, they allow collecting up to five pounds of minerals with admission to the museum.


Bring: Hand tools, food & water, camera.

Collecting: There is a $3.00 (?) museum entrance fee.
Location Notes From Newsletter and Internet Contributors

Forest Service Closes New Mexico Smoky Quartz Location

Once again the US Forest Service is trying to close down the Smoky Quartz location in the Lincoln National Forest. This time they are armed with a special federal order making the removal of crystals illegal. In conversation with Brian Huntsman, one of the four men arrested, he expressed doubt as to whether this was a bluff or not. He has been one of the most active collectors/dealers of specimens.

Bancroft, Canada I

I am a mineral collector in New Jersey, but I sneak away once a year to the Bancroft area of Ontario to collect in the pegmatites and skarns of that region. Last year, my sons and I visited the John Gole quarry, which is well known for its fergusonite crystals. We found some micros, but I also have a thumbnail specimen with fergusonite crystals up to 3 cm long. This fergusonite is an yttrium niobium oxide, although I don't believe that the quarry was exploited for that purpose.

We have also visited the Silver Crater Mine in Faraday Twp., Ontario, where we collected betafite crystals in what is either a controversial carbonatite or a calcite vein dike. The betafites from here have a high U content, but also niobium. I probably have a couple of small betafites kicking around for trading. The last place that comes to mind is the Wal Gem quarry in Quadeville, where I have collected nice, but small crystals of columbite in a zoned pegmatite known for its beryl and tourmaline. Euxenite (very radioactive) is fairly abundant in this quarry, as is allanite. The allanite is mildly radioactive. I may have some allanite from Wal Gem

Contact: Bancroft & District Chamber of Commerce, P.O. Box 539 Bancroft, Ontario, CANADA K0L 1C0
Phone: 613-332-1513 Fax: 613-332-2119

Bancroft, Canada II

LOCALITY: Faraday Hill -- Monck Road Road Cut
TOWN: Faraday Township
COUNTY: Hastings
PROVINCE: Ontario
GEOLOGY: The roadcut is made up of a tremolite-calcite-apatite skarn adjacent to an intruding gabbro dike. The dike can be seen on both the east and west sides of the roadcut, on the southern end of the exposure. The metamorphic effect of the intrusion is readily observable in the host limestone. The marble is an attractive salmon pink and light sea green. A nearby prospect is described as the "Lockwood Occurrence," in Masson (1981) at page 64. Interestingly, Masson's account, written before the present roadcut project states:

"As there are no intrusive igneous bodies in the immediate area of the showing, the authors assume that the uranium originally occurred within the marble sequence itself."

The present roadcut, which straightened out the Monck Road (see Sabina at 47), uncovers some of the igneous activity that probably was responsible for creating the skarn. Whether the uranium was original to the intrusion remains to be determined.

MINERALOGY: The roadcut features some typical skarn constituents, such as amphiboles and sulfides, along with some interesting uranium mineralization.

Sulfides:
Pyrite, as small crystals up to 5 mm and massive material in the marble and in veins in the gabbro

Molybdenite, as thin, euhedral, platy hexagonal crystals up to 2 cm in diameter; the crystals rarely show a pyramidal termination; secondary molybdenum minerals around the molybdenite usually fluoresce bright yellow under short-wave (SW) ultraviolet (UV) light

Carbonates:
Calcite, as massive crystalline material in the marble.
Aragonite, as thin, secondary coatings on fractures; these coatings will typically fluoresce weakly under SW UV light

Oxides:
Quartz, smoky and rarely as small crystals

Uraninite, mostly as massive or highly metamict inclusions in the marble, but occasionally as euhedral crystals (cubes, modified by octahedra, up to 8 mm on edge). The uraninite crystals are usually
black, but occasionally small, steel gray crystals can be found in the marble, with a good metal lustre, which is unusual for uraninite. Blebs of uraninite are sometimes surrounded by hydrated uranium oxides, in colors ranging from tan to yellow to bright red. Typical uranium green SW UV fluorescence can be detected frequently throughout the marble, even when no uranium minerals are obvious. To date, the best (most euhedral) uraninite crystals have been found at the north end of the cut, on the east side of the road; larger masses have been found throughout the cut.

Euxenite, as massive, black-brown to yellow material with resinous luster in the marble

**Silicates:**

Actinolite, tremolite, as bladed and needle-like crystals, ranging from white to dark sea green.

Pyroxene, as massive material in the marble and occasionally as small crystals; occasionally some of the diopsidic pyroxene will fluoresce weakly a cream color

**Phosphates:**

Apatite, as roughly crystallized blue and purple crystals and masses in the marble; the blue apatite sometimes fluoresces weakly gray-blue under SW UV light.

**LITERATURE:**

1. C. Fouts, Bancroft and District Mineral Collecting Guidebook (Bancroft 1995)

**EQUIPMENT:** Small to heavy sledges, chisels, gads for exploring in the harder parts of the roadcut and for breaking up small to medium boulders along the side of the road. A small shovel and a sieve would be helpful in sorting through some of the soil near the skarn (on top and along side) for crystals of tremolite or actinolite, which have weather out of the marble. A Geiger-Mueller Counter would be helpful in detecting uraninite and other radioactive minerals. An ultraviolet light might be helpful in the night for identifying areas of uranium mineralization and molybdenite secondary minerals.

**Bancroft, Canada III**

Here is another in the series. Note the reference to Graphite Road. Graphite Rd runs east to west; it leaves hwy. 62 2 km south of the chabazite locality, and runs west until it hits Musclow-Greenview Rd. About 20 meters before the intersection with Musclow-Greenview, there is a recent blast on the north side of Graphite Road. This blast has exposed some vuggy amphibolite with nice actinolite/hornblende crystals. Also look for an occasional albite crystal. Look on the ground, but the better material will require some work. Look up near the top of the roadcut, where there has been some digging. I found some lustrous, euhedral actinolite crystal, and one smallish (1cm) set of albite twins.

If you continue on Graphite Rd, heading east, and away from Musclow-Greenview, there is a wild skarn, which is exposed by blasting. It starts about 200 meters from the corner. Look for small sphene, zircons, graphite, smoky quartz (crude crystals), and much else. By the way, the National Graphite Mine is off Graphite Road, just up a ways, but the owners are definitely not collector friendly; I have never managed to get permission to collect there.

If you continue in this direction, you will reach Hwy. 62. If you turn left, south, and continue just past where Lake Baptist North Road leaves Hwy. 62 (heading west away from the highway), you will see a parking area on the right hand side of the road. Pull over here to explore the cuts along highway 62, just south of the junction with the Lake Baptist North Road. Most of the cut is in rather dull granitic gneiss, which does have some areas of pegmatization, which may warrant further inspection. On the east side of the road, however, between two larger masses of gneiss, there is a smaller cut, about 100m south of the parking area, on the opposite side of the road. This smaller area exposes an interesting skarn that calls out for close inspection. It was blasted in the summer of 1994, and so it hasn't been picked to death. At the top, I found some diopsidic pyroxene crystals, with a lone chabazite crystal in a crevice between two of the crystals. Also, some sphene, allanite, and blocky actinolite crystals.
You will need some digging tools here; the surface has been picked over, but there is a lot of material loosened from the blasting that requires digging out.

At the lower end of this area of the cut, there is an interesting assortment of skarn minerals, including: serpentine, talc, tremolite, phlogopite (some with fluorite inclusions), olivine, graphite, and much that still needs to be identified.

LOCALITY: Musclow-Greenview Road Roadcut #1
TOWN: Monteagle Township
COUNTY: Hastings
PROVINCE: Ontario
GEOLOGY: The roadcut contains a small lens of calc-silicate metasediments within a body of granite and amphibolite.

MINERALOGY:

- **Sulfides**: Pyrite
- **Carbonates**: Calcite
- **Oxides**: Quartz (minor)
- **Silicates**:
  - Actinolite, as long, green radiating crystals, up to 8 cm; smaller crystals are often doubly terminated and sometimes translucent,
  - Scapolite, occurs as yellow masses and occasionally as subhedral crystals; the scapolite demonstrates fluorescence typical of wernerite under UV light
  - Albite, occurs as white masses, perhaps responsible for blue UV fluorescence
  - Zircon, occurs as small brown crystals up to 5 mm
  - Sphene, occurs as small crystals and masses in the scapolite
  - Biotite
  - Tourmaline, occurs as black, elongated crystals and masses; smaller crystals are often euhedral and attractive blue green

**INFORMATION:**


**EQUIPMENT:** hammer, sledges, chisels, gads

**DIRECTIONS:** From Hwy. 62N, turn right onto Musclow-Greenview Road. Drive 22.2 km to the site, on the right, on the top of a small hill, just south of Hillsview Road. The site is a small roadcut, about 1 km past the intersection of Musclow-Greenview Road and Graphite Road.

**OTHER INFORMATION:** For some reason or another, this site is not in the most recent, 1995, Bancroft Chamber of Commerce Guidebook, but it is right off the road and still accessible. As of August 1995, I was still finding good specimens from this small roadcut.

**Near Bancroft, Canada**

And Bancroft is not on the direct route from Toronto to Montreal but well to the north, so it would mean a major detour of at least a day. BUT if you have the time its worth the visit. Some good dealers are in the area.

Some sites closer to your route but still a detour north:

ACKERMAN MINE near Marmora Gold mine originally. Very good arsenopyrites in calcite, mostly micro (less than .5 cm) but my haul this spring produced a tabular, doubly-terminated xl, that measures 1.7 by 1.5 by .5 cm, as well as several twinned groups about the same size. AND a tabular crystal (broken, alas) with gold particles crusting one side. Unusual twinning (bow-tie, .4 cm, rare) as well as common forms. Need to use muriatic acid to expose the arsenos. But there are chunks of ore exposing several xls that make reasonably attractive specimens in matrix, and often the arsenos are still attached to quartz after dissolving away the calcite. Digging in the dump with the pick end of your hammer or similar tool, look for large chunks of grungy, heavy calcite, usually with arsenos showing.

MARMORA IRON MINE, now owned by Ambro Construction, is fenced and permission hard to obtain, but there are small dumps around the perimeter. It is also a tourist attraction with viewing off Highway 7. Andradite, actinolite, magnetite, pyrite chalcopyrite, calcite, titanite (olive-green, rare), axinite (rare), etc. Good xls common on the main dumps, harder to find outside the fence. BOTH
sites are in areas overgrown by poison ivy and with the extremely wet conditions this year growth should be lush. Stick to paths. Bring insect repellent. Deer Fly and mosquitoes are BAD. Six to eight hour detour at the minimum.

MARBLE ROCK off Highway 32 going north from Gananoque has quartz xls very similar to those at Lyndhurst, Ontario. As of last year it was open to collecting. It is well picked over but there are still some good finds and even the occasional cluster with plates of barite. Unbroken quartz xls are small but good faceting material to be found in the sandy slope below the face of the ridge and in the debris to the sides.

There is a site of dumps off McLeod Rd., Niagara Falls (from construction of the canal) that has sphalerite, fluorite (cubes), dolomite, calcite, gypsum, selenite as well as fossils. Some of it is posted, some parts covered in recent housing developments, but some bits are accessible, at least they were in the spring. Need a sledge and good chisels. Ditto on instructions.

**Ontario, Canada**

The betafites come from the Silver Crater Mine, which was originally exploited as a trench and a pit for biotite mica in the 1920's or so. During the uranium mining boom in the 1950's, the site was redeveloped for uranium that is contained in the betafite. The miners drove an adit, which is still accessible, but which we did not explore for safety reasons. The site is set back about 5 km. from Monck Road, in Faraday Twp., on the farm of the Kerr family. The owners now live off the farm, but there is a new house next to the old farm house, where a sister of the owner lives. She has given us permission to collect whenever we have asked. The betafite occurs in a large mass of calcite, which also contains apatite, biotite, hornblende, pyrite, galena?, zircon. Befata is clearly, however, the reason to make the long hike back to the mine site. There is some contention that the Silver Crater represents a carbonatite, although I believe most writers now think it formed as a calcite vein dike in the regional gneiss. The betafite usually occurs in the calcite as fairly well formed crystals, with distinctive reddish halos around the betafite. There are not many occurrences of betafite crystals in the world, although the mineral is fairly common in Bancroft area pegmatites and elsewhere in the world. The Silver Crater is in Faraday Twp., Hastings Cty., Ontario.

Yes, the betafites are hot! They are gamma ray emitters so you would need lead to shield them. Perhaps you could use an old lead shield from a dental X-ray machine and fabricate some sort of box. They contain up to 35% Uranium oxide, which made them a respectable ore. I store my betafite specimens in a box I lined with heavy lead foil, which I bought from Fisher Scientific. The zircon, variety cyrtolite, comes from a different site, the Davis Quarry, about 20 km away from the Silver Crater. The Davis is on an old mining road, which runs up along the York River, from its intersection with Hwy. 28. The road is rough, but our Jeep Cherokee was up to the task. The site lies in Dungannon Twp, Hastings County. The Davis was a nepheline quarry, and is part of a nepheline belt that runs through the Grenville Province of the Canadian Shield. The nepheline occurs in gneiss and pegmatite with a variety of accessory minerals. The quarry is perhaps best known for its sodalite, var. hackmanite, which has some unusual fluorescent properties. Hackmanite is a deep magenta color, which fades to white in sunlight. UV light, however, restores the striking color in a few minutes. Under the long wave UV light, hackmanite glows a beautiful peach color. I have collected some hackmanite from the Davis on my first trip there in 1990. This summer, I found no hackmanite, but I did find a fair amount of large cyrtolite crystals, one of which you now have.

**Mexico**

The Cave of Swords is in a part of the Naica Mine in Chihuahua, Mexico. It was a small notice about it in Min. Rec. about six ? years ago. I was there in 1988 and the mine is amazing when it comes to minerals. The temperature in the mine is about 63 °C and the humidity about 100%. They are actually mining in a hydrothermal system.

The cave of swords or cave of the spades as the locals call it is in the Naica Mine. The Santa Eulalia mine find was destroyed in the process of building a ramp. It was very spectacular but not preserved as the Penoles company has done with the cave of swords. There is talk that the Santa Domingo find was actually more extensive and had more larger xls than Naica.
Colorado I

I would like to recommend sturdy clothing that you won't mind relegating to mineral collecting and gardening from now on. Don't worry about getting dirty, you find the best stuff when you get right down into the dirt and rocks and go to it. Also heavy boots or sturdy shoes. The comments about eye protection are right on. I have lots of deep scratches and chips in my glasses. Knee pads and gloves are also very good. *Always* be prepared for large rocks to fall on you... that way you are never taken by surprise! Get a 5 gal. bucket and some newspapers to put finds in and a bag to carry the tools around with. Two hammers, a 2-4 lb. sledge to bust up big stuff and a smaller rock hammer to do finer stuff. Get a long (10") chisel to split up specimens or to dig out things from the walls or boulders too large to bust up w/ the sledge. Don't forget the sun shield and/or hat if it is sunny. Also, don't forget water. I have been out there and it is *dry*!! Take a gallon.

