New York Mineralogical Club
GEM & MINERAL ALMANAC
1997 Gem & Mineral Almanac

A Compendium of Articles and Advice for the Gem & Mineral Collector

Compiled and Edited by Mitchell Portnoy
Editor, New York Mineralogical Club Bulletin
About This Almanac

This book is a collection of articles, writings, maps, etc. that cannot be found together in any one book. The New York Mineralogical Club publishes this information on a non-profit basis for the club members to further the hobby of mineral and gem studies and collecting. The articles contained herein come from a variety of sources including: the monthly Bulletin of the New York Mineralogical Club, bulletins of other mineral clubs, other mineral-related publications, and the Internet; some material was re-edited or written exclusively for this edition of the Almanac. Permission is granted to reproduce any material or information for non-profit purposes as long as club, name, author and other relevant information is properly credited.

The cover contains some color variations of an early portrait of George F. Kunz, founder of the New York Mineralogical Club.

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The New York Mineralogical Club and Editor wish to sincerely thank all of the contributors to its monthly bulletin and this almanac. A few individuals deserve special mention for their significant contributions:

John Betts
Larry Cohen
Vivien Gornitz
Mike Kessler
Audray Lapham
Melody & Michael McEnaney
Peter Nalle
Corinne Orr
Martin Pitts
Karen Rice
Richard Rossi
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About the New York Mineralogical Club

On September 21, 1886, in the home of Professor Daniel S. Martin at 236 West 4th Street, the New York Mineralogical Club was formed through the efforts of George F. Kunz, B.B. Chamberlin and Professor Martin. Monthly meetings followed at the homes of members, with hosts presiding. George F. Kunz was elected Secretary. At the sixth meeting in March 1887, the name “New York Mineralogical Club” was officially adopted. A constitution and bylaws were approved at the eighth meeting. Since no president was required by this constitution, none was elected until April 1895 when George F. Kunz became the club’s first president, an office he held for many years. At the end of the club’s first year, it had a membership of forty-six, including several notable mineralogists.

The club’s fine collection of more than 700 mineral specimens from New York City is housed at the American Museum of Natural History. The collection includes specimens of beryl, chrysoberyl, garnet, tourmaline, stilbite and xenotime, together with many other species. During the 110 years the club has been in existence several honorary members have been appointed in recognition of contributions in the field of minerals and mineralogy. They include: Joseph Arons, Sir William Henry Bragg*, Russ Buckingham, Lawrence H. Conklin, Madam Marie Curie*, Edward S. Dana*, Clifford Frondel, Victor Goldschmidt*, Richard Hauck, Carl Krotki, Alfred Lacroix*, Charles Palache*, Frederick Pough, Waldemar T. Schaller*, Leonard J. Spencer*, Herbert P. Whitlock*. (*Deceased)


Currently the club has a membership of over 250. Monthly meetings, most with a guest lecturer, are held on the second Wednesday of each month (excepting July and August) at the American Museum of Natural History, New York City. Meetings are open to the public. Frequent field trips are organized to interesting mineral localities in the vicinity of New York City and extended trips to more distant states. Each month a bulletin is published for members and guests with news, announcements and original articles about minerals and gemstones contributed by club members. The New York Mineralogical Club is affiliated with the Eastern Federation of Lapidary and Mineralogical Societies and the American Federation of Mineral Societies.

The club is dedicated to increasing interest in the science of mineralogy through the collecting, describing and displaying of minerals and associated gemstones. Anyone interested in mineralogy or gemstones is welcome as a member. Inquiries should be addressed to: New York Mineralogical Club, P.O. Box 77, Planetarium Station, New York, NY 10024-0077 or contact membership coordinator, John Betts, at (212) 678-1942.
Section I
General Club Information
New York Mineralogical Club

Mission Statement
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.

1996 Officers and Executive Board

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<th>Position</th>
<th>Name</th>
<th>Address</th>
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<tr>
<td>President</td>
<td>Gary Burke</td>
<td>951 Lorimer Street, Brooklyn, New York 11222</td>
</tr>
<tr>
<td>Vice-President</td>
<td>Ken Colosky</td>
<td>184 Norfolk Street, #4A, N.Y.C., New York 10002</td>
</tr>
<tr>
<td>Secretary</td>
<td>Richard Rossi</td>
<td>6732 Ridge Boulevard, Brooklyn, New York 11220</td>
</tr>
<tr>
<td>Treasurer</td>
<td>Lawrence Cohen</td>
<td>2725 Bath Avenue, Brooklyn, New York 11214</td>
</tr>
<tr>
<td>Bulletin Editor</td>
<td>Mitchell Portnoy</td>
<td>46 W. 83rd Street #2E, New York City, New York 10024</td>
</tr>
<tr>
<td>Membership</td>
<td>John Betts</td>
<td>215 W. 98th Street, New York City, New York, 10025</td>
</tr>
<tr>
<td>Field Trips</td>
<td>John Betts</td>
<td>215 W. 98th Street, New York City, New York, 10025</td>
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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 City, New York. 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 PM and the meetings start at 7:00 PM. Meetings are open to the public.

Membership Benefits
- Monthly Newsletter
- Monthly Meetings with Special Guest Lecturers
- Special Study Groups
- Collecting Field Trips
- Museum & Mineral Show Field Trips
- Yearly Banquet
- Annual Gem & Mineral Auction
- Club Gem & Mineral Swap
- New York Gem & Mineral Show Participation

Yearly Membership Dues
$20.00 individual, $30.00 family per calendar year

Address
P.O. Box 77
Planetarium Station
New York City, New York 10024-0077
### 1996 Calendar of Events

<table>
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<th>Date</th>
<th>Event</th>
<th>Location</th>
<th>Remarks</th>
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<td>January 10</td>
<td>Study Group at 5:30 Meeting at 7:00</td>
<td>Room 319, American Museum of Natural History</td>
<td>Boyd Compton: “Sagenite Agate - Two Minerals in One”</td>
</tr>
<tr>
<td>February 14</td>
<td>Study Group at 5:30 Meeting at 7:00</td>
<td>Room 319, American Museum of Natural History</td>
<td>Mike Walter: “Gem Polishing - Important Considerations”</td>
</tr>
<tr>
<td>March 13</td>
<td>Study Group at 5:30 Meeting at 7:00</td>
<td>Room 319, American Museum of Natural History</td>
<td>Mike Kessler: “Mineral Collecting in Baja California”</td>
</tr>
<tr>
<td>April 10</td>
<td>Study Group at 5:30 Meeting at 7:00</td>
<td>Room 319, American Museum of Natural History</td>
<td>Ted Johnson: “1995 Collecting in Dal’Negorsk, Russia”</td>
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<tr>
<td>April 13</td>
<td>Field Trip</td>
<td>Sayreville, New Jersey</td>
<td>Day trip to collect amber and marcasite, etc.</td>
</tr>
<tr>
<td>May 8</td>
<td>Study Group at 5:30 Meeting at 7:00</td>
<td>Room 319, American Museum of Natural History</td>
<td>Derrick Yoost: “Intarsia Techniques &amp; Craftsmanship”</td>
</tr>
<tr>
<td>May 19</td>
<td>Field Trip</td>
<td>Lime Crest Quarry, Sparta, New Jersey</td>
<td>Day trip to collect spinel, tremolite, pyrite, galena, etc.</td>
</tr>
<tr>
<td>June 12</td>
<td>Annual Club Benefit Auction</td>
<td>Convention Center, Springfield, Massachusetts</td>
<td>Fund raising auction of gems, minerals, books, etc.</td>
</tr>
<tr>
<td>August 10</td>
<td>Field Trip</td>
<td>Convention Center, Springfield, Massachusetts</td>
<td>Day trip via Amtrak to attend the Mineral &amp; Gem Show</td>
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<td>September 11</td>
<td>Meeting at 7:00</td>
<td>Blum Lecture Hall, American Museum of Natural History</td>
<td>Club “Show &amp; Tell”</td>
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<td>September 21</td>
<td>Club Swap</td>
<td>Blum Lecture Hall, American Museum of Natural History</td>
<td>Club members bring minerals, gems, etc. to trade</td>
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<td>October 9</td>
<td>Meeting at 7:00</td>
<td>People’s Center, American Museum of Natural History</td>
<td>Richard Bostwick: “Sterling Hill History &amp; Minerals”</td>
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<td>October 12</td>
<td>Field Trip</td>
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<td>Day trip to collect almandine garnet and staurolite</td>
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<tr>
<td>October 20</td>
<td>Field Trip</td>
<td>Lime Crest Quarry, Sparta, New Jersey</td>
<td>Day trip to collect spinel, tremolite, pyrite, galena, etc.</td>
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<td>November 13</td>
<td>110th Anniversary Banquet</td>
<td>Grand Ballroom, Southgate Tower, New York City</td>
<td>Fred Pough: “Sixty Years in Minerals”; Silent Auction</td>
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<tr>
<td>November 16</td>
<td>Field Trip</td>
<td>Laurel (Snake) Hill, Secaucus, New Jersey</td>
<td>Day trip to collect calcite, magnetite, etc.</td>
</tr>
<tr>
<td>December 11</td>
<td>Study Group at 5:30 Meeting at 7:00</td>
<td>People’s Center, American Museum of Natural History</td>
<td>Richard Haefner: “Serpentine Minerals of Pennsylvania”</td>
</tr>
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The 110th Annual Banquet
November 13, 1996
Grand Ballroom, Southgate Tower, New York City

Honorary Member Joe Arons attends the banquet.

John Betts wins the 1996 Kunz Prize. President Gary Burke and Prize Judge Vivien Gornitz congratulate him.

Russ Buckingham, our club’s most steadfast member, is honored.

Richard Hauck is elected Honorary Member.

Fred Pough is the featured Guest Speaker.

Photos taken by Corinne Orr
Section II

Field Collecting Tips & Techniques
Rules of Safety and Conduct for Field Trips

- Obey your field trip coordinator. Your safety and the safety of others is his priority. Never make him ask twice.
- Do not do anything that will cause personal injury to yourself or any other club 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 the owners’ 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 they do not bother other members, do not injure themselves and do not cause hazardous situations. Please go over all of these rules with them in advance.
- Do not hold up the trip by arriving late at the start time 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 into someone else’s discovery.
- Don’t borrow tools. Bring along all of the tools required. (See Gear Checklist, next page.) Only use another member’s tools if they are offered. If you accidentally damage someone’s tools, pay to replace or repair the tool.
- Bring maps, food, water, medicines, toilet items.
- Do not litter. Take out what you take in.
- Stay away from the edges of cliffs or from the face of quarry wall. A good rule of thumb is to stay ten feet away from any wall or cliff edge.
- Remember, only you are responsible for your safety

Tick Prevention
Whenever you go out collecting, it is worth following some basic steps to prevent tick bites:
1. Wear light colored clothing 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 on 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 cuffs.
5. Wear a hat with 100% DEET repellent to prevent ticks from getting into your hair.