I have been to both sites and liked the Calumet mine the best. It is a hike up to it but well worth it. Be prepared to move large rocks and dig to get to nice stuff. I found some great single crystals(xtls)of epidote (.5-1.5") and some nice grossular garnets. Lots of different minerals.

The Ruby Mt. area is an old porphyry flow (volcanic glass) that has many air chambers in it. In some of the chambers you can find small perfectly formed blood red garnets (rubys!), about 1-2mm large, and occasionally a topaz xtl, small clearish/brownish prisms. Don't be hesitant to climb up where it is difficult, that's where fewer people go so you have a better chance of finding something, but the cliff is high and steep so be real careful!! Always keep three points of contact so if one slips you won't fall. Look for large chunks of stuff that seems to have large openings on the outside and then bust it up. The lighter hunks will be more porous so better chance of finding something. You can swim after hunting at the parking area.

Colorado II

About Ruby Mountain: Named for the garnets that are found there. It is actually a rhyollite intrusion (volcanic) and is noted for its' high quality garnets and an occasional topaz crystal. I was reading Steven Voynics book on gem collecting in Colorado and he mentions that the west side of the mountain is privately owned by a man in Nathrop which is basically just a post office and a gas station on US 24, right across from Ruby mountain. He says that with permission and a small fee you can collect on the west side. There is a rock shop about 5 miles south of Nathrop called The Prospector where you can see some garnets and a topaz in matrix from Ruby Mtn. to give you an idea of what you are looking for. While there, I asked them about the man that owns the west side of the mountain and they told me not to worry about it, just go on over there because that's where I would find some good stuff. Well, I'm not one to trespass so I stuck to the east side which is on BLM land. There is a good trail to the top, not TOO strenuous and about halfway up, you will see some grayish material. This is perlite and in there you will find about a million apache tears! They are very small, only pea sized but they are abundant, to say the least! I went up on the mountain (actually it's just a hill compared to the surrounding area) and busted rhyollite for about 2 and half hours. I didn't find anything of interest. That's not to say it isn't there, I just didn't get lucky! The mountain just north of Ruby is called Sugarloaf Mountain and it is part of the same formation. It apparently isn't as accessible (I didn't go to it) so the collecting may be a little better there. I got that info from another gem collecting book. I had so many places I wanted to go that I just didn't take the time to go on over to Sugarloaf. Maybe next time. I hope this is of interest to you and possibly others. Even if you don't find anything, it is a beautiful place to be. From the top, you get a great view of the Arkansas river and the Sawatch and Collegiate mountain ranges.

Of all the places in Colorado I've been, the area between Leadville through Buena Vista and south to Salida is my favorite. It is a fairly dry area, great for camping, lots of great mineral collecting and the views are spectacular! Oh, if you go to Ruby, take a big hammer, a chisel or gad, wear boots and be very careful. There are a lot of very loose rocks where 'hounders (and nature) have broken them up and you can easily fall or slide down when you are trying to walk. Have fun and please post your adventures!
Scotland

Mineral Collecting - Isle of Skye, Scotland, May 1995

by Jolyon Ralph

At the end of May this year I went to the Isle of Skye, one of the Inner Hebrides islands just off the north west coast of Scotland, as part of an organized trip by my local mineral society - the Sussex Mineral and Lapidary Society (SMLS).

Having only confirmed at the very last minute that I was able to go, I left on the Friday - our plan was to meet up at Talisker Bay at lunch time on Sunday. I had not booked any accommodation (I carried a tent just in case), but I planned to drive up to Glasgow on the Friday, find somewhere to stay overnight, and drive the rest on Saturday.

In the end I zipped up through England on the motorways very quickly, and enjoyed driving through Scotland so much that I drove the full 670 miles from my house south of London to the Isle of Skye in one go (arriving 12 hours later at around 8.30pm), and luckily managed to find accommodation immediately in a small village called Portnalong, only a couple of miles away from where most of the rest of our party was staying.

We had come to Skye for one reason, the zeolite minerals. Our society (much to the annoyance of many Scottish collectors :-) had over the last fifteen years visited the island many times and had discovered many good collecting sites, and rediscovered some classic 'lost' sites, first recorded by the Scottish mineralogist Heddle in the last century. Several of the party had been to the island many times before, but it was my first visit (my first real visit to Scotland too).

So, having arrived a day early I did what all good collectors would do, I went to the first site a day early for reconnaissance and to get to the good bits before the others arrived! That first site was Talisker Bay, on the west coast of the island (and a couple of miles from where I was staying). Talisker Bay, like most of the island, is a very beautiful place, and despite visiting this beautiful unspoiled beach on a Saturday I was the only person there for most of the day.

Enough of the scenery, what about the rocks? Like most of the northern half of the island the rocks are tertiary basalts, vast lava flows many hundreds of meters thick, and many layers are vesicular with good zeolite specimens.

Within a few minutes I was turning up good Analcime crystal groups from the beach boulders., and soon I found nice Chabazite crystals too. Many were covered in 'grotty' decomposing mesolite, but that could be washed or brushed off.

That evening I met with the others, and we planned the next day's activities. On Sunday we returned to Talisker Bay, and explored further up the coast than I had traveled the previous day. We were rewarded with excellent Analcime, honey-brown Calcite with Analcime and (undamaged) Mesolite, and some small but lovely chabazites. Everyone came away loaded with good specimens. Only the half-mile walk back to the cars put us off carrying too much.

Throughout the rest of the week we visited other classic sites for zeolites. Some were old sites, and many of these (The Quiraing, some road cuttings) were not very productive. I found a new road cutting that the group hadn't visited before which contained some very large (head-sized and bigger) cavities filled with clear Analcime crystals, plus Chabazites and other zeolites, and we did well there.

By far the best of the new sites was Moonen Bay. An isolated bay on the west of the island, access is difficult. Parking at a nearby lighthouse a two mile walk across rough terrain up and down valleys is needed before access to the beach level can be made (we were discussing the merits of saner hobbies, like Stamp Collecting, at the time!). However, once we were there it was all worth it - superb Chabazites (gemmay salmon-pink crystals to 1cm or more in cavities up to fist sized, sometimes larger.), good Stilbites and some of the party (not myself, unfortunately) found excellent clear Apophyllite crystals a little further up the beach. But, we couldn't take too much - the two mile hike back to the car was mostly uphill on the way back.

On the Wednesday we were told the sea conditions were good and we attempted the major goal of our trip - a visit to Sgurr nam Boc (Mountain of Boc), or rather the isolated beach below the cliffs of that name. Sgurr nam Boc is a 1000 ft isolated cliff face on the western coast. This locality was 'rediscovered' by our society 15 years previously after finding a mention in Heddle's report on the Isle of Skye. Previously the only way to get to this locality was by boat with a difficult landing on a treacherous rocky beach.
On the Sunday four members of our group joined up with three Scottish collectors who had found a land route down to the beach, but required navigating a route down the 1000 ft cliffs (after a three mile walk from the nearest road). Most members, including myself, decided to avoid this route and wait for the boat assault later in the week!

After being given the OK for the boat trip, we unveiled our weapon - an inflatable dinghy with outboard motor that we had bought especially for this trip. We would use this to ferry people to and from the beach - our main transport would be a local fishing boat that used to be owned by the landlord where most of our party was staying - he had borrowed it back for the occasion. Despite concern about our dinghy's condition (it dated back to the late 1940s!) we set it up and it ran first time. Unfortunately the main boat didn't, the cooling water pump to the engine had failed. With no way to fix it we had to cancel the trip for the day - we then explored a few localities but failed to find anything of interest.

The next day we tried again - the engine had been fixed and we set off without incident. We landed on the beach at around midday, and spent less than two hours collecting before the swirl built up and we had to beat a retreat back to the boat (and everyone, except me for some bizarre reason, got extremely wet at that point). However, we had been more than happy. Superb large Stilbite crystal groups of gemmy crystals groups of large cabinet size with or without Heulandite, excellent Laumontite groups (keep them damp!), Quartz and Apophyllite. It has been estimated by locals that no more than 25 mineral collectors have ever been to Sgurr nam Boc, such is its remoteness.

On Friday we split up to visit sites of particular interest - I followed some advice from the Scottish collectors to examine the old marble quarries near Broadford where 1cm magneteite octagons had been found at the contact between the limestone and the granite intrusion. Another SMLS member, Mark, joined me - we found the quarries and started exploring. The quarries extend up the hill on both sides of a footpath. After examining the first few quarries and spoil tips we wondered if we'd found the right location - no magnetite of any kind was present.

Finally, at the top quarry, Mark found much massive magnetite, but no trace of crystals anywhere. We looked for signs of recent digging in the tips or in the quarries with no luck. Nothing could be found. We finally spied the last quarry, a smaller quarry off to the right of the path slightly downhill. This quarry showed the contact between the limestone (well, a forsterite marble) and the granite. And there it was! Magnetite in situ, along with thin veins of chalcopyrite and some black massive silicate mineral. I collected a few specimens of this 'gunge' and we both looked for the crystals. Nothing, not even tiny crystals, was visible anywhere. Mark got very despondent and left early. I stayed on a while and did some more digging, but found nothing much except more of the black massive silicate. On the way back down to the car, on the very first part of the very first dump, I found more magnetite, and after searching through the fragments at last found one piece with a crystalline surface. Some of the small pieces also carried nice Azurite and Malachite micros.

Later, when I discussed the locality with the Scottish collectors, I was told that they had been misled about the 1cm Magnetite - they had only found massive Magnetite there and my crystalline piece was a good find! And that 'black silicate' I had found was far more interesting, it was in fact the borate mineral Ludwigite, along with Brucite and Magnetite. Next time I go I'll bring back a sack load for the systematic collectors...

We had arranged to meet up outside Glasgow on Saturday to visit one of the Scottish collectors, Dr. Gordon Todd, and see his collection. I decided to leave immediately on Friday after visiting the quarries and drive around Scotland for a while. I caught the ferry back to the mainland (the ferry has recently closed as the Skye Bridge has now been completed) and starting touring around. I went across to Loch Ness (didn't see the monster!) and took a lazy route back to Glasgow via Ben Nevis, Fort William, Glen Coe and a few other places, stopping to take photos every now and then.

I stayed overnight near Glasgow and as I was again a day early I decided to get up early and visit Edinburgh. I drove across to Edinburgh and spent the morning walking around the city, finishing the visit in the superb Royal Museum (although the mineral gallery there was under repair - there were no lights!). In the afternoon I drove around to the south of Glasgow, visiting the famous mining areas of Lanark and the Leadhills (I had to stop exploring the minetips at Leadhills - the rain was torrential!). I left and drove back up to Glasgow to meet the others.
Michigan Copper

The White Pine mine did close down but the Caledonia mine which is operated by Red Metal Minerals is still operating for mineral specimens. The mine is not open for collecting except with arrangements with the owners. The public can collect on the dumps and underground there during the Red Metal Retreat if they pay a fee and also register for the conference. The retreat is early each August.

Contact Michigan Technological University Conferences
1400 Townsend Dr. Houghton MI 49931-1295 for details.

Or call the Seaman Mineral Museum at 906-487-2572.

The museum also sells a very detailed field trip guide produced in the Geological Eng. and Science dept at MTU. It sells for $25 and is rather comprehensive. One will certainly want to visit the museum when in the UP. It is fantastic. It has unbelievable copper crystals, copper in calcite crystals and silver, as well as many other UP minerals on display and a fine world wide collection. About 20,000 specimens are on display!

There are numerous old mine dumps with collectable minerals all over the Keweenaw. Underground collecting is forbidden. Underground tours at the Quincy and Delaware mines are available from Memorial Day through Fall Color Season (October) (but no collecting).

The Quincy mine steam hoist is quite awesome! The mine was 9,200 feet deep on an incline (a lot of cable to wrap around the huge hoist drum).

Michigan Millerite

I recently went on a collecting trip to Bayport, Michigan. Thought the results were interesting enough that some out there might want to give it a try. Details follow:

Location: Wallace Stone Plant in Bayport, MI - NW of Bay City.

Hours: M-F during working hours and some weekends if permission is obtained.

Tools needed: Masons hammer, hand sledge, 8 lb. sledge. Consider bringing pry bar and large sledge. Also, tissue paper to wrap millerite nodules that you accidentally break open.

Objects of search: Small quartz geodes filled with calcite, dolomite, and millerite. Other possibilities as well. Also, iridescent calcite with some selenite crystals.

What to look for:
Best millerite is found in older section of quarry near entrance. Look for layers of compressed coral fossils/shale. There may be millerite in coral but most is in nodules that crack very easily. Size is typically up to 50 cent piece in diameter but most are dime size.

Arkansas

To those headed for Mt. Ida/Hot Springs to hunt quartz:

1. About 5 miles east of Mt. Ida towards Hot Springs is a rock shop Fiddler's Ridge (Not Fisher). On north side of road on a curve - watch carefully, they're kind of in a draw. Fee digging at the mine - good place. They'll also brief you on how to hunt.

2. At north edge of Mt. Ida - Ocus Stanley & Son's - best place by far to buy stuff - they'll also let you hunt their mine free, but it takes real work for more than small stuff - but well worth the trip for 1st timers.

3. On highway 7 14 miles north of Hot Springs - Coleman's has a fine rock shop and two fee mines to hunt in. I've not tried them but the reports are good.

4. Wegner is good but very high priced - a few miles south of Mt. Ida

The mines are actually cuts on the mountainsides in a heavily timbered area and the summers are HOT. Take sun screen, hats, lots of drinking water, crow bars, screw drivers, rock hammers/chisels if you want to hunt new stuff. All the mines have singles and little clusters in loose dirt if that's all you want. Sometimes you still need to knock them off the matrix, so you still need tools. Lots of luck. It's a FUN trip. Don't miss the diamond mine nearby if you have the time.

Japanese Twins

Actually there are a number of locations in the Mt. Ida Arkansas area that consistently produce small
quantities of Japanese twins. They are Fisher Mountain and Collier Creek. The Collier Creek Area tends to produce crystals that are more tabular and proportional to each other. The Fisher Mountain area tends to produce the less proportional and more "normally" hexagonal morphology. I just purchased 17 super specimens yesterday which represents the years production from one of the Fisher mountain locations. The prizes were a palm sized doubly terminated Japanese twin where the larger of the twin segments is a double ender and a perfect (I don't use this word often) miniature that is optical and proportional.

Graves Mtn., Georgia

From Drexel Pitts

A coalition of GA & TN clubs had a 2 day trip to Graves Mt. last weekend. Probably around 50 folks the first day and maybe 20 the next. It started out cold in the mornings but quickly turned into 2 beautiful gorgeous warm days. You would have been content just to sit there and stare at the world the whole time...well...maybe not!

The highlight of the trip continued to be a seam of rutile/kyanite/quartz in the main pit. As mentioned in an earlier report, this area is at the base of what was/is called the saddle. It turns out this seam runs under the surface and under a mound/pile/island of material about 20 or 30 feet from the base of the wall. People had been digging/sledging a trench into this mound and managing to follow the seam and with incredible hard work bring out a lot of rutile. One guy dug a hole between the wall face and the mound and found the seam(of lesser quality and quantity) there. Only 2 to 3 people can squeeze into the trench at one time so being fast into the pit is a plus. Several buckets of material were extracted. Rutile xls ranged as high as 3 to 4 inches. The material itself is a matrix of seams of very hard white massive quartz(very often colored/covered by rutile stain), very hard, bladed/tabular(3/4 inch or less), blue/green kyanite xls, embedded rutile xls, and a variety of other rock such as quartzite. The mound itself is a collection of huge boulders, red clay, rocks of all sizes and dirt. Unfortunately we might be nearing the end of all this because the trench can’t go much further because a bunch of huge boulders will topple down. I was lucky enough to get into the trench the 2nd day and spent 2 plus hours sledging my way through a 3 foot boulder with some few xls for a lot of work. I did get some more in the tailings and managed to break off some of the boulders making the front of the trench and find some xls there. Back at home I wasn’t as happy with the stuff as I was Sunday, but it was much better than I had ever done before.

Saturday I managed to pick up a good deal of iridescent material from the area between the mound and the wall. Most folks don’t know to look for this. But if you check out the Graves Mt. edition of the Min. Record, you’ll find its one of the premier finds. Usually the material is either a chunk of massive quartz or a chunk of quartz/quartzite looking kyanite and who knows what else. This material gets covered by limonite/hematite/goethite and this in turns sometimes changes colors. The colors range up to very bright/shiny blues, purples, reds or greens often a rainbow collection on one rock. Usually the color is just a small patch of less than an inch, but can cover large areas at times. It makes a really ugly rock that only a hard core collector would like, into a thing of beauty.

That afternoon, I went back to extracting kyanite/pyrite from a boulder at the front of the lower pit(which is now dammed into a lake to hold the sulfuric acid water back for treatment). This soft(from exposure & water) kyanite xls interspersed with small shiny pyrite xls and pyrite coating some kyanite blades, the kyanite xls are an inch or less bladed/tabular and that one of a kind blue/green. Really pretty, shiny and showy stuff. The boulder itself is a that hard gray/green Graves Mt. quartzite. On the opposite side of the boulder I found what I felt at the time was ilmenite mixed in with some of the pyrite. Examination back home under the loupe re-enforces that opinion. The material is much darker with a more steel like metallic look than the silvery pyrite. Under the loupe it is rounded and not xl faced like the pyrite and if the light is right there is some burgundy color. Normally the ilmenite you find is in flat “tabular” chunks ranging from ½ to 3 inches. Previously however, I had found some beautiful pieces of massive white quartz with small “dribbles” of ilmenite running down a side. Nice color contrast stuff.

Once I had several thousand tons of this stuff in three buckets strapped to my hand truck, I began a hour and a half trip back up to the top and down to the car. Walk a few steps, rest and pant, walk a few steps, sit and pant....(probably a normal 10/15 minute walk). The high or low point was that 3/4s of the way up I lay gasping on the side of the road.
Flashing over the cliff face 20 feet away a buzzard passes barely over my head. He was soon followed by a pair of friends higher up. My life also flashed by before my eyes. Feebly I tried to move, to wave some appendage to indicate I was still alive. Finally I staggered up and continued. Buzzards are quite common there, they roost in trees on the Mt. and like the thermals that rise up out of the pits. But I SWEAR these were checking me out!

I heard of folks finding some good lazulite, which seems to be getting scarce.

One of the nicest things, was as always the newcomers. Their wonderment and enthusiasm is so refreshing. There was a newbie from Atlanta with a friend from Germany and a man and his daughter from near Gainsville. Helping these folks identify and find minerals is worth the trip in itself. They are always grateful and having the times of their lives. Let’s face it, there something special about picking up your own rocks...

This was my fourth and last trip to Graves this year and by Feb. or Mar I’ll be ready to go again....

Drexel Pitts - ndp@ssds.com
Senior Analyst
910-484-5566 ext 242
SSDS, Inc
1534 Purdue Dr
Fayetteville, NC 28301
fax: 910-484-4395

Agate
Yep, it's happening again! Ashwood here we come! Labor Day weekend, Friday through Monday, September 1 through 4, 1995. Here's the low-down:

Friend Ranch
They have a big thunderegg bed with big eggs which are beautiful and unique. Some prefer them to Richardson's. They have "blobs" of multicolored agate mixed with vivid opaque opalite, which runs from black (very black!) to red, blue, yellow, and vivid orange. Cut these the "wrong way" to capture the full effect! Darrel ran his cat over and scooped out a new hollow in the top of the bed which contains eggs up to about 10" across. This bed is reached by a nasty little road, 2WD pickups can make it but no p-cars! The fee for this ranch is 50 cents/lb.

Nartz Ranch
Nartz own the Chief Paulina agate ledge, which hasn't been open to collecting for many years. Once again they cleared about 2 tons of debris from the ledge and you'll have a blast fracturing large blocks of multicolored agate and jasp-agate from the ledge. The agate runs in many colors, with blue and clear/sugary white predominating. There is quite a bit of brown polka-dot sugary white agate here, and no wonder, it's only about 2 miles from the Polka Dot Dig! We got some nice purple-blue and pink sugary agate here. There's plenty of jasp-agate to choose from as well. And for a bonus, I got some perfectly clear blue agate with spherical brown polka-dots on the last trip! The fee for this ranch is 50 cents/lb.

MacDonald Ranch
They have four sites with a great variety of material. The petrified wood deposit is huge. The cat has exposed about four tons of wood for us. There are huge pieces and a gorgeous stump on top of the ground. These are mostly opalized, so preserve the grain well but don't cut or polish easily. The prize wood here is jasperized, preserves the grain perfectly. Some found "herringbone" wood which has a great pattern. I got a piece that if slabbed with grain should look like a quarter-sawn board. It's good hard jasper too. Easy to dig as the deposit is very soft. They also have a black plume agate ledge which has been fallow for many years. They have gotten a cat up there since I was last there so it should be ripe! The jasper ledge looks much like Richardson's Rainbow Ledge, and some even looks very close to Oregon Sunset Jasper. There's a lot of reds, massive quartz vugs, and jasp-agate here as well. It has also been cleared since I was there, and I have a sneaking suspicion that there's Oregon Sunset under the top layers! The thunderegg bed is assessed by a 4WD track, and it's small. Many of the eggs are solid matrix, but the good ones are worth the work. Some have tiny stalactites in a clear agate fill, and other have clear/milky blue agate with red and orange opalite coating the inside of the egg. Anyone who knows how to hollow out the inside of an egg drop me a line! Hike the creek at the bottom to cool off and find some nice float, including thunderegg cores which have eroded out of long-gone beds up the canyon. The fee for this ranch is 50 cents/lb., 25 cents for the thundereggs.

Friday Polka-Dot Agate Dig
The dig was open this Memorial Day Weekend for the first time in 10 years. Dale plans to have it open...
1995 Gem & Mineral Almanac

every day next summer. The polka-dot itself runs $2.00/lb., and it's worth it! If you don't believe find it at a rock shop (if you can) and price it there. One local shop has some not-so-good rough for $4.00/lb. Anything without dots runs from 50 cents for chips to $1.50 for white jasper (with dots). The agate has many dotted areas, and even the jasp-agate is beautiful. Some of the areas are full of healed fractures into which red and brown jasper has seeped. It's all beautiful! Bring some hard rock tools if you want to get your own as the agate is extremely tough. Don't bash on it as you'll just ruin it. If you've ever split basalt cracks looking for geodes you know what to do here. Find a crack, wedge a few bar chisels in it, and wait. It'll split eventually! Bring big sledges, bar chisels, wedges, and points. Leave your puny rock hammer in the car!

**Opal Butte, Oregon**

Note: I have not included exact coordinates for any of the locations described below, as they are either on private land, under claim, or both. It's up to you to gain permission to collect on private land. Leave the gates as you find 'em, and pack out others trash in addition to your own.

Saturday, August 12. Set forth to Anson Wright Campground in Morrow Co. Oregon for a week of R&R - Rest & Rockhounding. We (Jim, Judi, their son Nathaniel, two large dogs and myself) didn't quite know what to expect, but we had good luck two years ago collecting down the hill from Dale Hewett's opal mine, so we thought we'd give that a try. (later) Pulled into the campground - Hey, the camp host has a couple of picnic tables loaded with rocks! We met Willard and Judy Horton, the hosts. Turns out that Willard is the caretaker of Dale Hewett's opal mine, so we thought we'd give that a try. (later) Pulled into the campground - Hey, the camp host has a couple of picnic tables loaded with rocks! We met Willard and Judy Horton, the hosts. Turns out that Willard is the caretaker of Dale's mine and has the keys to the gate. This is good! He also informed us that the majority of camping spots were occupied by loggers working some local job sites. Oh, great! We're stuck in a logging camp for the next week? Not a problem, Willard insisted, they're really quiet folks. Turns out he was right. They showed up every day at around 4:30 PM, had supper and went to bed. By 2:00 AM the next day they were gone again. I've never had better neighbors in a public campground!

Sunday, August 13. Went exploring, marked a couple of promising looking spots on the GPS. After we got back to camp I noticed that my watchband was almost broken through... Add that to the list of things to buy when we go to Heppner for ice on Wednesday.

Tuesday, August 15. Willard drops by and mentioned that he's heading up to the mine today, would you all like to tag along? No, we'd rather sit in camp and vegetate, _NOT_! Everyone including the dogs head up to the mine... When we get there Willard is shaking his head, it seems that someone has stolen the 'no trespassing' sign off of the gate. We collect some nice opal, enjoy the view, etc.

Wednesday, August 16. Go to Heppner to get ice, batteries, etc. The local jewelry store was able to replace my watchband with a twistoflex sport band. We also picked up a new 'no trespassing' sign for Dale's mine.

(Later) Warren, (Willard's brother, one of the log truck drivers, staying right across from our campsite), shows up with a bucket full of blue agate. "I just picked them up on the road they just bladed up on top" as he pointed north of the campground at Barlow Butte.

Thursday, August 17. Installed the new sign at Dale's mine and poked about the hill looking at other possible collecting sites. We wound up kicking 3 basketball sized thundereggs down the hill and took them back to camp.

Friday, August 18. The loggers have gone home for the weekend, and Willard wants to head up to Barlow Butte. Jim and I tag along... At the first spot Willard points out I immediately find a blue geode, somewhat smaller than a golf ball. It was cracked in two when the road was bladed and was lined with small quartz crystals. Perfect - this was exactly what we were looking for! Right. We searched the road for 1/4 mile on either side of that spot and found nary a splinter of agate. We drove on about a mile and Willard points out another spot. This time we hit pay dirt. We found numerous pieces of blue and pink agate from thumbnail to fist sized, some with fortification. I don't think this area has ever been collected before, as even the spots where the ground was only disturbed by the hooves of the cows that graze there were thick with agate. You'd bend over to pick up one piece and on the way down you'd spot three more. By the time you picked those up you lost track of the piece that attracted your attention in the first place! We collected there until the bucket got too heavy to comfortably carry and headed back to camp.
At dusk Jim and I showed up at Willard and Judy's trailer with my battery powered SW ultraviolet lamp. They had no idea that a good percentage of their opal was fluorescent! We spent the next hour oooing and aahing the bright yellow/green display of the opal and yellow and blue blebs in some agate Willard picked up in Nevada somewhere. They even got into the 'special' stash from the back room that they hadn't been showing anyone. Nice stuff there... We have some new fluorescent enthusiasts now! Willard wanted to buy my lamp, but since I needed it this week I declined. I told him to get the number of UVP in San Gabriel, CA from directory assistance, and they would fix him up.

Saturday, August 19th. Time to pack up and head home. We didn't get all of Willard's secrets. We never did find out where he found some breathtaking jasp-agate. It had brown and red jasper fading into purple agate.

**Thunder Bay**

The Mine where I have had the best time is the Diamond Willow.

I've finally gotten around to cleaning up the amethyst I (and my hard-working family) collected up at Thunder Bay, Ontario, a few weeks ago. It's always a nice surprise to unwrap the newspaper and see what you REALLY collected. I wasn't disappointed! Most of the clusters I found are around 5x5 cm up to about 10x10 cm. A couple of pieces are nearly 15x15 cm. The crystal range from a light lilac up to a rich purple. About 10% of the clusters have phantoms, with the phantom faces coated with red iron oxide. The crystals on the cluster are, for the most part, 0.5 to 1.0 cm, base to termination.

As usual, we also came back with a pile of crystal fragments that fill up mason jars, sitting on the window sill looking pretty. Collecting was VERY spotty. The "season" has been delayed in that part of Ontario and a lot of the mine operators (as of early June) hadn't prepared the sites yet. I visited three locations, only one of which had any decent material. The good site was the "Blue Points" mine. There was lots of good material lying on the ground and some nice material in the mine cuts, if you have the right assortment of tools to pop it off the mine face. Collecting there was CAN. $12 for a 1/2 gallon ice cream bucket. All the material you could fit in the bucket was yours. What I do is trim down a chunk to get rid of as much matrix as possible, and then pop it into the bucket. After filling the bucket with the big chunks, we set the kids to work filling the voids with amethyst gravel, which litters the site. Good value, and very good collecting. The mine shack at the site also has excellent pieces for sale.

So much for the good site. Next to Blue Points is Blue Willow (at the end of the road, turn left for Blue Willow, right for Blue Points). Its on the same vein as Blue Point. I collected there four years ago and got a lot of nice material. Not much there this time though. I bet, however, as soon as he blasts there will be a lot of good collecting. Collecting there is CAN. $7 for a bucket.

About 15 km away I visited the Ontario Gem Mine at the end of Dorian Road. It's one of the oldest sites, and I think it is about worked out. Once again, they hadn't done their blasting yet, but from the looks of the face I don't think they are going to have much luck. I talked with the guy who now owns the place (he was struggling to get the mine's Cat back in shape) and he says it looks like the vein is splitting. Lots of grunge rock to move, and no guarantee of finding the vein again. Collecting there was (if I remember correctly) around CAN. $1 per pound. (For my book, the "by the bucket" places are a much better bet.)

You can get a good map to the sites at the Ontario Tourist office on the US/CAN border at Grand Portage. I imagine tourist places in Thunder Bay have the maps, too. Great camping is available nearby at Sleeping Giant Provincial Park. Good tent sites and trailer/mobile home sites.

**Michigan Copper**

You can also buy copper from Superior Gravel Company (or some name like that) in Hancock. They have barrels of it they have removed from their machinery (apparently it can make a real mess); they sell it for $1/pound. I suspect most of the locals who sell on the roadside buy there and clean it up.