Remember, ticks do not usually bite for 12 hours. The best prevention, therefore, is a change of clothing and a shower (the sooner, the better). Many of our field trips are in tick territory so do not take this warning lightly.
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 material is usually about three feet down.

♦ Know the minerals that you are looking for.
   Find out what minerals can be found, what color they are and what associated minerals are good signs that they are there.

♦ 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!
   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 by means of cleaning in water, chipping away the surrounding rock or by the use of acids.

♦ Use the largest hammer you can.
   The size of the pieces you take home is proportionate to the size of the hammer you use and the size of the rock you break.

♦ Hard work pays off. Keep looking!
   Collecting good specimens is 1% luck, 99% hard work.

A Kodak Moment
By Joseph Arons

Joe Rothstein, sadly no longer with us, was a longtime member of the New York Mineralogical Club. He was a storyteller, both of the written and verbal variety, and had contributed many articles to both Rock and Minerals and Lapidary Journal. His favorite collecting grounds were the trap rock quarries of the Watchung Mountains of New Jersey.

About fifteen years ago Route 80 was being built. While passing through Paterson, New Jersey, it cut through those fabled localities, the Upper and Lower New Street Quarries. That summer was collectors’ heaven! There were no restrictions but there was an occasional blast.

Joe would often be there, halfway into a hole, pry bars and hammers alongside. That’s how I found him one day. He had already collected his fill of prehnites and was working on a spray of natrolite, perched on a small slab of basalt, crystal-clear prisms, four or more inches long, beautifully splayed out, flower-like. It was the finest I had ever seen. Joe was carefully loosening the slab when the blast siren sounded.

Joe covered the hole and we walked up the hill. We heard the blast, saw the ground tremble. When the dust cleared, we went back down.

Everything was in order. Joe finished loosening and then grasped the slab to lift. In lifting he tilted it slightly — and that magnificent spray slid — and now lay — a jumbled mass at his feet. Joe was no cry baby. His only lament: “Why didn’t I take a picture first?”
Gear & Supply Checklist

This list is the absolute minimum required for most field trips

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

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

**Collecting Tools and Supplies**
- **3-lb Hammer**: The best single 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, not essential
- **18-24" Prybar**: The 22" prybar from Estwing is best.
- **Sledgehammer**: Optional but may be useful at times.
- **Newspaper**: To wrap large specimens and to prevent damage to them.
- **Membership Card**: Required at times; put it in your wallet

*Operating quarries require hard hats and hard-toe hiking boots be worn. You will not be admitted without them.* **NO EXCEPTIONS!**

**Member Responsibilities**

By John Betts

As mineral collectors, we travel the country collecting, buying, trading and generally networking with other collectors, dealers, club officers and mine owners. As we talk with others, please remember that you are a representative of the New York Mineralogical Club as well as an individual collector. Your behavior reflects on the Club both directly and indirectly.

An example of this is the members of another club who have a reputation for crowding in on other collectors who are doing well on a field trip. This club, through the behavior of their members, has built a bad reputation.

Last year, we had a member upset the owners of the Trumbull, Connecticut topaz site. The owners got so mad that they banned all NYMC members — and we didn’t do anything wrong. Just one member can screw it up for all of us!

So in your dealings with others, make sure that the opinions that you express are identified as your own and not those of the Club’s. Treat all others with the same respect with which you want to be treated. Never give anyone reason to complain about NYMC members. Respect others, behave graciously, with impeccable manners — from that we can all benefit!
Safety vs. Exploring

When we go field collecting we are always looking for a new discovery. We want to explore, we want to find hidden treasures, we want to find what others missed. If it is with an organized group to a long-known location this is highly unlikely. There have been thousands there before you. But who knows, maybe you know something the others don’t. If you must explore, please balance safety considerations with your need for adventure.

Follow some common rules of safety.

✶ Never go alone. In case one person gets injured, there is another to get help.
✶ If you are with a group, always tell the group leader where you are going in advance.
✶ Carry a whistle. The sound of a whistle carries great distances. If you are in trouble use the standard SOS signal (three short, three long, three short).
✶ Carry a map, watch, and compass. Know where you started from, where you are going to, and when to meet others.
✶ If you really are going deep into the woods, take trail markers (orange spray paint, plastic ribbons, etc.) and mark your trail well. Blaze a trail to a good base camp, then take exploratory trips out from the base. When going deep into the woods, always notify forest rangers or local police or friends where on the mountain you will be and when you will return (and when they should start searching for your lifeless body when you don’t return on time).

None of these should be considered on a NYMC field trip. You should never be out of sight from at least one other participant. Always stay within earshot of the group leader.

Tool Tape Tip

Suggested by John Betts

Do you often find yourself looking for your “disappearing” collecting tools while out in the field? Tools, which are usually steel gray or wood brown, blend right into the environment. So here’s a way to make them more distinct. Pick up some “Day-Glo® colored” tape (or paint): neon green, bright orange, or glowing red from a hardware or art supply store. Wrap your tools with the tape. They will now visually stand out making them easier to spot and less likely to get lost.

Collecting Tip: Contour Lines on Maps

By John Betts [As told by Jim Cahoon, President of the Boston Mineral Club]

According to a friend, the US Geologic Survey does not allow the contour lines on topo maps to overlap or cross. As a result a vertical cliff or overhang will just appear as a steep slope. So when planning a trip into unknown areas, make sure to anticipate surprises in areas with tight contour line spacing.

Mineral Cleaning Suggestion

By John Betts

I recently needed to clean some old mineral specimens at home where I do not use the more caustic chemical that I keep at work. I discovered that my wife had a cleaner under the sink called CLR (as in Calcium, Lime, Rust). It is sold in most hardware stores and drug stores in New York for cleaning bathroom fixtures, shower heads, etc. I tried a piece of native copper and it worked great. It also removed rust (iron oxide) from prehnites without apparent damage.

It turns out that CLR is a dilute phosphoric acid. It is so mild that gloves are not mandatory, though they are highly recommended. Use it in a plastic container, soak your rock, then pour it back for reuse later. As with any acid, wash very well to prevent unintended action and dry with a clean cloth.
American Federation “Code of Ethics”

More and more localities are being closed due to inconsiderate collectors. Now that collecting season is upon us it is time to review the “Golden Rules” for collecting (from the AFMS Newsletter Feb. 1994):

♦ I will respect both private and public property and will do no collecting on privately owned land without the owner’s permission.

♦ I will keep informed of all laws, regulations or rules governing collecting on public lands and will observe them.

♦ I will, to the best of my ability, ascertain the boundary lines of property on which I plan to collect.

♦ I will use no firearms or blasting material in collecting areas. I will cause no willful damage to property of any kind – fences, signs, buildings, etc.

♦ I will leave all gates as found.

♦ I will build fires in designated or safe places only and will be certain they are completely extinguished before leaving the area.

♦ I will discard no burning material – matches, cigarettes, etc. I will fill all excavation holes which may be dangerous to livestock. I will not contaminate wells, creeks, or other water supplies. I will cause no willful damage to collecting material and will take home only what I can reasonably use. I will support project H.E.L.P. (Help Eliminate Litter Please) and will leave all collecting areas devoid of litter, regardless of how found.

♦ I will cooperate with the field trip leaders and those in designated authority in all collecting areas.

♦ I will report to my club or federation officers, Bureau of Land Management or other authorities, any deposit of petrified wood or other material on public lands which should be protected for the enjoyment of future generations for public educational and scientific purposes.

♦ I will appreciate and protect our heritage of natural resources. I will observe the “Golden Rule”, will use “Good Outdoor Manners” and will at all times conduct myself in a manner which will add to the stature and public “image” of Rockhounds everywhere.
The Perfect Light-Weight First Aid Kit
By Chris Rylands, Bellevue, WA

Did you know that rockhounds field trip the Internet, too? Recently, the Rockhound e-mail exchange group had an interesting discussion. It started when Chris Rylands (BRIOSA@aol.com) attempted to describe the perfect light-weight first aid kit. See if you agree with Chris or perhaps you think of something that should be added. - Mel Albright, Chair, Safety, AFMS.

The idea is that this kit is small and lightweight but yet is an all-around life saver.

- One of those blue plastic eye cups if you need to wash out your eye, and an eye patch and eye ointment for infections. Most rockhounds do not bother using their eye protection. Next time you go out watch. . .
- Water purification tablets. The cheapest or one of those fancy pocket water purifiers if you are in a mineral rich area with springs or flooded mines.
- Hmm. Nice vug. Lost your footing? AAAAAAAAAHHH!!! WHAM!!! Roll of black electrician’s tape. It is elastic, waterproof, and air tight and can be used for things like splinting, arm slings, worse yet tourniquets.
- I hear the plane and can see it but they cannot see me. There is no wood or its too wet to have the smoking fire. Go to your local boat supply for orange smoke pots. Not flare guns, unless you want to burn to death in the forest, or be on CNN as the subject of the all-time most stupid rescue.
- Water out of sand for you desert rockhounders: 2 dark green thick jumbo plastic garbage bags and one 3 foot long, 1/4” diameter plastic fish tank tube. First, dig a 3 foot diameter by Two-foot deep hole and place one bag in the bottom center of the hole, shaping it as a cup. Then, lay one end of the plastic tube in the cup bottom and up and out of the hole. Now, cover the hole with the other plastic bag one layer thick and totally seal the circumference of the hole and bag with sand. Place a small stone in the center so as to made a depression in the bag over the cup. As the humidity condenses on the top bag the moisture will bead up and roll to the drip point and land in the cup. Then you can suck on the tube-straw. Remember, you can also soak the pit sand with whatever fluid you want as long as it has H₂O in it: radiator fluid, wet dirt, mashed up weeds/foliage, etc, or even your own you-know-what. After all, this is what the astronaut’s life support systems do.
- 30-something, sealed, wax-dipped, strike-anywhere, wooden matches, wrapped with wax-dipped paper. By the way, did you know you can start a camp fire with fine steel wool and your flashlight battery.
- Pocket thermal space blanket.
- Chemical toe warmers. These are about $2.00 a pair at your local sports stores and can be used as a warm compress or to save your cold toes or fingers.
- You may have a big geode stuck in your mouth, and cannot yell for help, and it is night. One phosphorescent snap-and-glow stick.
- One of those oval, green, rubber snake-bite kits.
- A pocket card on CPR heat injuries, shock, burns, fractures, dislocations, cold injuries, bleeding etc. Most fire departments and/or hospitals have these free items. After all, if you save your partner’s life, he or she may give you their rock collection.
- One safety pin, for among many things, picking out things.
- One candle.
- A pencil and a 3x5" card.
- Some waterproof cloth type band-aids.
- And remember, if you are in a cold or damp climate, “cotton kills.”
Section III

1996 New York Mineralogical Club Collecting Locations
By John Betts
Collecting Map & Site Introduction

The status of mineral collecting locations is always changing. Though the author has made every attempt to describe sites that are open, that situation can change at any time. Please follow these rules:

1. Possession of this book does not grant permission to enter private property. Make an attempt to contact the property owner for permission PRIOR to entering the property.

2. If you encounter the owner while collecting, show him the utmost respect. Follow any request he makes. Vacate the property immediately if requested to do so.

3. Respect the private property. Do not leave behind trash. Fill in your holes. Do not cut down trees or shrubs. Leave gates as you found them.

4. Do not block roads or driveways with your vehicle. Park in areas designated in the instructions, doing your best to avoid blocking others.

5. If the site is in public park land follow all rules established for the park. Collect minerals only if it not against the rules.

6. Only you are responsible for your safety. Use common sense to prevent personal injury. Stay clear of cliff faces, rock overhangs, cliff edges, and underground tunnels.

7. Thank the property owner when you leave. If you found a nice specimen give the owner a piece.
Diamond Lake Garnet Locality
East Glastonbury, Connecticut

Description: This location is a pile of rock dumped by the pipeline excavators where they blasted through a ledge. The rock is a pretty, lustrous mica schist. The garnets here are small, 1/8 to 1/4 inch in diameter, well formed crystals. They are deep wine red in color. There are many large boulder in the dumped rock on the left side of the trail. It is best to use a hammer to break off pieces that show crystal. The best specimens are those that split along the foliation of the schist to expose the garnets in high relief.

Bring: Bring along hammer, splitting chisel.

Directions: From Interstate 91 in Wethersfield, Ct, take Rt. 3 across the Connecticut River to Rt. 2 East/ South to Rt. 94 East. Follow Rt. 94 to right on Marlborough Road south. Turn right (west)onto Diamond Lake Rd./ Bailey St.. Just past the lake turn left (south) onto Lake Shore Trail West along the west edge of the lake. Follow this road as far south as it goes. It will turn to gravel after a short distance. Near the end of the road, as it curves around to the right, is a woods road leading off to the left. Park here and hike in along the woods road. It will intersect a pipeline, follow the pipeline to the right (southwest). As the pipeline goes uphill start looking in the trail and to the left side. You will see bright mica schist and small red garnets. The best digging is in the rocks piled to the left of the trail.
**Railroad Cut**  
**Glenmont, New York**

**Description:** Quartz and calcite crystals can be found in seams in shale banks. Look for the lighter color seams in the dark shale, especially where iron stained. This entire area has produced quartz crystal in Ordovician formation all the way down to Rhinebeck. It may pay to explore along other rail cuts in the area.

**Bring:** Bring along chisels, hammers, prybars, and your favorite digging tools.

**Directions:** From Interstate 87 south of Albany exit to Rt. 9W East and Corning Hill Road. Follow east to Rt. 144, turn right (south) and go 1.5 miles. Just past Rt. 32, Glenmont Rd. you will see a weather station with large antenna on the right (west). Park at the weather station and cross Rt. 144 to railroad cut to the east. Be careful of trains, this is an active rail line.

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**Barnes Mine**  
**Harriman State Park, Northwest of Ladentown, New York**

**Description:** The Barnes Mine operated between 1846 and 1880 as a source for iron ore. North of the mine dumps, visible from the road, is a large cross-shaped open pit. The iron ore was deep red hematite.

**Minerals:** Possible mineral here also include magnetite, goethite, pyrite, hornblende, etc.

**Directions:** From the Palisades Interstate Parkway take exit 15 to Gate Hill Road west to Lake Welch Drive, turn south (left). Look on the west side of the road for old stone wall and large mine dumps. Park here and hike in. The mine is located on the southern slope of Pole Brook Mountain. If you reach St John’s Rd. (Johnstown Rd.) you have gone too far, backtrack 0.2 miles.
Barrus Farm Ledges
Goshen, Hampshire County, Massachusetts

Description: The Barrus Ledges are lithium pegmatite boulders and glacial erratics. It is undetermined how far away the original outcrop is. There is some speculation that the boulders have not moved far from the place they originated.

Minerals: Minerals found here are typical of lithium rich pegmatites: albite, beryl var. goshenite, cassiterite, elbaite, lepidolite, spodumene, montmorillonite, pollucite, quartz. The north site is the type locality for goshenite, the clear variety of beryl.

Bring: Bring heavy hammers and tools to break up the boulders.

Directions: You must obtain permission in advance to collect at this site. Write to the Barrus Family, Spruce Corners Road, Goshen, Ma. 01032 (413) 268-7005 two weeks in advance. This will allow them to send you a response in time for your visit. Upon arrival, someone will show you around. Be sure to thank the family before leaving and send a note of thanks afterward.

Driving: From the junction or Routes 9 and 112 north of Goshen, Massachusetts travel northwest 1.9 miles on Rt. 9. Turn right onto Spruce Corner Road and go .6 miles to Barrus Road (Barrus Farm driveway). Turn right and proceed to farmhouse on right. From here someone will direct you to the ledges.
Slocum Quarry
East Hampton, Connecticut

**Description:** This is a well known location for 1/8" to 1/2" yellow beryl in albite matrix. All participants will need to dig into the quarry dump to excavate fresh material. Look carefully for small beryl crystal. The quarry has not been worked for 40(?) years and the dumps are partially grown over. This quarry has a reputation for being picked clean, but with a little work you should find some nice specimens.

**Minerals:** Albite, muscovite, yellow beryl.

**Bring:** Insect repellent, lunch, water; digging tools, sunscreen.

**Directions:** There is no easy way to get to this area of Connecticut. The problem is crossing the Connecticut River. You can either go north through Middletown or south and cross at East Haddam. Whatever way you go, proceed to the junction of Rt. 196 and Rt. 151, northwest of Moodus, Connecticut. 2/10 mile north of junction is a turn off (east) for Wopowog Road. **Do not be late!** The quarry is not easy to find without a guide; we will caravan together to the parking area and hike in as a group.

**Hike:** It is a short 1/2 mile hike uphill to the collecting area. We hike in going east along the pipeline, right of way to a path on the right that leads uphill. The quarry is on the east edge of the hilltop.

**Caution:** Local residents have reminded me to warn participants of four dangers:

1. The quarry is located on a cliff edge. Be careful to stay away from all edges of the cliff.
2. The quarry is in deep woods. Ticks have been very bad this season. Take precautions to prevent being bitten.
3. Snakes are in the area around the quarry pit. Most are common milk or corn snakes.
4. Poison ivy grows on the mine dumps. Learn what it looks like and avoid contact.
Green’s Farm Garnet Mine  
Roxbury, Connecticut

(Note: This contains revised and updated information since it appeared in the 10/96 Bulletin)

**Description:**
Green’s Farm Garnet Mine is an old, classic location. Large almandine garnet crystals to 1.5” 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 Connecticut and is an enjoyable drive from the city. This is an excellent location for beginners or for children.

**Minerals:**
Almandine Garnet, Staurolite

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

**Directions:**
From Danbury, take Route 7 to Brookfield and turn right on Route 25 South. Follow Route 25 for about two miles to Brookfield Center and turn left on Route 133 North. Follow Route 133 for 4.8 miles, as you go up a small hill look for Stuart Rd. on your right. Turn on Stuart Rd. (east) and follow it for 3 miles (it will turn into Hut Hill Rd. then Minor Bridge Rd.). After crossing the Shetough River you will come to a "T". This is South Street, go right. Follow South Street through Roxbury Falls for 1.5 miles. As the road turns left and goes up a hill you will see Perkins Rd. on your left. Turn on Perkins Rd., for .6 miles all the way around a left curve and straight into the old farm. Do not turn right onto Garnet Road. The farm is straight ahead with several abandoned cars parked outside the gate and there is a newer light green house to the right, you can park at the house.

**Fees:**
$2.00 per car. If nobody is home, leave the money under the doormat.
Laurel (Snake) Hill Quarry
Secaucus, New Jersey

Description: This is the closest quarry to Manhattan that is open to collecting. As you travel south on the New Jersey Turnpike, it is the large “rock” to the west of the highway before Newark. The quarry has long since ceased operation, but it is still possible to find collectible mineral specimens. However, beginners should note, this is not an easy location to get minerals. You have to look long and hard, everything has been thoroughly picked over.

Minerals: Calcite, quartz, stilbite, magnetite, etc.

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

Directions: Take the Lincoln Tunnel to Route 3 westbound to Paterson Plank Road westbound (if you miss this exit, follow signs to the Secaucus outlets and ask directions to County Road). Go 1/2 mile on Paterson Plank Road, cross over the turnpike and turn left on County Road. Stay straight on County Road for 1.7 miles, bear right at the fork in the road (do not go under bridge) staying on County Road. .5 miles further you will see the county prison, continue past and bear right, following the One-Way sign. Follow around the gravel road loop past boat launch around to left to parking area at the middle of the quarry.
**Road Cut**  
**Haddam, Connecticut**

**Description:** Large exposures of pegmatite rock have been made as a result of the road construction. Blue iolite (cordierite) can be found at a road cut just east of Rt. 9 and north of Beaver Meadow Road.

**Minerals:** Other minerals found here include: albite, bavenite, bertrandite, bismuthinite, apatite, dravite, magnetite, molybdenite, monazite-(Ce), powellite, tantalite.

**Directions:** Take Rt. 9 north from Old Saybrook to Exit 8, Beaver Meadow Road. Collect in the road cuts around the intersection of the roads and the exit ramps.