Be sure to go to the offices not to a pit; open 0800 to 1700; don't go right at quitting time because the office people like to go home. :-)  

At the Mt. Shasta site (near Michigamme) we collected some nice garnets. At the Taylor Mine (north of Alberta, off of "old" Hwy. 41) we got some so-so iron minerals after a nice slog through some swamps (and past one of the largest glacial erratics I have ever seen). We ( <--hah! "I") had
hoped to get to some of the copper mines, but the trip out to the shipwreck museum at Whitefish Point took longer than planned (while in the UP, don't miss it!).

While at a location not in the UP list, I had a MOST remarkable experience. Our first night camping, after a 440 mile drive from St. Paul, saw us at the Island Lake campground (south of Au Train). It was well past sunset and I was down at the lake, swimming with my boys. Sitting on the bottom, I was poking my hand around the sandy bottom when I felt something sharp and smooth. "Oh ****, a piece of glass...who would throw something like that out here??" I pulled it up, intending to throw it away. Imagine my surprise when I found myself holding a 2" long, perfectly terminated, absolutely clear quartz crystal! After about 10 minutes more of poking around I found one other crystal.

Watching a blast at the Phelps Dodge Morenci Mine. NYMC Feb. 1995 field trip.
Mineral Care

Mineral Cleaning for Amateurs

by John Betts

As promised this article is first in a series on how to clean mineral specimens. Many specimens collected in the field do not look like the ones that dealers are selling. Most collectors become discouraged or frustrated. These articles will give a few simple techniques clean the pieces you collect.

Oxalic Acid

Anything that has the word “acid” sounds ominous. But oxalic acid is easy to find, use and the safest for the home. In fact it is found in many vegetables including spinach. It is used to dissolve the iron oxide (brown) stain on all minerals. Specimens collected at Phoenixville, Ellenville, Case Quarry, NH smoky quartz and many others clean up beautifully with oxalic acid. Zeolites do not respond as well, so you should test beforehand on small specimens to see how they react.

To make this as simple as possible I will give a step by step guide to its use. Do not take any shortcuts or make substitutions.

Purchase a one pound box of Oxalic Acid (OA) powder at your local hardware store in the paint department or at a paint store. It is used as wood bleach and will be labeled as such. The most common brand is Rainbow.

Fill a plastic one gallon container 3/4 full with hot tap water. Pour in the OA crystals and stir for five minutes. Be careful not to inhale any powder when adding the crystals. Once the OA is dissolved top off the container to a full gallon. Label the container and put out of reach of children or pets.

When you are ready to use it place your specimens in a plastic container and add enough OA solution to cover. Set aside for several days.

After the iron color has disappeared then you can remove the specimens (with gloves on) and wash under running water for three hours. Then soak in clean water for a day changing the water as often as possible.

Heat speed up the reaction, as does agitation. If you have a hot plate and can set up outdoors or in an area with good ventilation the repeat step 4 but heat the solution to bath water hot (110° f.). Never Boil!

You will find that an hour in hot solution will usually do the trick. Best of all is an ultrasonic cleaner with built in heater. Sometimes only 30 minutes is necessary. But you should not put the OA directly into the stainless steel basin. Make a double boiler type of arrangement by partially filling the ultrasonic cleaner basin with water. Then place your specimens and OA solution in a plastic container or heavy duty plastic bag that is suspended in the water.

You can reuse the solution over and over. As it dissolves more and more iron it will get darker often taking on a green color. After it gets really dark I would discard it and mix a new batch.

Safety is important. OA solution is highly toxic. It can absorbed through the skin and builds up in your organs cumulatively. Same goes for the fumes, which is why you never boil the solution and always have proper ventilation when using the heated solution. Be careful not to spill the solution on porcelain and keep away from food preparation surfaces.

In spite of the fuss, this is the best all around method of cleaning minerals. I keep a large five gallon bucket with tight fitting lid filled and ready, I drop specimens in as I collect them. It always works and the large volume does not exhaust quickly. Mastering this technique will provide an important tool in your mineral cleaning and preparation arsenal.

Muriatic Acid

Now we are going to get more aggressive with our mineral cleaning technique. Hydrochloric Acid is available in most hardware store as Muriatic Acid. It is sold in one gallon containers and is used to clean masonry and as a rust remover, which is what we will use it for. In spite of its availability, it is dangerous. Do not inhale the fumes or get any on your skin or in your eyes. Always wear gloves and eye protection and old clothes. Keep your arms covered even if it is a hot day. And always observe the safety precautions on the container.

There are two main uses for hydrochloric acid: removing carbonates like calcite that often are the last minerals to form in a pocket and therefore obscure other mineral crystals, and the more aggressive removal of iron oxide rust stains (faster than Oxalic Acid). The former use is the most common and often produces staggeringly beautiful
specimens because the calcite being dissolved protected the minerals underneath. Specimens of almandine from the Trumbull, Ct., or vesuvianite from the Goodall Q. in Sanford, Maine are all easily cleaned in hydrochloric acid. If hydrochloric is being used to remove iron oxides you should be careful that there are no carbonates in the specimen that you want to keep. The acid will dissolve them. Which is why, no matter what minerals you are cleaning, always test your cleaning agents on lesser pieces to make sure you will not ruin your best pieces. The basic procedure is:

First wash your minerals carefully in water to remove any loose sand and dirt and to make the acid last as long as possible (sand and dirt contain iron oxide and will exhaust your acid quickly). Place your minerals in a large plastic container with a lid that can be tightly sealed. Again I prefer a five gallon joint compound bucket found at construction sites.

Let your specimens dry and move the container outdoors to an area with good ventilation. Pour in enough acid to cover the specimens. Always wear heavy rubber gloves and be very careful not to splash any acid on yourself.

Depending on what you are removing with the acid you will want to leave it in from 5 minutes to 5 days.

If you are etching carbonates/calcite off a specimen then you should check it after five minutes. Be careful not to inhale any fumes when checking the progress. When removing calcite or marble from specimens the action is very fast and active. Your bucket should be large enough to prevent the bubbling foam from overflowing.

If you are removing rust stains from quartz the action can take up to a day and is less energetic. When removing the “sphalerite” crust on quartz crystals from the Spring Glen Mine in Ellenville it is not uncommon to repeat three day sessions removing any loose material between each session. You can place the lid on the bucket to prevent children and animals from exposure (but provide a small vent hole for relieving gas pressure).

According to Jerry Call, a commercial mine owner in Brazil and North Carolina, you should not leave the bucket in the light. He says this results in a yellow stain. Whether light is the source of the stain I cannot tell, but it is not uncommon for some residual acid/rust stain to remain after your first treatment. Then you need a second treatment in a fresh, clean acid reserved for such a purpose. You will see the stain disappear quite quickly and you can remove your specimens for neutralizing and washing. This final batch can be diluted 1:1 with water. When diluting always add acid to water, NOT WATER TO ACID.

People neutralize the acid many different ways. I prefer to dissolve ordinary household baking soda in a bucket of warm water the immerse your specimens in it (after a brief pre-rinse). Let them sit in the baking soda solution for 15 minutes, then proceed with washing.

Because the acid has penetrated the specimen it is best to wash very thoroughly. I prefer the rule of thumb of washing three times the time the duration the specimen was in acid. If you just briefly dipped it for 5 minutes to remove some calcite then a 15 minute wash will be adequate. But If you left in your quartz specimens in for removing rust stains for a full day, then you should wash them for at least three days. The washing is essentially placing them in clean water and keeping the water clean as the acid diffuses out of the specimens. It is best if you can set a water supply on a slow trickle into the bucket to constantly provide clean water. Otherwise changing the water as often as possible will work. If you are washing for a full day then a water change schedule like this would be appropriate: change water every 15 minutes for an hour; then every hour for four hours; then every four hours for the rest of the day.

As the acid is used up it will eventually turn yellow/green/brown. It can be used until it no longer is effective or until it starts to stain your specimens. If you are using it to dissolve carbonates/calcite the acid will exhaust itself long before the color changes. You will see that it no longer actively dissolves the calcite. It should then be discarded. You can fully neutralize your old acid with crushed limestone or marble or with more baking soda. When it no longer fizzes then you can dispose of the acid safely. The limestone gravel found at the Limecrest Quarry in New Jersey is great for neutralizing the acid.

A last warning, if you are removing calcite from a specimen, do not dissolve all calcite. Often it may be the only thing holding the specimen together. A little calcite can provide a nice contrast and make it more aesthetic. In the case of the spinel crystals from the Limecrest Quarry, there are often alternating layers of spinel and calcite. They will
crumble to powder if cleaned too long in hydrochloric acid. Also fluorescent willemite may turn powdery on the surface if cleaned in acid resulting in the loss of fluorescence.

**Mechanical Methods**

This month we are reviewing mechanical methods of cleaning and preparing mineral specimens. By mechanical we mean using force of some sort to remove unwanted minerals or encrustations. Obviously this method has the potential or damaging the specimen by scratching or fracturing the crystals. As usual, care should be taken to test the methods on lesser specimens to see if there is any damage resulting from the process.

The mechanical cleaning of minerals ranges from a toothbrush to dental picks to ultrasonic cleaners to water guns to sand blasting. I am not going to discuss the more ordinary use of chisels and saws to trim a specimen.

**Brass brush and Dental Picks**

The first thing we do after a field trip is to wash the specimens and pray that they will cleanup like the minerals sold by dealers. And they never do. Dirt and pocket mud are often very tenacious and require more than running water. The first mechanical tool to try is a brass brush. They are available in hardware stores for use as a cleaning tool and for wood refinishers. Make sure you get brass bristles because brass is softer. Brass is between 3.5 and 5 on Moh’s scale of hardness. In theory, you can scrub a specimen of any mineral harder than 5 and not damage the specimen. In reality though, you should always perform a test to make sure. I have used brass brushes on quartz successfully for many years without any damage. Occasionally on etched crystals a burnished appearance results but this usually disappears in later chemical treatments.

With this first wash there will always be sand and dirt deep in the crevices between crystals. these can be loosened with a set of dental picks. They come in a variety of shapes and sizes. Often a friendly dentist will give away his old ones. If you are not friendly with your dentist (who wants to be friends with their dentist?) and you cannot find them at your hardware store you can purchase them mail order from Woodworkers Supply (1-800-645-9292) item no. 862-028, set of four utility picks for $8.95. These picks are steel and therefore harder. So be careful not to use a scratching stroke. Just loosen the dried, caked dirt in the crevices.

**Ultrasonic Cleaner**

Obviously with delicate crystals scratching is not the problem, they will simply break off from the force. With delicate specimens we need to use an ultrasonic cleaner. These are simple stainless steel basins with piezoelectric drivers attached to the bottom. They often have built in timers and heaters. When turned on they vibrate the solution at ultrahigh frequency causing cavitation, the formation and collapse of bubbles. This cavitation scrubs off dirt and soluble minerals very fast without damaging delicate crystals. I can hear the skeptics out there saying that some minerals can be damaged, like herkimer diamonds (after all, aren’t we supposed to pack them in temperature shielding sand or sawdust). Well this may be true, but in my experience (and this article is nothing more than one person’s methods learned through trial and error) I have only had one herkimer diamond damaged. (There was a large stress fracture in a 2” crystal that “popped” during cleaning.) But in terms of odds, I have cleaned thousands of herkimers and only that one broke.

The ultrasonic cleaner is the best way to clean zeolites from New Jersey. Especially delicate natrolite sprays or terminated pectolite. Unfortunately they are expensive. If you shop around for the best price you will pay around $150.00 for every quart of capacity. I have a three quart unit that is more than adequate. Unless you collect a lot of large specimens, then a 1-1/4 quart unit will suffice.

I highly recommend getting a built-in heater. it is well worth the extra expense. It will heat the solution to just below boiling and keep it at that temperature. That is perfect for cleaning with oxalic acid (see Part I). The heat accelerates the action of the acid, but prevents the acid from boiling.

**Sand Blasting**

Sand blasting sounds exotic but is more common than you would think. All of the pink tourmaline in purple lepidolite sold has been sandblasted to expose the harder tourmaline. The sand blasting removes the softer lepidolite very quickly and leaves a more natural appearance than chisels or scrapers. The new pink chalcedony from New Mexico being sold by Ray DeMark is all sandblasted. In its natural state it is rough and encrusted. A quick sandblast
and only the harder quartz chalcedony remains. Amazonite from Colorado is also cleaned with sand blasting. These crystal often have a late growth without the blue-green amazonite color. The outer coating is blasted off with glass beads and then the surface is “polished” by sandblasting with a soft limestone powder.

A sand blasting unit is not expensive. The basic setup can be purchased for around $50.00. However the air compressor to drive the sand blaster is expensive. Unless you already have access to a 3.5 HP air compressor, then sandblasting is not for you. There are many different media that you can use in a sandblaster. Anything the consistency of table salt can be blown through the gun, wet or dry. Glass beads are readily available and are the hardness of quartz. But you can purchase many different hardnesses down to 3.5 on Moh’s scale. The goal is to choose a media softer than the mineral you want to keep but harder than the mineral you want to remove.

I have found it works great for removing schist matrix from almandine garnet and staurolite crystals. There has been much discussion regarding the effects of sandblasting minerals including an article in Rocks and Minerals. The article points out that chalk dust with a hardness (H) of 3 has been found to abrade periclase (H: 5.5). The article points out that the force that you drive the media can result in damage to the specimen and recommends testing on a sample until you get the right balance of air pressure and correct media hardness.

Air Scribe
This is a miniature reciprocating impact chisel commonly used by fossil preparers to expose fossils. ARO air scribe Model 8315 costs $289.00 and comes with a medium carbide tip. Additional tips are available in fine to coarse for $31.00 each. from Main Tool Supply, 55 Lafayette Ave., North White Plains, NY 914-949-0037 These tools reciprocate at 36,000 cpm and are very efficient at locally removing matrix. Fluorescent collectors find these are the best tools for removing calcite from willemite specimens because acid will etch willemite.

Water Gun
Similar to a sand blaster, the water gun is used in the dry cleaning industry as a stain remover (they blast cleaning agent right through the fabric). The Krebs 5000 cost $350.00 and is available from Aurora Mineral Corp. at 516-623-3800.

The action is a combination of sandblasting and ultrasonic. The gun creates a fine, high powered jet of water that will loosen most clays or dirt. It is very forceful though and not suitable for delicate minerals. The advantage is that you can put solutions other than water in the gun. In theory you could shoot oxalic acid through it. But since oxalic acid requires time to work the value is questionable. And remember the toxicity of oxalic acid, the last thing you should do is create a fine mist of oxalic acid that you could accidentally breathe.

A simpler and cheaper alternative to the water gun is to take your minerals to a do-it-yourself car wash. Lay out all of your minerals and for $1.75 in quarters you can blast away almost anything with the water gun can, plus you can get a hot wax at the same time.

In conclusion, you do not have spend lots of money to clean your minerals. In many cases the brass brush is all that you need. Remember also that these mechanical methods are often the first in a many step process. You may start with brass brush then use hydrochloric acid and finish with oxalic acid.

The “Waller” Solution
This method of mineral cleaning was first introduced to me by Roland Franke as a simple method of cleaning iron stain from minerals. Further research reveals different methods of using the basic solution.