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**Manhan River Lead Mines**  
**Loudville, Massachusetts**

**Description:** The lead vein crosses the river running north-south. Where the river cuts through the vein, lead minerals can be found: pyromorphite, sphalerite, wulfenite, goethite, galena, quartz, malachite. Galena from this mine was used to manufacture musket balls for George Washington’s Continental Army.

**Bring:** Heavy hammer, chisels, root cutters, shovel or hoe, insect repellent.

**Directions:** From Route 66 west of Northampton turn south onto Torrey Street for one mile. Turn right (west) onto Loudville Road for one mile. Just after Drury Lane branches to right look for dirt road on south side (left). Hike down the dirt road to river bank. Collect on both sides of the river.

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**Blue Mine & Roomy Mine**  
**Midvale, New Jersey**
Description: These are old iron mines typical of northern New Jersey. The ore was primarily magnetite, though other minerals may be present, including hornblende, pyrite, mica, etc. The Blue Mine orebody was discovered in 1765. In 1868 a survey of the mine reported the ore vein was nine to sixteen feet wide running vertically.

The Roomy Mine, opened in 1840, has an accessible underground excavation, that is open to at the top to let light in. Enter at your own risk. Hard hats, lights and extreme caution are a must if you enter any old mine, including this one. To enter, do not go in the upper entrance on the right, instead crawl into the small caved entrance to the lower left.

If you reach the small brook you have gone too far. There is another set of workings accessible by following the red trail to the brook, do not cross it, instead follow trail to left 30 paces along brook to old mine.

Directions: From Interstate 287 take exit 55 to Rt. 511 north towards Hidden Valley Lake and the town of Midvale. Turn west (left) onto Westbrook Rd. follow to left onto Dale Road to left onto Snake Den Road. Look for the Weiss Ecology Center on your right, park in their parking lot. Walk back along Snake Den Road 150 feet to trail south. Follow the red blazes (Wyanokie Trail), the yellow blazed trail will branch right after 350 paces and cross back again after 200 paces, stay on red trail. Another 130 paces you will see an unmarked mine road branching off to left, follow 200 paces to the Roomy Mine. Large dumps are directly in front of the mine entrance.

To find the Blue Mine continue on red blazed trail, past the mine road to the Roomy Mine, another 500 paces. Look for trail off to left periodically marked with sheet metal strips on trees. Follow this trail 260 paces to where the trail marks stop, the Blue Mine dumps are clearly visible with the mine workings above.
Hollister Pegmatite Quarries, North and South
South Glastonbury, Connecticut

Description: The Hollister quarries are very promising for both dump collecting and hard rock work. There are two quarries along with many small prospects in the area. The north pit is filled with water but the dumps are extensive. A casual look at the dumps produced plentiful lepidolite, beryl, and other pegmatite minerals. The south pit is much smaller in scale but shows promising signs for collecting.

Directions: From the Connecticut River bridge in Portland, Ct. take Rt. 17A north along the river to junction with Rt. 17. Turn left on Rt. 17 and proceed approximately 3 miles to Dayton Road, turn right and follow it to the southeast. After about .6 miles it will come to a “T” with a private road to the right, turn left to stay on Dayton Road. There will be two or three houses on the right, after .2 miles the road will turn left with a woods road off to the right. Park here. Hike in along the woods road. Go 60 paces, heading 80°, then 65 paces heading 120° to swampy area. Now go 65 paces heading 120°, 20 paces around curve to right. After 20 paces heading 175° you will see a small dump on left. The Hollister north pit is visible ahead on left in woods on heading 120°. The trail continues 15 paces around a curve to the left, 40 paces heading 160°. The Hollister north pit is now up hill on left. If you continue 70 paces heading 160°, then 60 paces around “S” curve, the Hollister quarry south pit is straight ahead on right of trail.
Herkimer Diamond Development &  Ace of Diamonds Mine
Middleville, New York

Description:
These mines are fee localities to collect the world famous Herkimer Diamonds, water clear double terminated quartz crystals. Of all the locations to collect “Herks”, these are the most touristy but also the best crystals.

The rock is extremely hard. Unless you are exceedingly lucky you will have work long and hard to find a pocket. The pockets occur in layers several feet apart. Look for old pockets to see the level. Then tap the wall with your hammer. If you are lucky you will find an area that produces a hollow sound. This is the best indication of a hidden pocket.

Using every tool you have and the heaviest hammer you own start to work the rock. Some areas will require the removal of 10 to 15 feet of rock above. Not easy. But many have found pockets with less work. Last year one collector on his first visit was tapping the wall. His hammer punched right into a pocket with a 15 pound Herkimer Diamond.

Directions:
These mines are easy to find just south of Middleville, New York on Rt. 28. From Interstate 90 exit at Herkimer and follow Rt. 28 north. At the Middleville town line you will see the two mines and campground.
Mine Hill Park
Roxbury, Connecticut

Description: This is a town park. Mineral collecting is not allowed!

Mine Hill Park is a wonderful place hike to see old mining ruins. There is an old furnace where they burned the ore, siderite (iron carbonate). Ore was continuously fed into the furnace and the fires needed constant caring, for if they cooled the ore would solidify necessitating dismantling the entire furnace. From the furnace the trail follows the old mine path that mules hauled the ore down. The grade is even and straight. The first mine entrance you will encounter on your left has siderite and quartz crystals scattered around on the ground. Mine dumps are down the hill opposite the entrance. A short distance uphill is another tunnel and quarry. Dumps here show pockets of terminated siderite and quartz crystals.

Minerals: Other minerals attributed to Mine Hill include: calcite, chalcopyrite, galena, hydrozincite, pyrite and sphalerite.

Directions: From intersection of Routes 133 and 67 north of Bridgewater, Connecticut. Travel east 2.75 miles on Route 67. Turn left onto Mine Hill Road. Look for Mine Hill Park on right after .2 miles. Turn in and park. From the parking lot is a trail leading east. Look carefully at the trail map near the beginning for direction. (Bring a pencil and paper to make your own trail map.) From the iron furnace is a long straight trail uphill to Mine Hill. After about 1.5 miles you will encounter two mine tunnels on the left with mine dumps on the right. Continuing uphill on the trail will lead to four mine shafts and small dumps. There are other quarries further around the loop trail.
Moat Mountain Smoky Quartz Collecting Area
Conway, New Hampshire

Description: This location is one of the most asked about locations. Gas pockets forming during magma intrusions allowed large crystal to grow of smoky quartz, albite, muscovite, microcline, amazonite, and rarely topaz, danalite. Crystal clusters as large as 150 pounds have been found although ½ to 3-inch crystals are more common.

Bring: Bring along chisels, hammers, prybars, and your favorite digging tools.

Directions: A map of this location can be picked up at the U.S. Forest Service office west of Conway. From intersection of Routes 16, 113 and 153 in Conway go north on West Side Road passing old covered bridge on right. Turn left onto Still Road, the left again onto Dugway Road. At High Road turn right and follow to Parker Road north. Follow Parker Road to the end passing an old sand pit on your left (the Government Pit) and a chained road to the right. At the end is a parking area with a trail head. Follow the trail, it is an easy hike for about 15 minutes to the collecting area.

Along the way the trail will cross a dry stream. If you follow the stream uphill you will see an area where much collecting has been done. If you follow the trail to the end you will reach a sign for the Moat Mt. Mineral Collecting Area in a dense wooded area. In the area near the sign crystals can be found digging down into the gravel-like soil. You will see other holes and piles of soil. This is decomposed pegmatite rock. Most collecting is done 50 yards uphill from the sign through the brush. Here ledges are exposed with miarolitic pockets visible everywhere.
Description: At one time this was a famous collecting location, especially for dinosaur tracks. Now very little is accessible, and obviously no active blasting is being done. But it is the only place left where you can legally collect zeolite minerals.

Important: This location is on private property. You must obtain permission in advance by calling campus security at (201) 655-5222 from 7:00-3:00 weekdays. Request a “Hold Harmless Waiver” prior to entering the property. Collecting should be restricted to holidays or weekends to avoid conflicting with student activities.

Minerals: Expect to find calcite, prehnite, quartz, stilbite crystals.

Bring: Hammer and chisels, insect repellent, food and water, advance permission.

Directions: From New York City take Rt. 3 to Rt. 46 exit at Valley Rd. Continue south to Normal Ave., turn right and follow to the entrance to Montclair State University. Park in Student Parking Lot #25. The quarry is the water-filled pit on the west side of the lot.
Nickel Mine
Harriman State Park, New York

Description: The Nickel Mine, named for the high nickel content of the ore, was opened in 1871. There are four open pits, and large mine dumps. This mine was typical of the iron mines of northern New Jersey and southern New York. Iron-nickel minerals should be prevalent, though the author has not collected at this location.

Directions: From the Palisades Interstate Parkway take exit 16 to Tiorati Brook Road (Cedar Brook Road) west to where the road crosses the brook. Park just past the crossing on the north side of the road. Hike back along the south side of the road, east of Beech Trail crossing, to an old woods road (Grape Swamp Mountain Trail) leading southeast. Follow trail, often overgrown, staying left at the first branching road. Proceed east, then south to trail junction marked by cairns, turn right and follow branch trail south (uphill) for 900 paces. Because of the overgrown nature of the trail, it is best hiked in spring or fall when foliage does not obscure the trail.

Stirling Brook
Watchung, New Jersey

Description: Stirling Brook contains brown to red carnelian, probably weathered from the surrounding basalt. The carnelian is found in the stream bed using screens or probes. Other minerals found here include smoky quartz, amethyst, agate and other chalcedony. Many holes where other collectors are visible in the brook.

Bring: Shovel, ½” mesh screen, boots or old shoes, insect repellent, food and water.

Directions: From Interstate 78 west of Newark, take exit 40 to Rt. 531 (Hillcrest Ave.) south to Watchung traffic circle. Turn northeast onto Rt. 653 (Stirling Road and follow 1.4 miles to bridge over brook. Continue past the inn adjacent to the brook to the shopping center on the left on Community Place. Park behind the shopping center and follow the power line right of way south to the brook. Stay clear of the inn and other property owners.
Hogencamp Mine and Pine Swamp Mine
Harriman State Park, East of Southfield, New York

Description:
These are old iron mines that shipped their ore to the blast furnace at Arden. The ore was primarily magnetite, though other minerals may be present, including hornblende, pyrite, mica, etc. The Hogencamp Mine, mined between 1870 and 1885, is an extensive complex of old building, shafts, open pits and dumps. The largest dump is at the southern part of the complex east of the yellow blazed Dunning Trail.

The Pine Swamp Mine, opened in 1830, has a large large mine dump on the northwest side of the Dunning Trail. The workings are a 100 x 40 foot open cut with a 125 foot adit in the southern end. At the far end of the underground adit is an air shaft open above. Hard hats, lights and extreme caution are a must if you enter any old mine, including this one. Enter at your own risk.

Directions:
From the Palisades Interstate Parkway take exit 15 to Gate Hill Road west to Kanawauke Circle. Go north onto Seven Lakes Drive to parking lot on northeast corner of Lake Skannatati.

To visit the Hogencamp Mine follow the turquoise blazed Long Path trail west 1.3 miles to the yellow blazed Dunning Trail south for 160 paces to mine complex on right (west).

Starting from the Skannatati Lake parking area, the Pine Swamp Mine is found by following the red triangle on white blazed Arden-Surebridge Trail 1.25 miles at the junction with the yellow blazed Dunning Trail (which connects to the Hogencamp Mine). The Pine Swamp Mine is a large open cut and dump uphill, 300 paces southwest of the trail junction. Other workings are 30 and 100 paces east of the trail intersection north of the Arden-Surebridge Trail on a low hilltop.
Simpson Quarry
South Glastonbury, Connecticut

Description: The Simpson Quarry is the most promising quarry for gem aquamarine. At a recent NYMC meeting a member brought in a fine aquamarine specimen, worthy of facetting. Other minerals here include sciorl, hyalite opal, elbaite, lepidolite, columbite, and other pegmatite minerals. The quarry dumps are extensive. You can dig in the dumps with your favorite digging tools or work the ledges with hard rock tools. Bring along hammer, splitting chisel, and digging tools. This site does have snakes, though the author in his many times there has never seen any.

Directions: From the Connecticut River bridge in Portland, Ct. take Rt. 17A north along the river to junction with Rt. 17. Turn left on Rt. 17 and proceed approximately 2 miles to Michelle Drive, turn right and go to the end and park at the small circle where the road breaks right. From the parking area hike north on the trail. Go 65 paces, heading generally 0° around curve to left, to log across trail. Then 76 paces, heading 340°, there is a stone wall perpendicular to trail on left. Go 50 paces, heading 340°, 13 paces, around “S” curve. Finally go 46 paces, heading 335° (at this point the trail breaks right heading 30°). Look for a white pegmatite stone trail marker on right. From this location the Simpson Quarry is through the woods heading 280°. There may be orange trail markers attached to trees. It is very overgrown, a compass will be helpful to keep you oriented correctly. In the winter and fall, when there are no leaves on the trees, you can see the light colored dumps through the woods from the trail.
Section IV

Mineral Collecting

Information & Sources
Gem & Mineral Research: How to Get Answers to Your Questions
By John Betts

How do you research the answer to a question about minerals or gems? Where do answers come from?

Every collector has questions, especially beginners. When we get answers, we increase our knowledge of the subject. The process of researching a subject often leads to unanticipated connections and discoveries. But where do you turn for answers to questions on gems and minerals? After all, you can’t go to just any bookstore or newsstand and pick up a book on minerals the way you can for computers or other popular subjects. The best way is to build a set of reference resources from a number of different sources.

Magazines
As a beginner, a good place to start is back issues of magazines. But if you are a beginner, you probably don’t have any back issues. Fortunately for you there are three indexes available for locating articles and one of them offers a reprint service.

For mineral collectors, the 25 year index of Mineralogical Record (M.R.) has just been published. You can research by mineral name, author, location, etc. It is great reference even if there are some errors. With this reference you can identify the issue needed and page number. Many of the back issues are still available for Mineralogical Record. If you are lucky the issues you need can be purchased for as little as $10. Only very special collector’s issues (like the series on Arizona) are out of print. In the future, there is talk that all of the back issues will be made available on CD ROM for those of you with computers. However you can be sure that the CD will not be cheap.

Another index available is for Lapidary Journal. It cover 44 years of publication and as in the M.R. index, you can search by mineral name, location, title, author etc. Lapidary Journal does not have back issues for sale though. To make the index useful they offer a reprint service. For a small fee, they will send you a photocopy of the article. (For an additional fee, they will fax it to you if time is critical.) I have used this service many times when researching a location.

Mineral News is a monthly 16-page newsletter specializing in new mineral finds, mineral locations, field trip reports and show news. Because of the smaller format, their news is the most up-to-date available (at least in print, I still find the grapevine is fastest via phone fax Internet). There is an index available of past issues plus they sell back issues. They even have a good deal if you want to buy all back issues. Lanny Ream, the editor and publisher, works very hard to get good useable information. As a result, the back issues are an excellent source for collector’s information.

If you want to build a collection of magazine back issues, I highly recommend looking at the small mineral shows in your area. These shows have very small fees to allow anyone to setup and sell what was sitting in their basement. You will often find someone selling gem and mineral magazines.

Mineral Clubs
The best place to get information about your local area is to join the local mineral club. If you are lucky enough to have several in your area, then join them all until you find out which ones are best, with programs that match your interest.

You can find a complete list of the gem and mineral clubs listed by state in the Annual Buyers Issue of Lapidary Journal. (Formerly the April issue each year, in 1996 it was moved to the May issue) or from Bob’s Rockshop on the Internet. Fortunately Lapidary Journal is carried at any good newsstand or bookstore. The club listings gives the club mailing addresses, the president, the meeting time and location. Contact the president to find about the club

Then visit a meeting; these are usually open to the public. If you are interested, join the club (for insurance reasons you will probably be required to join the club prior to participating in any field trips). Once you get to know some of the members you can start asking questions of the more knowledgeable members. Usually there is one member good at sight identification, another knows collecting sites, another knows lapidary technique.

Be careful not to be a pest. Keep your questions reasonable. If you need lots of help be sure to ask them
for a good time to talk, do not assume they have as much time as you do or live on the same schedule. Also be
sure to return the favor in some way - tell them of secret locations, or give them a polished stone you made with
their help, or invite them over for dinner.

Libraries
Don’t forget to check the references of the articles you are reading. They will often list books that are still
available or can be found at your library. You should investigate your local library. Often it will have a surprisingly
good selection of books (usually because a collector donated his collection to the library). If you are lucky enough
to have a university or museum nearby, they will have a good selection of research material. Many have back
issues of Mineralogical Record, American Mineralogist, Lapidary Journal or Rocks and Minerals.

If you find references to back issues of Rocks and Minerals you might be out of luck. Although recent back
issues are still available from the publisher at mineral shows or by mail, the really old ones are, however, not
available. The current publisher has not been the publisher through the magazine’s complete history. Your only
choice is to haunt the mineral shows looking for a collector selling his old issues.

Reference Books
There are certain essential books that everyone should have as a reference. My recommended essential library
includes any book written by John Sinkankas. If you are at a loss on which book to buy on a particular subject,
look for his name and you can be assured that it is a perfect combination of in-depth, up-to-date information,
readability and well-illustrated.

If you are a field collector, his book Field Collecting Gems and Minerals is the reference on tools, mineral
deposits, how to find pockets, mineral cleaning, etc. Anyone who has the book and has been out collecting knows
that this book is dead on with its inside information derived from many years of field collecting.

His book Mineralogy is an excellent species reference for the study of minerals. It is more complete and
up-to-date than Pough’s Field Guide to Rocks and Minerals, less cumbersome than Dana’s Textbook of Mineralogy. This
is the best all-around reference for identifying minerals as well as the fundamentals crystallography, chemistry, and
physical properties of minerals and gems.

The Gemstone and Mineral Data Book is a one-stop reference for mineral and gemstone data, formulas, and
lapidary skills. Includes comprehensive mineral cleaning formulas listed by mineral, mineral determination tables,
lapidary reference, coloring gemstones, and optical properties of minerals and gemstones, and much more.

Out-of-Print Books
Old books are also a good source of information. You will see these listed in the bibliography of any article. There
are many good sources for out of print books. By getting on a dealer’s mailing list and searching their catalogs you
will be able to purchase reference books about locations, minerals, mining, etc. For example, in New England
there is a single USGS report that is the best reference on the pegmatite mines. It is called New England
Pegmatite Investigations 1942-45 by Cameron, et al and published by the USGS in 1954. There are maps and
diagrams of all of the big mines active during WW II. You can get a copy through a book dealer for $55 to $70.

The Internet
Finally, in this age of computers you can use the resources on the Internet. If you have a computer with a modem,
an online service like CompuServe or America Online you can browse the web sites for information. Many sites
will “link” you to other sites of similar interest. Some are compiling all references or location information for
research. It is in its infancy but there are some good sites out there now.

Your last resort should be joining a mail list like Rockhounds or Rocks & Fossils. These lists send you e-
mail copies of all discussion on the mail list. Once you subscribe to the list, you can pose questions in the hope
that someone else on the list can answer it. Unfortunately too many people use this as their first place to look. As
a result many questions posed are remedial at best. And the answers are often grossly inaccurate or out of date.
But if you need really current status on a collecting site, or need to find a source or supplier then this is the only
place to get that kind of information. Just be aware that many responses to questions are being answered by
people with old information (“Yeah, I was there three years ago...”) and is really not accurate. Also this is not the
place to get minerals identified. Any answer made to such queries without seeing the specimen is inaccurate and
useless.

New Tools
When a member inquired about an old location I started with my book collection that I have catalogued on my computer. I have key words for each book so I can quickly search for a specific region or state. Next I searched my file of magazine clippings. These are also sorted by state and kept in an accordion-type file. It is very easy to browse the clippings for any mention of the area of interest or their references. (This clipping file is essential to research. All articles in magazines are xeroxed and sorted by state, even if I plan to keep the magazine in my collection.) Finally, I visited the library to read any books that I did not own, but were mentioned in any of the previous resources.

After reviewing all of the printed material I could get my hands on, I started to assemble the information into a useable form. I turned to my laptop computer and used some tricky little tools that may send everyone out to buy one, once you hear what it can do for you. In the computer world these are known as killer applications, or "killer apps," those that make everyone want to have Internet access and buy a computer. The tools I used are the GNIS Internet website and linked US Census Tiger Map Server, the USGS MasMils CD-ROM, and Delorme's Street Atlas USA software. This sounds like a mouthful but each of these performs a unique function that makes them essential to research.