As originally described by Roland the solution is made by dissolving in one liter of distilled water:

8.4g Sodium Bicarbonate
17.4 g Sodium Dithionite
5.9g Trisodium salt of Citric Acid (sodium citrate)

Once mixed, the minerals are immersed in the solution. The cleaning action can be accelerated by placing in an ultrasonic cleaner. This solution is not appropriate for indoor use because, once mixed, there is a strong odor of rotten eggs. Use only outdoors or in an area with proper exhaust venting.

As usual read all precautions on the individual component packages.

The solution is good for only about 24 hours and should be discarded after that. Since a liter of
solution may be more than you need, the Geological Museum of Copenhagen (Hansen, 1984) suggests a variation - you can prepare a stock buffer solution of one liter water, 28 g sodium bicarbonate and 59 g sodium citrate (citric acid). Then when ready place your specimens in a container, pour in buffer solution to cover the top, then carefully sprinkle on top 1 g sodium dithionite for every 30 ml of buffer solution. After five minutes another 1 g of sodium dithionite is added in the same way. They also recommend sealing tightly with a lid and keeping at room temperature to avoid the formation of sulfides and sulfur.

If you have heavy iron stain a specimen may require several treatments in succession as the solution becomes saturated and loses effectiveness. After your piece is clean then wash in distilled water for an equal amount of time that the specimen was in the solution. Then in running (or regularly changed) tap water.

Apparently the solution works by reducing Fe$^{+3}$ to Fe$^{+2}$ and then dissolving Fe$^{+2}$ in the Citric Acid. The Sodium Bicarbonate balances the pH to be neutral. This last point means that theoretically you can clean any mineral in it without worrying about etching it. Practically though caution should be taken by testing on samples prior to immersing your best piece.

In conclusion, I have stayed clear of the more hazardous hydrofluoric, sulfuric, nitric acids and treatments for specialized uses such as cleaning native copper. If you are looking for more information I highly recommend starting with John Sinkankas books Field Collecting for Gemstones and Minerals (originally published as Gemstones and Minerals: How and Where to Find Them) and Gemstone and Mineral Data Book both published by Geoscience Press.

References

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Marcasite Disease and Preservation

Pyrite / Marcasite Preservation

by Sally Shelton

Via the Internet, here is the most up-to-date information on the problems with pyrite oxidation. I have abstracted this information from several sources. One of the best is the chapter on the subject in “The Care and Conservation of Geological Material: Minerals, Rocks, Meteorites and Lunar Finds”, edited by Frank M. Howie and published by Butterworths in 1992. (The companion volume on paleontology, edited by Chris Collins of the Geological Conservation Unit at Cambridge University is due out soon.) Frank is the Health and Safety Officer at the Natural History Museum, London (formerly called the BM(NH)), and prior to that worked in the paleontology section.

I'll skip the basic petrology of the iron disulfide minerals. Pyrite and its rare morph marcasite are both susceptible to the destructive oxidation that worries us all. If you see any sources that call this "marcasite disease" or attempt to claim that marcasite is more susceptible than pyrite, ignore it. This claim has not proved to be true in any subsequent experimentation. (Isn't it amazing how bad information gets established quickly in modern scientific gossip?)

Problems with pyrite/marcasite oxidation are not limited to paleontology and mineralogy, but are found in archeology, products such as concrete and building foundations (cf. Howie), and ores. In the great Victorian tradition, the problem was called "disease" or "decay." This parallels the description of "Byne's disease" in malacology collections, the development of a white efflorescence on the surfaces of shells was assumed to be bacterial and treated accordingly. Shell drawers were aired, treated with mercuric chloride (which did the shell no good but took care of those pesky curators!), and subjected to various other treatments. Even though this condition was shown in the 1930s to be the formation of calcium formate and calcium acetate salts from storage in wood cabinets with acidic vapors, you can STILL find MODERN references that describe Byne's as a bacterial blight. Moral: look first at your storage conditions. Swabbing a surface and getting a bacterial culture from it proves nothing, as the little devils are everywhere.

The same caveat goes for pyrite oxidation. The main things to keep in mind:

Not all pyrite oxidizes. In fact, the bigger the crystal, the safer it may be. Most at risk are specimens containing microscopic, frambooidal pyrite masses, because they have the most surface area per volume.

The reaction is accelerated by high relative humidity. If you can keep this low at or below 50% unless trouble has started, in which case you need 30% or lower), your reaction will slow or cease. (I
don't believe it ever truly ceases, but we can keep it incredibly slow.)

Polymers that you apply to the specimens (i.e. adhesives, consolidants, lacquers, waxes, paints, saliva, blood....) aren't the answer. They have finite lives of their own, may react with the specimen, and may deteriorate in several undesirable ways, including shrinking, yellowing, or simple failure. They also ruin the specimen for some forms of future analytical work in which chemical contamination is an issue.

You can't repair what has already oxidized.

No matter what you read in older literature, there is no good evidence for bacterial complicity, so put away the ethanol, Bactine, and penicillin.

What To Do - A two-pronged attack would include the following:

**Prevention**

Keep your pyrite specimens cool, dry, and in the dark. (Some of you may think that this applies to certain people as well!) If you are in an area with high ambient relative humidity or big annual swings in the RH, and you can't afford a temperature and humidity controlling HVAC system (who can?), invest in archival storage materials and give the specimens as much buffering from the outside conditions as possible. If you are really worried, get a recording hygrothermograph and USE the thing to find out what is really going on in your room. Put specimens in well-gasketted, steel cases. There are designs for the truly ambitious for self-contained case systems that will keep everything inside at a desired RH, but you can take the cheap way out with conditioned silica gel or saturated salt systems. These have to be done right and re-conditioned periodically; you can't just throw 'em in and walk away.

Again, there's lots of literature on this subject. I recommend strongly against permanent displays, outdoor exhibits, or loans to places with poor environmental conditions if your material is fragile.

The Shelton Rule: The reaction never truly ceases. It will start again when the RH rises.

**Treatment**

Oxidized specimens should NEVER be treated with water-based cleaning agents, acids or alkalis. If you can brush away the reaction product with a soft, dry brush, do that, then see the Prevention suggestions above. If not, use organic solvents and store at 30% or lower RH. (Howie: "It is safe to assume that all pyritic material and marcasite are susceptible to oxidation, and to treat them accordingly." "Accordingly" means you should read the section on prevention again. Oven-drying is a disaster: the warm mineral will just pick up more RH as it cools. Bring a specimen to a desired RH as SLOWLY as possible without further jeopardizing it.

Ethanolamine thioglycollate procedures work in dissolving the crust of reaction product, but a lot of damage can be done if you don't watch this and stop the reaction as soon as the color change is visible. This destroys the crust, which not everyone wants to do, especially if the crust is all there is.

Surface application of polymers may make the specimen look shiny, but these seldom act as effective water and oxygen barriers. Howie recommends such treatments only as support for friable specimens. They don't do anything to stop the oxidation and may give you another headache to deal with. Vacuum impregnation of sulfides with polyvinyl acetate or acrylics, according to Howie, is only effective if the consolidant truly penetrates the specimen--and a lot of them don't! Very often only a half-inch or less of the outside of the specimen gets true consolidation, and water vapor and oxygen can still get through, so what's the point of doing it halfway? My advice: skip these altogether except for support of the fragile material.

So the best answer is the simplest: low RH, good storage materials and systems, careful handling. Frank's bibliography includes everything I would recommend, and I can mail this on request rather than taking up your email screens. Comments much appreciated.

Sally Shelton
Collections Conservation Specialist
San Diego Natural History Museum
619-232-3821, x226
Sources

X-ray Diffraction Analysis

STEM, Inc.
Materials Analysis & Research Laboratory
60 Newton Road
Woodbridge, CT 06525
(203) 389-6065 [tel]
(203) 387-3574 [fax]

Geller Microanalytical Lab.
One Intercontinental Way
Peabody, MA 01960
(508) 535-5595

Lambda Research
5521 Fair Lane
Cincinnati, OH 45227
(513) 561-0883 [tel]
(513) 561-0886 [fax]

The Mineral Lab Inc.
2700 Youngfield, Suite 105
Lakewood, Colorado 80215
Tel. (303) 232-8708
Fax. (303) 232-2033

The cost runs from $40 for standard powder analysis (31 elements) to $80 for Fusion analysis. Hope this helps.

You may desire to contact the offices of the magazine JOM [Journal of Minerals, Metals, & Materials - A publication of TMS: The Minerals, Metals, & Materials Society] to see if they may have more/other firms in newer issues of their journal, where the above firms ads where placed, at:

JOM
420 Commonwealth Drive
Warrendale, PA 15086
(412) 776-9000 [tel]
(412) 776-3770 [fax]

In regards to the firms above, please be aware that they -may- be much more familiar w/ metals and ceramic type of samples, although they may be still quite happy to take a look-see at other kinds. Just a caution...

Disclaimer: the above is in no shape or form an endorsement of the above firms, or a slight of firms not mentioned; it is only a helpful post of firms that the author [me] is aware of that -may- be of assistance to the public.

Submitted by Rob Tayloe, MSM Spelunkers Club
Metallurgy/Petrography. Missouri Speleological Survey
Rolla Research Center, Bat Conservation International
U.S. Bureau of Mines,| Missouri Cave & Karst Conservancy
tayloe@ptbma.usbm.gov

Russian Mineral Microscope

There has been lots of talk about the Russian binocular microscopes at Tucson during the last two years. At the Rochester Mineralogical Symposium I found out the a NYMC member is now an agent for these microscopes. Tony Nickisher at Excalibur-Cureton is offering them at very reasonable prices.

The Basic Microscope ($425.00) includes:

- Heavy duty base, vertical column, optical module and binocular viewing tubes.
- 5x to 100x magnification in ten fixed steps.
- 220v incandescent light source and power pack. (Requires 110v converter).
- Two sets of oculars (8x and 14x) plus an additional 8x scalar ocular.

Optional:

- Focusable fiber optic eight point ring illumination with halogen light source. (This has to be seen to be appreciated!) $349.00
- Photography module with third ocular tube and SLR camera. Allows simultaneous viewing and photography. $349.00

A special package deal includes all of the above for $999.00. It is a great price and serious micromounters report the optics are top quality. For more information contact Tony at 914-739-1134.

Mineral Boxes

The Denver Box Co. supplies most of the major mineral dealers in the US and distributors also. Give them a call for a catalog and pricing. Tell them that found out about their company on the Internet and TSN.

Denver Box Company
8890 N. Federal, # 52-D, Denver, CO 80221
800-762-5639 Order only number
303-428-8773 Fax
Cobra Rock Drills

Cobra rock drills are gasoline powered pneumatic hammer/drills. Unlike the jack hammers that you see at street construction sites, Cobra drills do not require an air compressor. They are entirely self contained. Otherwise they work the same way and use the same drills. I highly recommend Pioneer Sales and Equipment as a dealer. He will ship you the Cobra with drills and you can return it in thirty days for any reason.

<table>
<thead>
<tr>
<th>Product</th>
<th>Weight</th>
<th>Drill Rate</th>
<th>Max Depth x Dia.</th>
<th>Features</th>
<th>Price New / Used</th>
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<tr>
<td>Pico 20</td>
<td>22 lbs</td>
<td>4”/min</td>
<td>3’ x 7/8”</td>
<td>light-weight</td>
<td>$2435 - $1800 - $1650</td>
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<tr>
<td>Cobra 148</td>
<td>54 lbs</td>
<td>10”/min.</td>
<td>20’x1.5”</td>
<td>auto carb.</td>
<td>$4795 - $3100 - $2450</td>
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<tr>
<td>Pionjar 120</td>
<td>57 lbs</td>
<td>10”/min.</td>
<td>20’x15”</td>
<td>man carb.</td>
<td>$4295 - $2900 - $2250</td>
</tr>
</tbody>
</table>

Warranty: 6 months for new equip. - 6 months for used equip.

Dealers:

- Pioneer Sales and Equipment
  303-782-9669
- Mr. Mel Dirksen
  1743 S. Leyden St.
  Denver, CO 80224
- Berema Inc.
  800-243-5005
  10 Fitch St.
  Norwalk, Ct. 06856
- Sal Florio
  Central Equipment
  207-827-6193
  Stillwater, Me.

Drills 1” or 7/8” x 12” under collar (16” overall length) use with 1” or 7/8” feathers and wedges from:

- Bicknell
  PO Box 627
  Rockland, Maine 04841
  207-594-8494

Used Gasoline Powered Drills Available

Dealer demonstration units of the lightweight version of the popular Cobra drills, the Pico 20, is available at great discounts. This machine lists at about $2500.00 but two are available for $1200.00 each.

The Pico 20 weighs 22 lb., drills through granite at 4” per minute, has a maximum hole depth of 3 feet, and uses regular hollow drills. Unlike the cheap drills from Ryobi, the Pico vents the exhaust down through the drill to blow out the stone dust. This makes for faster drilling and sharper drill bits.

For more information call Mel Dirksen at Pioneer Sales and Equipment, 303-782-9669.

Topo Maps, No Waiting

Jim Cahoon of the Boston Mineral Club has passed on a great source of topo maps. If you have the luxury of time you can order topo maps directly from the USGS Map center in Denver, CO. for $2.50. But they commonly take six months to arrive. That is often inconvenient.

Fortunately a new small business has started to ship topo maps within two days. They are Timely Discount Topo Maps (1-800-821-7609 or 1-303-469-5022). When they get your order they simply pick them up in person at the USGS center. They charge slightly more per map ($3.50) for the convenience, but it is worth it.

If you are not sure what quadrants you need, they will fax you the catalog for the state you are interested in. You can then call in the names. Unfortunately they do not accept credit cards, so you must arrange for payment with check or COD.

Oxalic Acid

Q: Where can you get oxalic acid?

A: As mentioned in last months newsletter, most hardware or paint stores carry oxalic acid for use as a wood bleach. Grand Metro Hardware (95th & Broadway), Janovich Plaza (52nd & Ninth Ave.), are two that are on the west side of Manhattan.

Some states do not allow oxalic acid to be used (I believe because it is in the same category as phosphate detergents). In those states you can purchase your oxalic acid mail order from The Rock Bin, 33020 Dowman, Lake Elsinore, California 92530 (909-678-3106). Their prices range from $3.75 to 3.00 per pound depending on quantity.
15 Volumes Set of The Mineral Collector Still Available

A few years ago Messrs. Lawrence Conklin and Jay Lininger teamed up to produce a fifteen volume set that reprinted the complete Mineral Collector. There are only about twelve complete sets known in the country. They arranged to borrow one and make facsimile reproductions including halftone images of the front and back covers. Sets are still available from Mr. Lininger. He currently has them unbound but will arrange binding on receipt of your order.

The set covers the entire Mineral Collector from 1894 to 1909. This was a monthly magazine dedicated to mineral sciences. The period that it was written was at the same time as many exciting discoveries in our area. It is interesting to read about Haddam, CT or West Paris, ME from the perspective of the time.

This set is a must have for any collectors interested in old locations or old specimens. The advertisements from the mineral dealers alone make this set worth purchasing.

The complete set soft bound is $325.00 and $400.00 hard bound. Each volume is approximately 320 pages. For further information write Mr. Jay Lininger at MATRIX, Box 129 Dillsberg, PA 17019

Sources For Out of Print Earth Science Books

Many members have expressed interest in sources for old out-of-print mineral and gem books. I suspect this is due to the sense of history in our club that is unique to others in the country. The following is a summary of the better known dealers with books on our region. If you have others please submit them for future publication.

Frederick Blake, Bookseller
45 Seville Lane
Stony Brook, NY 11790
516-689-3754

Offers about 200 books in a list 8 pages long. A good selection of books concerning New England. Prices are competitive but occasionally high. It pays to compare with others for the best price.

Rocks of Ages
PO Box 3503

Mineral News

Best source of locality new for field collectors. 12 page newsletter with articles on new mineral locations and new minerals at old locations. Also includes book reviews international show schedule, show reviews, and new minerals identified.

Subscriptions: $18.00 per year (12 issues)
Mineral News
L. R. Ream Publishing

GEM AND MINERAL MUSEUMS

L. R. Ream Publishing

SOURCES FOR OUT OF PRINT EARTH SCIENCE BOOKS

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Rocks of Ages
PO Box 3503

1995 Gem & Mineral Almanac
Matrix
A magazine format 36 page journal about the history of minerals. A great source of information on historic locations, collections, collectors and dealers. Articles are limited to pre 1970 events. I especially enjoy the serialization of the correspondence between Ed Over and Arthur Montgomery from the 1930’s and the stories of Over’s amazing collecting trips.
Subscriptions: $20.00 per year (4 issues)
Matrix Publishing Company
P.O. Box 129
Dillsburg, PA. 17019-0129
717-432-7201

Lapidary Journal
Featuring articles on gems, jewelry arts, beads, minerals and field collecting. Several theme issues per year including gem and mineral directory (April), bead annual (October), field collecting (March ?), etc. Good all around magazine and easiest to find at newsstands. Monthly article by Fred Pough has fun anecdotes and information on different gemstone.
Subscriptions: $28.00 per year (6 issues)
Lapidary Journal, Circulation Department
P.O. Box 124
Devon, PA. 19333-9933
1-800-676-4336

Rocks and Minerals
Nice publication devoted to minerals and fossils. This is the official publication of the EFMLS. They reprint the Geo Currents column of geology news, have a featured location or mineral each month, and have a connoisseur’s choice column for classic specimens. Good source of locality information with emphasis on eastern US.
Subscriptions: $38.00 per year (12 issues)
Rocks and Minerals
Heldref Publications
1319 Eighteenth Street
Washington, D.C. 2007-6117
1-800-365-9753

Rock and Gem
More gem/lapidary oriented than Rocks and Minerals and definitely slanted towards western US collecting. Good selection of collecting locations, lapidary how-to articles.
Subscriptions: $19.95 per year (12 issues)
Rock & Gem
4880 Market Street
Venture, CA. 93003

Pseudo News
Quarterly publication dedicated to pseudomorphs and pseudomorph locations. Articles are short and well referenced.
Subscriptions: $12.00 per year (4 issues)
Philip Betancourt
410 Chester Avenue
Moorestown, NJ. 08057

Micro Probe
Semiannual publication of the Northwest Micromineral Study Group. Excellent detailed articles on micros, generally from the northwest US. Heavy on zeolites and crystallography.
Subscriptions: $12.00 per year (2 issues)
Don Howard
356 S.E. 44th Street
Portland, OR 97215

Picking Table
Semiannual publication of the Franklin-Ogdensburg Mineral Society. Well produced magazine format devoted to the minerals of northwest New Jersey, especially Franklin. Articles are on the technical side.
Subscription: free with FOMS membership - $20.00 year
John Cianciulli, FOMS treasurer
60 Alpine Road
Sussex, NJ 07461

New Tools
Here are some new toys on the market perfect for mineral collectors. While they are not cheap, they sure will come in handy.
**Cordless Diamond Saw**

This is a new tool from Makita that could be a great asset to mineral collectors. It is the Model 4190 cordless 3.5” diamond saw with built in water reservoir for wet cutting. It is made for tile cutting but would be perfect for separating crystals from too large matrix or opening up pockets for easier access. Available from Tools on Sale (1-800-328-0457) for $119 or $189 with battery and charger.

**Magellan Hand Held GPS2000**

This is a small (about the size of a small cellular phone, hey, there’s another toy!) hand held Global Positioning System (GPS) receiver. It receives signals from up to five satellites and tells you where you are in latitude, longitude and altitude. There is a memory of 300 locations that you control. And features backtracking, waypoints and course plotting. The potential for this tool is amazing. For instance, when prospecting you can take a position at your car and it will always guide you back to it by giving you compass heading and distance to travel. Plus if you find anything while out, you can record the position so you can find it again. Or if you are looking for a known location, this will guide you to it. Accuracy is limited to between 100 to 25 yards depending on how many satellites the system is locked on to. Available from OEMs, (61 St. west of Broadway) for $199.00.

**Connecticut Mines Map**

Gary Burke found a great map from the Connecticut Geologic Survey that shows all the known active and inactive mines and quarries in the state. It is a large format (about 60” wide) and costs only $10. Entitled “The Bedrock Mines and Quarries of Connecticut” compiled by Robert J. Altamura, 1987. For more information write:

State of Connecticut
Natural Resources Center
Department of Environmental Protection
165 Capitol Avenue, Room 555
Hartford, CT 06106

**Tool Sources**

**Q:** Where can I get tools for collecting?

**A:** Almost any hardware store has the basics, hard hat, 3 lb. hammer, 1” cold chisel, small crowbars. And any outdoor store has rucksacks, backpacks, tote bags, rain poncho, insect repellent. But there are some specialty tools that more serious collectors might want. Try Metropolitan Lumber on 11th Ave or Canal Hardware for extra long crowbars, 6 to 20 lb. sledge hammers, pickaxes, extra long chisels (pocket robbers). Griegers has a free mail order catalog that has all of the Estwing tool that are made for mineral collectors. Call them at 1-800-423-4181. See the Ad below for prices.

**Screens**

**Q:** During our field trip to the Hickory Hill Diamond Diggings I saw members use screens for screening the dirt for crystals. Where can I get these and what size mesh do I need?

**A:** There are several options for screens. You can make your own, buy a kitchen type screen (like they fry french fries in at McDonalds), or you can call an industrial supply house.

If you make your own you should use 1/8 inch mesh for Herkimer diamond collecting or 1/4 or 1/2 inch mesh for normal collecting, like at Ellenville. The size of the mesh should correspond to the size of the crystal that you will keep. I will keep a 1/8 inch Herkimer or tourmaline or apatite but I would only keep a 1/2 inch common quartz crystal.

If you want to buy a manufactured screen, I highly recommend buying mail order from McMaster Carr, an industrial supply company. They sell “foundry riddles” used in foundries to screen castings from the sand molds. They are available in many different mesh sizes, so you can get the one that is right for you.

Fortunately for us, McMaster Carr accepts credit card orders over the phone. And they deliver usually the next day if you live in the New York area. Their order number is 908-329-3200.

**New Russian Mineralogical Magazine “World Of Stone”**

This is the only Russian popular science mineralogical journal. Mines, minerals, museums and much more! Printed in English with supplementary sheet of texts in Russian about 80 pages per issue, many illustrations

One year subscription (4 issues) $52, including postage. You may subscribe at any time. Back issues are available. Send Your subscription list and check to: H. Obodda, Box 51, Short Hills, NJ 07078, USA
Cataclysms of the Ice Age

The Grand Coulee Dam and Dry Falls, Washington interpretive center now sells a very, very good 15 minute video tape called The Great Floods:

Cataclysms of the Ice Age for $14.95. It’s an impressive overview of the Bretz Events, and I urge you all, especially you teachers, to see it. Apparently it was originally a Washington State University slide show, and was so popular they went ahead and made a tape of it. It packs a lot of information and excellent graphic illustrations into a 15 minute time frame. Sent chills up the old spine!

National Park Service
Grand Coulee Dam Recreation Area
1008 Crest Dr.
Coulee Dam, WA 99116

Geiger Counters

by Ken Colosky

As requested by several list members, here’s a compilation of sources for Geiger counters that I received from my inquiry I bought one of those Russian gm counters with an LCD readout from David Shannon:

David Shannon Minerals
E. Rustic Drive
Mesa, AZ 85215
(updated Feb. 20, 1993)
In the last catalog, these counters were $37.50 each with $4.75 for postage and handling.

Chris Wong in Worcester Massachusetts, 508 757-6607 sells a pocket Geiger counter that clicks and flashes for about $20. He sells others for $49 and up with meters.

Tom Hay
Mt. Mist Products
PO Box 4215
Morgantown WV 26504-4215
Has some of those Geiger counters for sale. They are $16 + $3 shipping. They are small and are surprisingly sensitive. Had one sound off on a specimen I collected in Maine and when I checked it w/ a ‘real’ Geiger it registered at .02mr/hr. ...

I remember seeing an ad, I think in the back half of Scientific American, for a ‘counter that you could hook up to a notebook computer. If you had an old clunker of a notebook you could wander around and have the notebook build an on-the-fly database of readings for you. The counter and DOS software go for about $150. It is sensitive and accurate. I use it for small specimens in order to detect levels above background. The supplier is Aware Electronics; 800-729-5397; 302-655-3800.

Newsletter About Pseudomorphs

Philip Betancourt has started a quarterly newsletter devoted to pseudomorphs. Each issue is 8 pages and has several short articles on pseudomorphs from around the world. Articles in the first issue included “New Find of Chalcophanite Pseudomorphs from the Sterling Mine” and “Millerite Pseudomorphs.” Subscription is $12.00 per year. Order from Mr. Betancourt, 410 Chester Ave., Moorestown, NJ 08057

Two Volume Book Free From USGS on Arizona

I have just received a new publication in two volumes free from the USGS. Part A is the program and abstracts of the ninth McKelvey Forum on Mineral and Energy Resources in Tucson, Arizona, February 22-25, 1993. Part B is the Guidebook for Fieldtrips as part of the same forum. Part B is of most interest to collectors that travel to Arizona to collect. It has several papers on the geology and mineralogy of Arizona. The last section is a detailed road log with comments for field trips to the mining camps of Arizona.

These books are available free of charge from the USGS, Map Distribution Center, Box 25286, MS 306, Federal Center, Denver, Colorado, 80225. Ask for Circular 1103-A and 1103-B.
Matrix Magazine

MATRIX: A Journal of the History of Minerals recently mailed its Summer 1994 issue. The journal, which has been published somewhat erratically since about 1988, is attempting to make a fresh start and get on a regular publishing schedule. Thus, the latest issue represents a change from a newsletter format to a more attractive journal format. The journal was started by Larry Conklin and Jay Lininger and now boasts a staff of additional aficionados of minerals and mineral collecting history. The latest issue is superb!

This issue includes:

A Search for Bridgewater Station Titanites
The Peabody Museum Meteorite Collection:
A Historic Account Professor Charles Palache: A Tribute (written by Arthur Montgomery!)
The Search for Radio Grade Quartz in the Southern Appalachian Region
The Crystal Bearing Churches of Southern Virginia
The Skidoo Mines Company
The San Francisco Stock Exchange Association.

If you are interested in mineral history, I highly recommend subscribing. US rate is $20/yr and outside US is $24/yr. (4 issues/volume) Write to:

MATRIX Publishing Company
PO Box 129
Dillsburg, PA 17019-0129
Phone: 717-432-7201
Fax: 717-432-7109

Mineralogy of Maine

Finally the new book “The Mineralogy of Maine” has been published. This monumental work by Vandall King and Eugene Foord has been in progress for many years. It is large format book with 418 pages, 99 color photos and 537 black-and-white photos. It is an invaluable reference for any New England or Maine collector.

It is available for $55.00 hardbound or $40.00 softbound from the Maine Geological Survey, State House Station #22, Augusta, Maine, 04333

Gregg Cunningham inside amethyst pocket #2, Intergalactic Pit, Deer Hill, Maine.
### State Geological Surveys

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<th>Number</th>
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<tr>
<td>Alabama</td>
<td>(205)349-2852</td>
<td>Tuscaloosa, AL</td>
<td>35486-9780</td>
</tr>
<tr>
<td>Alaska</td>
<td>(907)474-7147</td>
<td>Fairbanks, AK</td>
<td>99709-3645</td>
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<td>Arizona</td>
<td>(602)882-4795</td>
<td>Tucson, AZ</td>
<td>85719-4816</td>
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<tr>
<td>Arkansas</td>
<td>(501)324-9165</td>
<td>Little Rock, AR</td>
<td>72204</td>
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<tr>
<td>California</td>
<td>(916)445-1923</td>
<td>Sacramento, CA</td>
<td>95814-3531</td>
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<tr>
<td>Colorado</td>
<td>(303)866-2611</td>
<td>Denver, CO</td>
<td>80203</td>
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<tr>
<td>Connecticut</td>
<td>(203)566-3540</td>
<td>Hartford, CT</td>
<td>06106</td>
</tr>
<tr>
<td>Delaware</td>
<td>(302)831-2833</td>
<td>Newark, DE</td>
<td>19716-7501</td>
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<tr>
<td>Florida</td>
<td>(904)488-4191</td>
<td>Tallahassee, FL</td>
<td>32304-7700</td>
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<tr>
<td>Georgia</td>
<td>(404)656-3214</td>
<td>Atlanta, GA</td>
<td>30334</td>
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<tr>
<td>Hawaii</td>
<td>(808)587-0230</td>
<td>Honolulu, HI</td>
<td>96809</td>
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<tr>
<td>Idaho</td>
<td>(208)885-7991</td>
<td>Moscow, ID</td>
<td>83843</td>
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<tr>
<td>Illinois</td>
<td>(217)335-5111</td>
<td>Champaign, IL</td>
<td>61820-6964</td>
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<td>Indiana</td>
<td>(812)855-9350</td>
<td>Bloomington, IN</td>
<td>47405</td>
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<tr>
<td>Iowa</td>
<td>(319)335-1575</td>
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Precious Metal Exploration Maps

Published at a scale of 1:500,000 these maps are the latest information displaying specific areas prospective for gold, silver, platinum and other valuable metals. Overall map size is 46 x 63 inches. Each map is made from all currently available information describing aeromagnetics, gravity, structural details, outcrop and subcrop geology, geomorphology, current and past mining activity, geochemistry, geothermal data and aeroradiometric trends. This information has been carefully combined in computer mapping software to delineate those areas with the greatest probability of precious metal deposition and represents an interpretation by an experienced exploration geologist. Each map shows primary areas for exploration overlain on a base map printed in five colors displaying roads, railroads, topographic contours, water features, counties, national park monuments and national forest reservations. Included with each map are the geographic coordinates for ten of the best areas for prospecting. Very useful by those who have GPS receivers. Exploration maps are available for the following areas:

- Alaska    $ 125.00
- Arizona   $ 75.00
- Colorado  $ 75.00
- Ecuador   $ 125.00
- Northern California $ 75.00
- Idaho     $ 75.00
- Northern Mexico   $ 250.00
- Nevada    $ 125.00
- Oregon    $ 75.00
- Panama    $ 75.00
- Utah      $ 75.00
- Western Colombia $ 125.00

Price includes shipping and handling. Personal check or money order O.K. Purchase order from D&B rated organizations O.K. Send order to:

G.H. Hamilton Geologist

EMAIL,INTERNET: 3326954@MCIMail.com
FAX: 804 490 0516

MAIL: P.O. BOX 5381, VIRGINIA BEACH , VIRGINIA 23455. U.S.A.
TELEX: 6503326954 MCI UW

AAPG map

Submitted by Alan Silverstein

The American Association of Petroleum Geologists (AAPG) map I ordered a while ago just arrived last night. I promised to let you know if I was disappointed or especially pleased.