**Geographic Names Information System (GNIS)**

As the name implies, this is an Internet server that you can inquire for the location of a geographic feature. The Geographic Names Information System (GNIS), developed by the USGS in cooperation with the U.S. Board on Geographic Names (BGN), contains information about almost 2 million physical and cultural geographic features in the United States. The Federally recognized name of each feature described in the database is identified, and references are made to a feature's location by state, county, and geographic coordinates. The GNIS is our Nation's official repository of domestic geographic names information. Information about foreign geographic feature names can be obtained from the GEOnet Names Server, developed and maintained by the National Imagery and Mapping Agency.

Anyone with Internet access and a web browser can search by feature name, state, county, feature type, elevation range, or population range. For example, during my research, I found mention of a location at "southwest of Moose Ledge". But none of my maps show where in the state Moose Ledge is. That is where the GNIS comes in. I log on to the Internet, call up the GNIS, enter "Moose" as feature name, enter the state, and hit "send query". Less than a minute later my screen is filled with a list of features starting with the name moose, including Moose Ledge. For each entry the server lists latitude, longitude, and the USGS quadrangle map that the feature can be found on. But that is not all - the best is yet to come. All you have to do is click on the name on the screen and it gives you the choice to view a map of the location. When you click on that option, it links your computer to the U.S. Census Bureau Tiger Map Server. It shows a view of the continental U.S. and the feature as a red dot. It also shows a detailed map, showing surrounding towns, roads and other geographic features. At this point you can zoom in for more detail or you can print the page for future reference. (My nephew once spent two weeks with the Maine state atlas counting each "Long Pond" shown. With the GNIS he could have done the same thing in two minutes.) There are some limitations though. It is limited to geographic names in current use. When querying for all mines in Maine, it only produced a list of six, none of which are what I was looking for. Now you need our next tool.

**USGS MasMils CD-ROM**

The MasMils CD looks just like a music CD but it contains a database of 220,000 mineral locations, mines, deposits, and processing plants in the U.S. and around the world. It was originally published by the USGS in September 1995 under the name Minerals Availability System/Mineral Industry Location System (MasMils). Only 500 were originally published and it was soon sold out. When mineral collectors heard about it, an enterprising computer enthusiast arranged to copy the CD and sell it for $15. Not a bad price considering the wealth of information.

To use the CD, you define search parameters from a wide variety of fields including name, state, county or country, type of excavation, commodity mined, map quadrangle, elevation, year of first production, year of last production, mining method, etc. It is truly an exhaustive list of variables. There are also logic statements that allow you to use "and", "or", "not" arguments. The query process is very simple, you start with a field (e.g. "state") and select a name from the list. If you are not too particular you can stop right there and get every listing in the database for the state. Or you can add another parameter (e.g. "quarry") and narrow it down. You can add as many parameters as you wish (e.g. "beryl") to narrow down your list. When you have entered all of your parameters you select search and the computer sorts through all 220,000 listings to list all that fit.

For each listing it gives latitude and longitude to six decimal places as well as all known information on the mine. You can also plot the list of locations by exporting to the built-in mapper program. You can create maps in several projections and plot the mines and mine information directly on the map. Finally, there is a
built-in bibliography that lists every mention of the mine in known literature including company reports. In practical terms it is best used as a search engine to find exact latitude and longitude. Because the mapper program does not show roads and towns you will need to create your own map for field use (unless you are willing to take you laptop into the field with you) compiling all of the information.

DeLorme Street Atlas USA CD-ROM
I first found this mapping program at a computer trade show. A salesman asked me if I could stump it. I asked for Helvetia, Arizona, a ghost town with no buildings or inhabitants, 25 miles south of Tucson surrounded by many mines. In 5 seconds, up came Helvetia and it showed about 25 of the mines. I was impressed. I bought it on the spot and find it indispensable for producing field maps, including the ones in this newsletter for field trips.

Once again, it is a CD-ROM that you insert into your computer. Then you can search by city, latitude and longitude, zipcode, or telephone exchange. Once you are in the general area on the map, you can search by street address. This is great if you have direction to a location but do not know the streets. You can zoom in and out, make notations for directions, and show precise latitude and longitude.

That is where all of the previous tools come together. I make local maps of each region, locate the mines as determined by MasMils. I make notations on directions or roads, and generate several different scale maps (an overview for driving around, a regional map to understand the pattern of area mines, and a mine map with direction for hiking into the location). The DeLorme Street Atlas is unfortunately geared for use with driving; the topographic information is therefore rather poorly detailed. If you are doing serious backwoods exploration, an up-to-date topographic map is essential. But the DeLorme Street Atlas will get you much closer than you would expect.

In conclusion, if you are adventurous and looking to find old, "lost" locations, these computer tools will be valuable additions to your search. In general they cost very little, though you must have a computer to use one.

Reference Sources and Addresses

Magazines - Back Issues, Indexes, Reprints

Lapidary Journal Index 1947-1991
Lapidary Journal Book Dept.
P.O. Box 124
Devon, PA 19333
1-800-676-4336
Comes with certificate for one free reprint.

Lapidary Journal Reprint Bureau
60 Chestnut Avenue, Suite 201
Devon, PA 19333-1312
1-800-767-GEMS; 215-293-1112
FAX 215-293-1717
$2.00 per reprint plus shipping.

Mineral News
Mr. Lanny Ream
P.O. Box 2043
Coeur d’Alene, ID 83816-2043
208-664-2448
$18.00 per year
Index and back issues available.

Mineralogical Record 25-Year Index
$35 plus $3.00 shipping & handling and back issues
The Mineralogical Record
P.O. Box 35565
Tucson, AZ 85740
520-297-6709; FAX 520-544-0815

Reference Libraries

New York Public Library - Science, Industry and Business Library
188 Madison Avenue (at 34th Street), New York, NY 10016
Open Monday, Friday, Saturday: 10:00 am to 6:00 pm; Tuesday, Wednesday, Thursday: 11:00 am- 7:00 pm.
Excellent scientific libraries including mineral related books. Very old collecting magazines like The Mineral Collector are in their collection. They also have an Internet web site for more information and online research: http://www.nypl.org/research/sibl/index.html

American Museum of Natural History Library
American Museum of Natural History
79th Street and Central Park West, New York, NY 10024
Open Tuesday to Friday 11:00 am to 4:00 pm.
Back issues of American Mineralogist and Mineralogical Record. Small assortment of gem and mineral books.

Essential Reference Books

Book Dealers
These are a few of the dealers in out of print mineral and gem books. Each publishes a catalog. If you are looking for a popular book it is important to call immediately after receiving the catalog to place your order before another customer. They all take want-lists and will notify you when they locate a book.

Ed Rogers
P.O. Box 455, Poncha Springs, CO 81242
719-539-4113; FAX 719-539-4542

Frederick Blake, Bookseller
11 Oakway Drive, Stony Brook, NY 11790
516-689-3754

Rocks of Ages
John & Linda Stimson, P.O. Box 3503
Tustin, CA 92681
714-730-8948; FAX 714-730-1644

Peri Lithon
John & Marjorie Sinkankas
5371 Van Nuys Court, San Diego, CA 92109
619-488-6904

GeoScience Books
Michael Dennis Cohan, Bookseller
502-West Alder Street
Missoula, Montana 59802
406-721-7379; http://www.ism.net/~geoscibk/

Donald E. Hahn, Natural History Books
P.O. Box 1004
**Internet Maillists**
**Rocks & Fossils**
Send an e-mail to Majordomo@world.std.com with the command SUBSCRIBE in the subject line and your e-mail address in the text.

**Rockhounds**
Send an e-mail to rockhounds-request@infodyn.com with the command SUBSCRIBE in the subject line and your e-mail address in the text.

**Internet Web Sites**
**Bob’s Rock Shop**  
This web site was the first on the Internet dedicated to gem and mineral enthusiasts. Host Bob Keller is not selling anything like the name implies, he is merely providing access to all the mineral related information he has amassed. He has a good index and access to collecting locations sorted by state, lots on Tucson where he is based. He has links to other noteworthy mineral web sites.

**Rockhounds Information Page**  
[http://www.rahul.net/infodyn/rockhounds/rockhounds.html](http://www.rahul.net/infodyn/rockhounds/rockhounds.html)  
This is the web site for the Rockhounds Maillist, the best mail list for mineral collectors. There is subscription information for the list, a search of the archives, links to dealers, galleries, site information. A good all-around research web site.

**Smithsonian Institution Gems**  
[http://galaxy.einet.net/images/gems/gems~icons.html](http://galaxy.einet.net/images/gems/gems~icons.html)  
This is an online gallery of gems and minerals in the Smithsonian Institution. Very well photographed images are downloadable. However you must get permission to reproduce.

**Tim Fisher’s Rock Page**  
This is another web site that has been around a while. Good information on northwest US locations and very good links to other web sites.

**GNIS the Internet web site address is:**  

**MasMils CD-ROM available for $15.00 from:**  
Gordon Zumach  
12017 150th Ave E, Puyallup WA 98374  
umachg@earthlink.net

**DeLorme Street Atlas USA approximately $39.00 from:**  
DeLorme Publishing  
P.O. Box 298, Freeport, Maine  
800-234-0679 or 207-865-1234

**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 eight 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
Tustin, CA 92681
(714) 730-1644

Sends out four catalogs a year. Each catalog has about 700 books. Great selection. It pays to call the day you receive the catalog because rare items sell out quickly. They maintain your wish list and will call you as the books become available. Will send books without prepayment.

Peri Lithon Books
John & Marjorie Sinkankas
5371 Van Nuys Court
San Diego, CA 92109
(619) 488-6904

Their catalog and inventory is so large that they issue the catalog in six installments. One installment is sent quarterly, and it takes about a year and a half to get the whole catalog. As a result it is much more efficient to send them your wish list. Catalog 119 that covers I to L has approximately 600 books listed. Clearly this has the best selection of true antique books.

Gem and Mineral Magazines

Mineral collecting is a dynamic, fast-paced hobby. Information and research often seems to flow in at the speed of light. All collectors need periodicals to keep up with this hobby. (They are fun to read and browse as well!) The recommended ones are listed below.

Mineralogical Record
Subscription: $39.00 per year (six issues)
Mineralogical Record, Inc.
7413 North Mowry Place, Tucson, AZ 85741

The best magazine exclusively for mineral collectors. The success of Mineralogical Record is directly related to the explosive growth in mineral collecting and the escalation of value of minerals. Articles about classic locations and new discoveries are beautifully illustrated with color photographs, site maps, crystal drawings and complete known mineralogies. If you are a mineral collector this magazine is a must!

Mineral News
Subscriptions: $18.00 per year (12 issues)
L. R. Ream Publishing, P.O. Box 2043
Coeur d’Alene, ID 83816-2043

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.

Matrix
Subscriptions: $20.00 per year (4 issues)
Matrix Publishing Company
P.O. Box 129
Dillsburg, PA 17019-0129
(717) 432-7201

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.
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 a different gemstone.

Rocks and Minerals
Subscriptions: $38.00 per year (6 issues)
Heldref Publications
1319 Eighteenth Street
Washington, DC 2007-6117
1-(800) 365-9753

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.

Rock and Gem
Subscriptions: $19.95 per year (12 issues)
4880 Market Street
Venture, CA 93003

More gem/ lapidary oriented than Rocks and Minerals and definitely slanted towards western US collecting. Good selection of collecting locations, lapidary how-to articles.

Pseudo News
Subscriptions: $12.00 per year (4 issues)
Philip Betancourt
410 Chester Avenue
Moorestown, NJ 08057

Quarterly publication dedicated to pseudomorphs and pseudomorph locations. Articles are short and well referenced.

Micro Probe
Subscriptions: $12.00 per year (2 issues)
Don Howard
356 S.E. 44th Street, Portland, OR 97215

Semiannual publication of the Northwest Micromineral Study Group. Excellent detailed articles on micros, generally from the northwest US. Heavy on zeolites and crystallography.

Picking Table
Subscription: Free with FOMS membership - $20.00 year
John Cianciulli, FOMS treasurer
60 Alpine Road
Sussex, NJ 07461

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.
English-language version of a Russian mineralogical magazine. Focus is on minerals, deposits, history, jeweller's art, new finds and mineralogic sites of Russia and the former Soviet nations. Terrific color photos, maps, tables and relevant information. They could use an English-speaking editor, but overall an attractive, worthwhile magazine.

**It All Comes to Light**
The following information is taken from *Field Collecting Gemstones and Minerals* by John Sinkankas, Geoscience Press, 1989, Appendix II: Table of minerals requiring protection from atmospheric influences.

**Damaged by Exposure to Light**
Many specimens of the following minerals are affected by ordinary light and especially by direct sunlight:
- Apatite (pink type loses color)
- Argentite (alters)
- Beryl (brown or orange type loses color)
- Cerargyrite (alters and changes color)
- Cinnabar (alters and changes color)
- Fluorite (purple and green type changes color)
- Orpiment (decomposes)
- Proustite (alters and becomes gray)
- Pyargyrite (alters and becomes gray)
- Quartz (amethyst, smoky quartz, and rose quartz sometimes becomes paler in color)
- Realgar (alters to orpiment)
- Spodumene (kunzite becomes pale or loses all color)
- Topaz (brown topaz alters color)
- Tyuyamunite (alters)
- Vivianite (quickly changes to dull dark blue-violet color)

**Start a Clipping File**
By John Betts

I would like to urge you to start a clipping file of magazine and newspaper articles. I keep a file for each state that I put collecting location articles in. Then when I am planning a trip, I can quickly pull out all articles for the region and get a quick idea of where to visit. If you are facetor, you could keep files of cut designs, a jeweler can keep files of settings, a lapidary can keep files on cutting material, etc. This is a very good way to develop a custom, focused information resource. Remember, the key is keeping the information organized so that you can lay your hands on a particular article easily. If you save them, but don't organize them, all you have is a pile of paper. The same goes for books and magazines - organize them by subject or date or author so you can locate them quickly and easily.
SuperBright 2000SW Information
By Don Newsome (Via the Internet - Rockhounds)
The SuperBright 2000SW has more UV output than any other typical hand-held SW light - guaranteed! Engineered to optimize lamp and ballast performance, its new U-shaped long life quartz lamp (tube) has nearly double the effective arc length found in a typical lamp. Quartz, used in this lamp, transmits more UV (about 90% transmission) with less solarization compared to the glass tubing in typical lamps which have only about a 65% transmission. The light uses a high-efficiency, high-frequency inverter-ballast which boosts the lamp's production of UV energy, allowing the SuperBright 2000SW to show off your minerals better than any other hand-held SW light.\(^1\) The SuperBright uses the Hoya Optics U-325C SW filter - a superior filter because it has the lowest solarization rate of any filters available.

The SuperBright can be powered by either AC house current or by a 12V battery. For AC, it uses a remote desktop 115VAC to 12VDC power supply that is included with the light. A 220V 50 Hz power supply (PS-220/12) is available if needed in place of the standard power supply, for a small additional charge. An optional HD-06 car lighter cord (6' long) is available to enable you to operate the light from your car. The standard power supply that comes with the light has a 6 foot 115VAC cord on one end and a 6 foot 12VDC cord on the other that plugs into the SuperBright; this enables you to use the light up to 12 feet away from a power outlet without needing an extension cord.

Due also to its strong lightweight aluminum housing, the SuperBright weighs only 1 lb. 14 oz. Although the power supply weighs just 2 lb. 3 oz., you will be glad that it was designed as a separate unit that sits on a desk or table so that you don't have that weight in the light itself!

The SuperBright has instant start-up with no extra button to push. You could also check phosphorescence by just turning the light off.\(^2\) The light is about 8" long, 3.75" wide, and 3.5" high, excluding the handle. The window for the filter is 1.8" x 5.3" and the filter is 2" x 5.5". Four small non-metal feet protect the filter when the light is set down. The handle is ergonomically designed and is 4-way adjustable.

The lamp and filter of the SuperBright 2000SW have a 30 day limited warranty, and the rest of the light has a one year limited warranty.

A long wave light (SuperBright 2010LW) will be available about February, 1997. No combination SW/LW light is planned. Portable external rechargeable battery packs are in development and are expected to be available in February, 1997. The cost for the battery pack is unknown at this time.

Prices
SuperBright 2000SW, complete with the 115VAC to 12VDC power supply, has a list price of $385.00, plus $11.50 shipping and handling (USA only). However, a special limited discount offer of $100 off is in effect on fully-paid orders received through Nov. 29, 1996. This makes the price only $285.00, plus $11.50 shipping and handling.

A minimum $100 deposit in advance is required to reserve a light in the first production group. Those making this deposit will be notified when the specific availability date is known, at which time they will need to send in the balance. If you reserve a light in this way, you can be sure that yours will be among the first shipped. Shipping will begin on or before Nov. 29, 1996.

The optional six-foot HD-06 car lighter cord is only $3.35 plus $1.50 shipping and handling. The $1.50 shipping and handling fee is waived if the HD-06 is ordered at the same time as the SuperBright 2000SW.

The SuperBright 2000SW can be ordered with a 220V 50 Hz power supply (PS-220/12) instead of the standard 115VAC power supply for an additional charge of $20.00.

A replacement SW lamp, LS-16X, is available for SuperBright purchasers for $33.75 including shipping and handling (USA only). The normal LS-16X price is $37.25. (However, you should not expect to need a replacement lamp for several years, with normal use of the light.)

A replacement SW filter, FS-20, is available for SuperBright purchasers for $47.35 including shipping and handling (USA only). The normal FS-20 price is $50.90. (You should not expect to replace your filter for 1,000 to 2,500 hours, with normal use.)

Dealer inquiries are welcome. Dealers must order a minimum of 3 lights for their first order.

UV SYSTEMS
16605 127th Ave. S.E., Renton, WA 98058, Phone and FAX (206) 228-9988

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\(^1\)The wattage of the lamp is not related to UV output, and so wattage is not being published. This is to avoid confusion, since people often think that the more the watts, the more the UV output; that is not true. Because of the long quartz lamp and high-frequency inverter-ballast, the SuperBright produces more UV than any typical hand-held light, regardless of the wattage others may list for their lights.

\(^2\)To show phosphorescence, in most cases you may want to continue to simply move the lamp or the mineral; this would extend the life of the lamp, since each start reduces the life time of the lamp by a small amount. The lamp life is rated for 4,000 to 6,000 hours of use.
Museum Web Sites

Carnegie Natural History Museum  
http://trfn.pgh.pa.us/Carnegie/CMNH/home.html

Museum of Natural History of the University of Pisa  
http://astrpi.difl.unipi.it/Museo_di_Calci/MusSN.html

National Museum of Natural History  
http://nmnhwww.si.edu/nmnhweb.html

The Natural History Museum of Los Angeles County  
http://www.usc.edu/lacmnh/default.html  
(This is my home town--a great museum to visit when you come to L. A. !)

The Royal Tyrrell Museum, Drumheller, Alberta, Canada  
http://www.cuug.ab.ca:8001/VT/tyrrell/

University of California Virtual Paleontology Museum  
http://ucmp1.berkeley.edu

Griffith Observatory  
http://www/csun.edu/~hbphy003

The Field Museum  
http://www/bvis.uic.edu/museum

Foreign Mineral Magazines

Le Regne Mineral  
Editions du Piat  
1 bis, rue du Piat, 43120 Monistrol sur Loire, France  
6 issues + 1 special, 300 FF  
In French; Like Mineralogical Record (with full color pictures)

Magazine du 4M  
Editor: A. Foucart  
2, Avenue des Eglantines, 6110 Montigny le Tilleul, Belgique  
10 issues, 600 FB  
Belgium Micromounter Newsletters (B&W)

Le Cahier des Micromonceurs  
Editor: R. Pecorini  
8, place des Chenes Verts, 34820 Teyran, France  
170 FF, 4 issues + 1 special  
The French Micromounter newsletters (color + B&W); home page: http://www.cri.ensmp/afm
Mineralien Welt
Editor: Rainer Bode
Bode Verlag GmbH, Oeter Putt 28, D-45721 Haltern, Germany
Fax: 02364-169273
6 issues, 80 DM
In German; mineralogy & paleontology; Like Mineralogical Record

Le Cristallier Suisse
Treasurer: Geschäftsstelle SVSM/ASCM
Frau B. Elsasser
Postfach 101, 3608 Thun, Switzerland
11 issues, 63 SFR
In French and German; The Switzerland Review; Like Mineralogical Record

International Association of Collectors of Slag Minerals
Editor: Horst Windish
PO box 17273; 0027 Groenkloof; South Africa
4 issues, 5 US$
Newsletter for slag minerals (B&W)

Revista de Minerales
Editor: Miguel Calvo
Apartado 31014; 08080 Barcelona; Spain
4 issues, Price unknown
New Spanish review; Like Mineralogical Record
Section V
In Search of Kashmir Ruby
By Karen L. Rice

The following narrative recounts a 1995 journey to the ruby mines of Azad Kashmir in Northern Pakistan by a group of nine Americans, one Italian and one Briton. The trip was organized by Gemcore, a non-profit organization dedicated to the advancement of gemological knowledge through research and education. The expedition also was made possible by the Azad Kashmir Mineral and Industrial Development Corp. This is a personal account of the experiences, observations and thoughts of author Karen L. Rice, a first-time traveler to this remote region. Karen is a member of the New York Mineralogical Club and a gemmologist. A close version of this article appeared in the June 1996 Jewelers' Circular-Keystone and it is reprinted with permission.
“Everything on this road is on so stupendous a scale that as one rides day after day through these mountains, one is dazed by their vastness and beauty, their solemn desolation and silence, everything in one that feels is steeped in the sense of it. . .”