A big “thank you” to the person who first wrote of the AAPG. I am VERY pleased with what arrived in the mail. I ordered map #2 of 11, Southern Rockies (Colorado, Utah, Arizona, New Mexico). I expected a mailing tube, but received a folded map in an envelope, which surprised me at first. “$12 is a lot for a single map, and it’s not even in a mailing tube?” ($13.25 total with shipping.) But the map turned out to be packed with information, quite a bargain I think.

It’s a big map, about 28x40”, folded much like a highway map. About 2/3 of one side is a big geologic map of the four states showing the surface rock types and faults. On this section Colorado is about 10x13”, or about 30 miles to the inch. The map is very colorful and well marked. (It would be harder for a color blind person to use, but not impossible.) There are enough landmarks (towns, roads, and geologic features) to make it pretty easy to locate yourself on it.

At a fine detail level it is not quite as precise as I would like, a bit “cartoonish”. However, it would probably have taken an inordinate amount of work to make it more precise, and that might have overstated the known mapping of rock types anyway. Again, there is enough detail to locate yourself pretty well. I can locate and explore the rock types and ages at a variety of places I’ve rockhounded. For example, I can see where the Rincon and Piute Canyon are on Lake Powell, though they’re not accurately portrayed. The value of this map is not precise navigation or fine detail, but obtaining the big-picture view, the context. I think I’ll find it useful as a guide to new areas to hunt for agates and petrified wood.

I could easily spend hours poring over the geologic map, in fact I’ve already started. :-) But in addition to this, there is a lot more. On the same side are stratigraphic columns that identify all the layers and formations by age, in order. On the back side is a
large amount of text and some other sorts of maps that identify and describe long lists of geographic features and mineral and fossil sites, many of which are new to me. A real wealth of information... This document was clearly intended for use by rockhounds as well as petroleum explorers.

Once again, to order from the AAPG or obtain their order form, call 800-364-2274 (in the US at least).

Mining Equipment
There is a company in Riggins, Idaho, USA called Miners Supply that will ship anywhere in the world, call 208-628-3247.

Gary Howard, partner of the Intergalactic Mine, removes amethyst from the pocket using an air hammer.

Access to the pocket is through a 17 foot shaft. Here, Gary brings up some amethyst to give away to the NYMC field trip participants.
News from the Mineral World

Seen In The Press...
contributed by John Betts

From Mineralogical Record, May-June 1994, V.25, No.3

A letter from the editor reports that the Bureau of Mines has developed a system for sealing mines by suspending a form in the mine shaft and pouring a concrete cap. This will seal the mine to prevent accidental deaths.

There are approximately 558,000 abandoned mines in the U.S. At a cost of $33,000 to cap each mine it is extremely unlikely that they will all be capped. Every year approximately 10 people die each year in closed mines. The majority are not mineral collectors. But as collectors we stand to lose access to many collecting sites if they are all sealed.

Bennett Pegmatite, Buckfield, Maine

The members that heard the lecture at our December Banquet will remember the stunning photographs of the morganite from the Bennett Quarry in Maine. This site is the subject of an extensive article in this issue. The article covers the history, geology and mineralogy of the quarry with some more amazing photos of great minerals. There is a 600 lb. milky quartz cluster and shots of “Rose of Maine “ morganite crystal shown before removal from the pocket.

Copper Roses from near San Lorenzo, New Mexico

This article reviews a site first discovered in 1889 that has native copper “roses”. These are copper crystals similar in habit to azurite. The article explores the history and geology of the site and recent geochemical theories regarding their origin. This is a great site to collect at if you have a metal detector!

Subscriptions $39 per year, P.O. Box 35565, Tucson, AZ., 85740, 602-297-6709

From Mineral News

A great article on all of the pegmatites in the Custer Pegmatite District in the southern Black Hills, South Dakota. The article is a travelogue of a visit last year to these mines and is full of great information for collectors. Among the finds reported:

Elkhorn Q.: White beryl to 2” diameter by 6” long
Mohawk Mica M.: Abundant white beryl to 1/2” dia.
Triangle A M.: brilliant black tourmaline 2.6 long by 1” dia. with trigonal dipyramid termination.
Burt Mica M.: 6” terminated green beryl, 4” euhedral red-black garnets
Phelps Spar Q.: euhedral black tourmaline crystals 3” in diameter by 4 feet long ( is this a typo?)

Black Cap Mt., North Conway, NH

An article on the reopening of the amethyst discovery on top of Black Cap Mt. This site was discovered in 1983 by Bill Ross, the old mineral dealer on Hurricane Mt. Rd. near N. Conway. At that time Bill took out 90 lbs. of amethyst crystals. In 1993 seven collectors took advantage of the dry summer and reopened this site. They worked down the vent shaped opening 21 feet, 9 feet beyond the original workings. They encountered fluorite and hematite nodules along the way. Finally they unearthed a single 50 lb. fluorite crystal 12x10x8”.

Sally Ann Claim, Powell City., Montana

A report on recent discovery of amethyst tipped scepter crystals from a claim owned by the Helena (Montana) Mineral Society. The pocket was approximately four feet square and contained 300 scepter crystals from 3/4 to 5” long. For a $7.50 annual membership visitors can collect at the site for up to ten days per year. (Sounds like a great idea for our club, any ideas on claims worth our attention?).

Subscription: $15.00 per year, P.O. Box 2043, Coeur d’Alene, Id., 83816-2448, 208-664-2448

From Lapidary Journal, June 1994, V.48, No.3

The entire issue is devoted to Opal. The first article is about jewelry designs that incorporate Opal. It shows several pieces by three different designers. Next there is an article on Opal pseudomorphs that look like pineapples from the White Cliffs in southeastern Australia. There is a photograph of one specimen 4 1/2 “ across that weighs 3500 carats!
Man-Made Opal

There is an article on Slocum Stone, an artificial Opal that looks like the real thing. Collectors take note so that you don’t get fooled by an unscrupulous dealer. Mr. Slocum produces one million carats a year and is tight lipped about his process.

Field Collecting Opal

There are two articles on locations for collecting Opals. The Rainbow Mine in Gerlach, Nevada allows collecting for $25 to dig in the mine and $15 for digging in the tailings per day.

Finally there is a field trip travelogue to the White Cliffs mineral collecting fields in Australia.

Subscription: $24.00 per year, P.O. Box 1100, Devon, PA., 800-676-4336

From Mineralogical Record September - October 1994, Vol. 25, Number 5

The article about famous mineral localities is on the Orford Nickel Mine in Quebec, Canada. This is one of the places open for collecting to the public at no charge.

A profile of Martin Leo Ehrmann, mineral dealer and an early member of the New York Mineralogical Club.

Subscriptions $39 per year, PO Box 35565, Tucson, AZ., 85740, 602-297-6709

From Mineral News, July August and September Issues

News that the Crystal Vista collecting area in Arkansas has been opened to the public for collecting prior to its reclamation.

A new mine in the Cave-in-Rock area called the Iron Hill Mine has been opened with minor production of mineral specimens.

A new vanadinite find in La Paz County, Arizona (exact location is still secret) that is producing bright red vanadinite to 3/8 inch or longer crystals.

A two part article on collecting evaporates at Searles Lake, CA.

Several articles on recent finds in New Mexico. (Sounds like the winter 1996 New York Mineralogical Club field trip should be to New Mexico!)

Subscription: $15.00 per year, PO Box 2043, Coeur d’Alene, Id., 83816-2448, 208-664-2448


A calc-silicate locality that is in a road cut 18 miles west of Denver Colorado. Specimens of Grossular, vesuvianite, allanite, scheelite and others are illustrated.

A barite and sphalerite location at a road cut in central Kentucky. Barite up to 1 inch, calcite up to 2 1/5 inches, and sphalerite up to 1/4 inch can be found.

Subscription: $37.00 per year, Heldref Publications, Rocks and Minerals Magazine, 1319 Eighteenth Street Northwest, Washington, DC 20077, 202-296-6267

From Lapidary Journal, September and October Issues 1994,

Fred Pough’s article on Kunzite variety of spodumene.

A great story on the quest for access to the recently discovered Lechuguilla Cave in New Mexico

A field trip to Agate Fossil Beds National Monument in Nebraska

Subscription: $2.00 per year, Lapidary Journal Magazine, Circulation Department, PO Box 1100, Devon, PA 19333-9935, call 1-800-676-4367

From Mineralogical Record, July - August 1994, Vol. 25, Number 4

An article from the Natural History Museum of Los Angeles County about displaying and protecting a mineral collection in seismically active regions.

There is a great article on the history and apparatus of blowpipe analysis. This appears to be the definitive reference on the history of this once important method of mineral identification.

An article on the secondary nickel minerals of the 132 North open-pit nickel mine in Widgiemooltha, Australia.

A report of newly discovered mineralization in the upper Arno River valley, Tuscany, Italy. Discoveries include anapatite, vivianite, kutnohorite, etc.

My favorite column is the Mineral Stories compiled by Lawrence Conklin. This month’s include collecting stories about Herkimer diamonds, the Commodore mine in Colorado, a story about Kunz and mislabeling specimens, plus several others.

Subscriptions $39 per year, PO Box 35565, Tucson, AZ., 85740, 602-297-6709
From Mineral News, June 1994

A field trip report on collecting Ametrine at the diggings of La Mina Anahi, Bolivia. This is a first person report of collecting mineral specimens (rare) in the wilderness of Bolivia.

Part 4 of the article on the minerals of Halls Gap, Kentucky.

A review from Duane Leavitt on the recent work of the Aldrich prospect in Stoneham Maine. This location has produced some beryl/aquamarine equal to the Songo Pond location. This report talks about their recent finds.

Art Smith’s report on a collecting trip to Maine and collecting twinned cassiterite at the Emmons Quarry in Greenwood. (This site is currently under lease and closed to collectors).

A preliminary report on Global Positioning System (GPS) products on the market.

Subscription: $15.00 per year, PO Box 2043, Coeur d’Alene, Id., 83816-2448, 208-664-2448

From Rocks and Minerals, July/August 1994

A review of Pyrite from Colorado locations. This is a review of important specimens from public and private collections with general location information.

An article on the minerals of the Walker Vein from the Caldwell Stone Company, Boyle County, Kentucky. Featuring barite, calcite, fluorite, marcasite, etc.

Crystal habits and twinning of calcite crystals from the Old Faylor-Middlecreek Quarry, Winfield, Pa. Unfortunately this report is after the closing of the pit that the crystals were collected. The pit is now water filled.

Subscription: $37.00 per year, Heldref Publications, Rocks and Minerals Magazine, 1319 Eighteenth Street Northwest, Washington, DC 20077, 202-296-6267

From Rock and Gem, July 1994

A great first hand account on visit to the Caverna de Santa Domingo, an amazing cave of selenite crystals similar to the Cave of Swords. The author was the second American to enter this cave filled with selenite crystals up to 12 feet long in diverging sprays 15 feet across.

An article on techniques the pros use to find gold. If you are interested in panning or dredging for gold you will want to read this article.

Another collecting location from the owners of Many Facets Rock Shop in Albany. This site is north of Amsterdam, NY and has some pyrite, diopside, quartz, pyrhotite, etc. (These folks have put together a good guide book to collecting in New York and southern New England).

A field trip report on using a shop vacuum for collecting gold at the Nevada County Malakoff Diggins State Historic Park in California.

A field trip report on the Ruggles Mine in Grafton, NH.

Subscription: $3.00 per year, 4880 Market Street, Ventura, CA 93003. 805-644-3824

From Lapidary Journal, August 1994, V.48, No. 5

Fred Pough’s article this month is about sphaerocobaltite.

A profile of midwest collector/jeweler Victor Porter.

A field trip article on collecting garnet at Sweetwater Creek, Montana.

An article by Si and Ann Frazier on red gemstones, ruby and others. This includes a list of all known red cut stones.

A report from the first Dino Fest conference at Indiana University/Purdue University.

Profiles of the six new inductees in the National Rockhound and Lapidary Hall of Fame.

An article on the gem trade on the streets of mining towns in the Minas Gerais region of Brazil.

From Pseudo News, Spring 1994, V.1, No. 2

What’s New in Pseudomorphs: featuring Russian chalcocite after silver, powellite after molybdenite from Chile, cerrusite after anglesite from Australia.

A report on the Blueball Mine in Globe AZ. and the unusual nodules of azurite and malachite.

Part 1 of What is a Pseudomorph. This article is the core of the lecture that Mr. Betancourt will give to the club in November.

Carbonate-hydroxylapatite after pyrite from the Big Horn Basin, Wyoming.
Subscription is $12.00 per year. Order from Philip Betancourt, 410 Chester Ave., Moorestown, NJ 08057

1995 Gem & Mineral Almanac

**Seen In The Press II...**

*contributed by Vivien Gornitz*

**A Rare New Volcanic Mineral (Nature, May 5, 1994)**

Russian mineralogists and volcanologists have discovered a rhenium sulfide mineral as a sublimate on a volcanic fumerole, at Kudriavy volcano on Iturup island in the Kurils, northwest Pacific Ocean. This find is particularly unusual because of the scarcity of the element rhenium in nature, which ordinarily occurs only as a minor constituent of other minerals, notably pyrrhotite, pentlandite, and other sulfides.

**Emeralds From Sulfurous Brines (Nature, June 16, 1994)**

The origin of Colombian emeralds has puzzled scientists until now. Unlike most other emerald occurrences from pegmatite dikes that are associated with igneous activity, the Colombian emeralds are found in sedimentary rocks. A group of researchers from Canada and the U.S. present evidence that emeralds from the Muzo mine in Colombia formed when the dissolved sulfates carried by hydrothermal brines reacted chemically with organic-rich shales and limestones. These sediments provided the elements beryllium, chromium, and vanadium, essential to the formation of emerald.

**A “Youthful” Diamond (Geotimes, Oct. 1994)**

Geologists Henry O. O. Meyer of Purdue University and Peter Kinney of Curtin University of Technology, Perth, Australia have dated the crystallization age of a diamond from Zaire, using solid inclusions containing radioactive isotopes, at 628 million years. This is the youngest diamond ever found. Most diamonds are at least 2 to 3 billion years old, although the deep-seated volcanic eruptions that have brought them to the earth’s surface have occurred much more recently than that.

**Harder Than Diamonds—Part 1 (The Sciences, May/June 1994)**

Prof. Marvin L. Cohen, professor of physics at the University of California at Berkeley has predicted that carbon nitride will be harder than diamond. He based his prediction on a theoretical model of solids he developed, inspired by ideas originally proposed by the Italian physicist Enrico Fermi in 1934. Short chemical bonds make hard materials. In diamond (the hardest known substance, 10 on the Mohs scale), all of its bonds are equally short and strong. According to Prof. Cohen, a likely candidate for an even harder material with shorter bonds than diamond is carbon nitride, C3N4.

**Harder Than Diamonds—Part 2 (New Scientist, Dec. 18, 1993)**

A material harder than diamond may have been synthesized in the laboratory. Henri Szwarc, a physical chemist at France’s National Center for Scientific Research together with Russian colleagues were trying to synthesize diamonds, but instead produced buckminsterfullerene, a 60-atom carbon sphere, named after the famous inventor and popularly known as “buckyball”. Formed under high pressures with a diamond-tipped anvil, the buckyball scratched the diamond surface of the apparatus, suggesting that the new substance was at least as hard as, if not harder, than diamond.

**Minerals from Space**

Part 1. Stardust in meteorites (from T.J. Bernatowicz, GEOTIMES, Dec. 1994; L.R. Nittler et al., NATURE, Aug. 11, 1994). Minute grains of minerals suspected to originate in supernova explosions deep in space have been isolated from carbonaceous meteorites by several research groups including those of Dr. E. Anders and colleagues at the University of Chicago, and Dr. E. Zinner and others at Washington University, St. Louis, Missouri. Interstellar minerals found to date include tiny crystals (1 to 2 nanometers across; 1 nanometer is one billionth of a meter) of diamond, cubic silicon carbide (moissanite is the hexagonal form of silicon carbide), graphite spheres, corundum, spinel, and titanium carbide as solid inclusions in graphite. The interstellar origin of these minerals was confirmed by the unusual isotopic composition of inert gases such as neon and xenon, which was quite distinct from the composition of these gases originating on earth or
elsewhere in the solar system. Additional evidence for a stellar source includes the non-solar oxygen isotope composition of corundum and an excessive amount of $^{26}$Mg in the spinel.

**Part 2. Buckyballs from space (by David Graham, EARTH, Dec. 1994).**

In the November 1994 Mineralogical Club Bulletin, lab-grown buckyballs (i.e. buckminsterfullerene, a 60-atom carbon molecule shaped like a geodesic dome) were described as being harder than diamond. David Graham reports in the Dec. issue of EARTH that they have been found in nature, in 1992, lining cracks in Russian rocks. More recently, geochemists L. Becker and J. Bada of the University of California, San Diego, have also discovered tiny amounts of buckyballs at the 2 billion-year old impact site at Sudbury, Ontario. The Sudbury buckyballs are believed to have been either brought to earth along with the asteroid or comet that created the Sudbury crater, or were formed as a result of the intense heating, following the moment of impact. The carbon appears to be of extraterrestrial origin because of the virtual absence of carbon in the surrounding sedimentary and igneous rocks.

**Diamonds as dead bacteria? (from E.G. Nisbet et al., NATURE, Feb. 24, 1994).**

Prof. E.G. Nisbet and his colleagues, of the Department of Geology, University of London, raise the intriguing, if somewhat unromantic, possibility that diamonds may have originated as bacteria from ancient Precambrian mid-ocean ridge hydrothermal systems. This provocative hypothesis is supported by the lighter than average carbon isotope composition and the sulfur isotope ratios from sulfide inclusions in diamond, both of which are characteristic of biogenic origin. The high manganese content of some eclogites and eclogitic inclusions in diamonds is in keeping with an oceanic hydrothermal source.

The bacteria-containing sediments were probably dragged down deep into the earth’s mantle by the subduction process. The wide range of observed carbon isotope compositions could then have resulted from the varying amounts of metamorphism to which the rocks had been subjected. The high temperatures and pressures at great depths converted the carbon, by then probably reduced to graphite, into diamond. In an ultimate form of recycling, the diamonds were later transported back to the earth’s surface by deep-seated explosive volcanic gas eruptions (forming kimberlite pipes). Nisbet et al. speculate, in conclusion, that some diamonds may indeed be our very distant ancestors!

**Unusual Crystal Growth in Burmese Rubies.**

The recent Mineral Study Group session on crystal growth offered a mere taste of this fascinating topic. Several recent articles provide new insights into growth behavior. In the Spring 1995 issue of Gems & Gemology, Dr. Adolf Peretti and his colleagues describe complex crystal growth patterns in rubies from Mong Hsu, Myanmar (Burma). The Burmese rubies display a distinct color zoning of dark purple sapphire cores, overgrown by red ruby rims. Heat treatment turns the violet cores a deep red.

Microscopic examination further reveals a complex growth sequence involving up to two discrete violet inner core zones that are separated by a mixed violet-red zone. These, in turn, are enclosed within an all red outer zone. The color changes are also accompanied by changes in crystal habit and variations in chemical composition. Inner cores generally have higher chromium and/or titanium contents than do the outer layers. Iron concentrations are relatively low as compared to rubies from other marble-type deposits. Nevertheless, the combination of color zoning, crystal habit, and growth sequence is unique to this locality.

**Inhibited Growth in Crystals.**

Bill Henderson, in the May-June 1995 Mineralogical Record, gives examples of “inhibited” growth in crystals. Inhibited growth occurs during an interruption of the growth process, when impurities are selectively absorbed on certain crystal lattice planes, thereby interfering with further growth in these directions. In the examples mentioned by Henderson, growth tends to be selectively inhibited along crystal edges and corners. This situation contrasts with dendritic or hopper growth, in which crystals develop most rapidly at their edges and corners, leaving hollow, or stepped faces.

In trapiche emeralds from Colombia, six rays of emerald emerge from a central zone, like spokes of a wagon wheel. Growth of an initial hexagonal prism core of emerald has slowed or stopped. When growth resumed, the hexagonal prism faces continued to form emerald (the rays), while the
areas along edges between prism faces could not grow, and instead were filled by albite.

Other examples of inhibited growth include “triaxial” pyrite in trona (hydrated sodium carbonate, bicarbonate, usually formed by evaporation of saline lakes), in which growth has continued on the cube faces of pyrite, but not the edges, also a six-sided hourglass structure in clear sapphire from Sri Lanka, and hollow cavities arranged along cube diagonals in fluorite from Mt. Saint-Hilaire, Quebec.

**Skeletal Olivine Crystals from Ancient Hot Lavas.**

Rebecca Renner, Steve Barnes, and Rob Hill describe odd shapes of olivine in a rare type of billions-of-years old volcanic rock, komatiite, from a number of localities around the world (see *New Scientist*, July 24, 1993). Komatiite is the volcanic equivalent of peridotite, an igneous rock consisting predominantly of olivine. The high magnesium content of olivine in komatiite indicates that it must have erupted at temperatures as high as 1560°C. (Forsterite, pure magnesium olivine, melts at 1890°C, whereas fayalite, the iron end-member, melts at 1205°C. By contrast, typical basaltic lavas melt around 1100° - 1200°C).

Olivine in komatiites displays a number of unusual habits. The upper part of the lava flow exhibits a “spinifex” texture (named after its resemblance to a type of Australian desert grass), consisting of intersecting, elongated, bladed crystals of forsterite. Olivine from other zones within the lava rock has grown in skeletal, dendritic, and hopper crystals. Hollow cores within the hoppers have been subsequently filled by other minerals. Toward the base of the flow, the olivine assumes a more normal rounded, equant shape. These skeletal textures suggest that the lava rocks have cooled very rapidly.

**The Search for Gold in South Africa**

The Witwatersrand in South Africa has produced nearly 40% of all gold ever mined, worth around $5 billion! However, South Africa may soon be running out of gold. In an article in the April 15, 1995 issue of *New Scientist*, Garry Davidson describes the heated debate among geologists, concerning the origin of these fabled ore deposits. Knowing how the gold got there will provide clues on where to look for more.

Two rival theories attempt to explain the formation of the Witwatersrand gold fields. Both sides agree that these deposits were formed around 3 billion years ago, early in the earth’s history. However, according to the placer theory, gold, uranium, and other minerals were eroded from rising mountains, were carried by ancient rivers along with other detritus, and then accumulated in a 7 km thick pile of gravel, pebbles, and sand. The opposing epigenetic theory, on the other hand, maintains that the gold and other associated minerals were introduced into the gravels hundreds of millions of years later, by heated solutions that reacted chemically with carbon and iron already present in the pebble beds. The problem is that each side has good evidence in support of its case.

The well-rounded shapes of the mineral grains, and the orientation of the gold-bearing beds parallel to the direction of flow of the former rivers support transport by river water. Gold- and uranium-rich ancient highly altered granites could have been the original source rock from which the placer deposits were eroded. The epigeneticists counter by claiming that ore minerals replaced pre-existing iron-titanium oxides (ilmenite) at a later date, while preserving details of the original detrital textures. Furthermore, changes in chemical and mineral composition have been found, caused by heated solutions that penetrated after large-scale fracturing of the rocks had occurred.

Meanwhile, the lack of a middle ground leaves the mining companies with contradictory prospecting strategies. The placer theory predicts that gold should occur in all pebble beds of the region, whereas the epigenetic theory is more restrictive: only iron-bearing beds should have gold.

**Minerals under Extreme Pressures.**

Robert M. Hazen, in an article entitled *The New Alchemy* (*Technology Review*, Nov./Dec. 1994), describes experiments in squeezing minerals under extreme pressures, such as found deep inside the earth. The lure of diamonds motivated scientists to devise methods of attaining high pressures. In the early 1900s, Percy W. Bridgman, a Nobel prize-winning physicist, had invented an apparatus for compressing materials and discovered five polymorphs of ice in the process! Although by the 1940s, he had improved his hardened steel anvil cells sufficiently to achieve pressures up to 425,000 times that of the atmosphere at the earth’s surface,
he proved unsuccessful in synthesizing diamonds. In 1954, General Electric scientists created the first synthetic diamonds by heating graphite mixed with molten iron, to over 1500°C with a powerful electric current, and then squeezing to 60,000 atmospheres of pressure.

In 1960, Sergei Stishov, a Russian geologist, used a large press at Moscow’s Institute of High Pressure Physics, to compress ordinary quartz to over 100,000 atmospheres, and created a new form of silica, 60% denser than quartz. This new mineral, named stishovite, in his honor, was later discovered in rocks at Meteor Crater, Arizona, that had been shocked by the intense pressures resulting from the meteorite impact.

The first diamond anvil cells achieved pressures up to 300,000 atmospheres, and by the 1990s, further improvements in anvil design produced pressures of over 1 million atmospheres. Now scientists could begin to duplicate conditions deep inside the interior of the earth and other planets. In addition, the high pressure research has led to the discovery of potentially-useful diamond-like materials and superhard forms of glass.

contributed by Vivien Gornitz, Nov. 4, 1995

**Mineral Esthetics**

An important motivation for collecting minerals is their sheer beauty. The dramatic shapes and vivid colors of well-formed crystals have a sculptural quality that represents nature's finest artwork. In an article "Million Dollar Minerals", in the November issue of ROCK & GEM Magazine, Steve Voynick describes some spectacular tourmaline and rhodochrosite crystals from the Keith Proctor private collection, now up for sale. In an interview with Voynick, Proctor shares his insights on the 12 most important characteristics determining beauty (and value) in mineral specimens. His points are:

- Crystals should be as complete in form as possible.
- Crystals should be gem-like in transparency or translucency.
- Natural crystal faces should be clear and glassy.
- Colors should be intense and bright.
- The overall arrangement of the crystals and matrix should be attractive and well-balanced.
- The crystals and matrix should be undamaged.
- The proportions between crystal and matrix should be comparable, neither dominating the other.
- There should be a sharp color contrast between crystals and matrix.
- Crystals should be well-distributed over the entire matrix, rather than clustered in a small space.
- Familiarity is desirable, as well as rarity. The most popular and collectible minerals are often the most common. Twenty species attract the most collector interest. These include: tourmaline, aquamarine and other gem varieties of beryl, quartz and its varieties, the garnets, topaz, gold, copper, fluorite, selenite, gem varieties of corundum, azurite, malachite, and the zeolites.
- A resemblance of the specimen to some familiar object or form, such as an animal or plant, enhances its appeal.
- The overall impact of specimens in a collection increases when grouped by species, shape, color, size, or mine of origin.

**Iris Agates**

Iris agate is a form of agate in which the spacing between bands is roughly the same as the wavelengths of visible light. The regularly-spaced bands act as a diffraction grating that produces the characteristic rainbow colors. Although often obscured by pigmentation, zones with iris banding are present in most agates. The nature of iris agates has been carefully scrutinized by Peter J. Heaney from Princeton University and Andrew M. Davis, from the University of Chicago. Their findings are summarized in an article appearing in Science, 15 Sept., 1995. Microscopic examination reveals that the bands in agate comprise regularly-alternating zones with contrasting crystal grain sizes and concentrations of defects. They found that at high magnifications, coarser zones of nearly perfect quartz crystals alternate with chalcedony fibers which contain more impurities and show Brazil twinning. The agate slices reveal a self-similar banded pattern on various levels of magnification, from the centimeter scale, in the hand specimen, down to millimeter and micrometer dimensions. The researchers conclude: "This fractal quality...suggests that the crystallization behavior that governs this compositionally simple mineral system in universally complex".
Blanchard Mine, Bingham, New Mexico

The owner of the Blanchard Mine in Bingham, NM, Ray De Mark, wrote a recent report of collecting activities at the mine in the September, 1995 issue of Mineral News. He reports that they rented a Caterpillar excavator for a weeks work with co-owners Brian Huntsman and Mike Sanders.

They opened several rich fissures of “Blanchard Blue” fluorite. The most exciting specimens though were barite blades sprinkled with 1mm bright orange pyramidal wulfenite.

Collecting Status Changes

Mr. De Mark also reports that collecting is still allowed at the mine. But, you must get written permission in advance. You no longer can get permission at the caretaker.

Write: Ramon DeMark, 530 East Arch Street, Marquette, MI 49855. This unfortunate change is due to restrictions by the BLM following the death of a mineral collector at the mine.

They also found drusy green spangolite to 1mm, some with creedite, libethinite to 1mm, amethyst crystal to 1.5” in clusters to 18” across. Finally they opened a large pocket 10 feet long by 3 feet wide by 2 feet high lined with galena cubes up to 2” across with dark purple fluorite cubes to 1.5”. they removed a large number of slabs intact in order to reconstruct at a later date.

Smoky quartz from Moat Mountain, Hales Location, New Hampshire