H.R. Pirie
Kashmir: Land of Streams and Solitudes
(1908)
Introduction
In August, 1995 a journey was undertaken to visit the ruby mines of Azad Kashmir (Free Kashmir) by an eleven member team consisting of nine Americans, one Italian and one Briton. It was the first visit by a foreign team to the remote Nangimali and Lower Khora deposits - the world's highest operational ruby mines.

Our journey began amid the hustle and bustle of New York City with a luncheon and orientation meeting. From New York we flew to Islamabad, the capital of Pakistan, a flight of some seventeen hours. Due to military conflicts between Pakistan and India along the "line of control" (the disputed border between the two countries) our route to the mines would take us on a journey through the North West Frontier Province, into the Northern Areas to the town of Gilgit then, finally, into the foothills of the Himalayas, across Shounter Pass and into Azad Kashmir.

It was to take four days of hard traveling, first by bus/jeep and then on mule/foot to reach Nangimali Village, location of the principal camp for both mines. From here we made our final ascent, first to Nangimali Top (14,000 ft) and then to Lower Khora (12,500 ft).

In the following pages a narrative of our journey is presented. It is both a record of daily events and an expression of the author's personal thoughts while traveling in a country far different from her own. Since, on several occasions, groups/individuals pursued slightly different agendas, not all team members were witness to all the events recorded herein. In addition, the views expressed are solely that of the author.

While it is a personal account, it is hoped that this narrative will allow the reader to both accompany the team on the expedition, albeit from the comfort of an arm chair, and to gain some insight into life in one of the remotest corners of the world. A beautiful and as yet unspoiled region.

Karen L. Rice
January, 1996
Monday July 31st. Islamabad to Gilgit - A Journey Through the North West Frontier Province.

It was already getting light when the hotel wake-up call awakened me from a sound, if only short sleep at 4:45 am. Within the hour the entire team was assembled in the hotel lobby (on time!!). But our planned 6 am start came and went as an endless trail of baggage was both hoisted aloft, firmly secured, we hoped, to the roof and maneuvered into the bus, wedged between seats. At first glance, the bus, a twenty-five seat Toyota Coaster had appeared overly big for our needs considering that only half that number would be on board. However, by the time everything was loaded any feeling of spaciousness had disappeared completely. Instead, with a mass of baggage clogging the rear of the bus, there was only just enough room for all the passengers. Finally, at 7 am with all eleven team members, an officer of the Azad Kashmir Mineral and Industrial Development Corporation (AKMIDC), the driver and an additional driver (asleep on the back seat), we set course for Gilgit, some four hundred miles to the north. Our adventure had begun - one that would take us from the modern capital of Islamabad in the Punjab, through the North West Frontier Province, into the Northern Provinces to the town of Gilgit and then on into the foothills of the Himalayas. But this was not simply to be a “physical” journey; rather, for most, it was also to be a passage of initiation, a thrust into a world physically, mentally and spiritually far different from our own, bound by traditions we could not hope to fully understand during our brief visit.

The journey that day was to take nearly sixteen hours, most of those spent traveling the infamous Karakoram Highway (KKH). Following a branch of the old Silk Road, the two lane “highway”, devoid of any road markings or apparent speed limitations for most of its length, stretches some eight hundred miles from the Chinese trading town of Kashgar in the north, to the old city of Rawalpindi, just south of Islamabad. Its official start, however, is at the town of Thakot on the banks of the Indus where a shrine-like monument stands in remembrance to its builders. It can best be described as a mammoth feat of engineering and is testimony to the endurance of its builders who, quite literally, cut their way through some of the world’s most inhospitable terrain, not to mention the world’s highest mountain ranges - the Himalayas, Karakoram and Pamirs. In doing so, it cost the lives of hundreds of Chinese and Pakistani laborers during the twenty years it took to complete. By some estimates one life was lost for each mile of road constructed.

In the early morning the wide streets of Islamabad were already teeming with activity. In particular, yellow and black taxis cruised the streets, desperate to pick up fares (they became positively annoying when walking the streets, constantly trying to entice you to ride). Begun only in 1961, the capital, a centerless urban spread divided into sectors with map-like coordinates for names (e.g. F-7, G-6), was a mixture of the not-so-old and very modern; the not-so-affluent and very wealthy, and, as we were to discover at the end of the trip, in complete contrast to its sister city of Rawalpindi some ten miles away.

One and two story residences, many hidden behind high walls, lined the streets in neat rows, the monotony being broken every now and again by the taller, featureless, once white, flat-roofed buildings of the “markets”. These maze-like shopping malls, one to each sector, were packed to capacity with an assortment of small shops, their large signs promoting what was for sale: books, jewelry, fabrics, ladies’ clothes, rugs, woodcarvings and furniture, to mention just a few, interspersed with tea shops, dry cleaners and launderers (who appeared to use the grass verges to air dry their customers’ clothes!).

Soon, however, the wide streets and modern white faced buildings of Islamabad were left behind as we traveled north along a busy stretch of tarmac, softened by an already intense early morning sun. We joined a colorful array of other travelers crowding the road, riding every type of vehicle imaginable - both motorized and “animal” powered. Intricately decorated buses sped by with passengers packed into every available space - and more hanging from the outside. Trucks heavy with sacks of grain kicked up swirling clouds of dust and motor bikes weaved in and out of the traffic. In a seemingly indiscriminate manner, all honked their horns as they went by. It was just another Monday morning in the Punjab! Our driver was no different, and he too weaved in and out, tooting the horn with regularity and in so doing, redefining the concept of a “near-miss” over and over again. From our air-conditioned sanctum, we viewed images that many of us had previously seen only on celluloid. Paddy fields fed by irrigation channels crisscrossed an otherwise arid landscape. Water buffalo with shiny black skins harnessed to ploughs struggled to till the hard ground. Civilization had begun on this land some four millennium before, the Indus being one of the great river-valley civilizations of antiquity. In many ways life had changed little since early times, clearly, it was still a struggle for most.
At first, the road was straight and open. Our rapid progress slowed only by the myriad of small, busy towns we passed through, which necessitated the driver to slow and skillfully maneuver his vehicle around man and animal. One town was much like another. Their unpaved side streets crammed with stores and roadside vendors squatting behind sackfuls of wares. Adding to the confusion, horse drawn buggies, donkeys draped with heavy packs, cyclists and small Honda minivans with decorated fabric canopies, fought their way through the crowds, all seemingly avoiding one another, if only by the narrowest of margins.

Soon the road narrowed and stretches of straight tarmac became a feature of the past. In an almost monotonous fashion the road began to curve left and right, continually swinging the passengers on the bus back and forth. We had also begun to climb, slowly at first, and then more steeply as we continued northwards. However, we were still a long way from the rugged, barren hills further north and a thick covering of lush vegetation hid many of the physical features the land possessed. Indeed, much of the time it was difficult to see beyond the road, a wall of tall greenery obscuring the view. On occasions the road would open out as it crossed a plateau or a wide flat valley floor, exposing the presence of small settlements and accompanying tilled terraces.

At midday our journey was temporarily halted as we rounded a sharp bend only to find a “traffic jam” ahead of us. Upon investigation, we found the reason to be a landslide which had, apparently, occurred the day before. A long line of highly decorated Bedford trucks, complete with carved wooden doors, were patiently waiting for the road to reopen. The slip had wiped away some five hundred feet of tarmac creating a large ugly brown scar running up an otherwise green slope. A lone bulldozer slaved away trying to clear a passage. But as fast as it cleared, more rubble would come crashing down sending the bulldozer and its accompanying entourage of military personnel running. For their part, the people seemed resigned to the wait, displaying utmost patience. Some quietly slept beneath their trucks, feet protruding into the road. Others, sipped freshly brewed tea in the shade. Still others, probably determined not to let a mere landslide stop their journey found alternative routes, the steep slopes of the narrow valley posing little problem to them. While one group improvised by dropping into the valley, through the fast, waist high river, along the opposite bank and back again across the river, another group climbed the steep hillside, crossed above the slide and descended on the other side. They demonstrated total adaptation to their environment. On slopes too steep for most, they walked sure-footed. Women, with babies in one arm, chickens in the other and baskets balanced on their heads, traversed the narrow “homemade” paths without hesitation. Not a moan or a groan, just a determination to get the job done.

Our wait in the hot midday sun lasted three hours. During this time, some team members took the opportunity to catch up on some sleep, others tested their endurance in the pounding heat, walking up and down the convoy, content to observe, first-hand, life - and its hardships in this region. Eventually, all returned to the air-conditioned bus, the confining visits lasting longer and longer as the idea of venturing outside into the “oven” became less and less attractive. As the bulldozer backed away for the last time, the waiting crowd descended on the rough and muddy single-track road, eager to remove the remaining large boulders, heaving them over the edge and down into the river. As the last obstacles were tossed aside, a frenzy of activity occurred as truck after truck jostled for position to cross the narrow track. The stream of vehicles was interspersed by a multitude of people, all totally unconcerned about the loose rubble above and the possibility of another slide. We too were caught up in the moment, racing on foot alongside the colorful convoy. By the time we reached the other side the air was thick with dust and it became prudent to cover, as much as possible, nose and mouth to avoid inhaling the dirt.

Covered in a layer of brown dust, firmly embedded into the weave of our clothes and glued to all exposed wet skin, we piled back into the bus around 3 pm. We still had many hours of driving ahead of us so there was no time to waste. Within a very short time the narrow valley we had been travelling along came to an abrupt end, opening out into a larger deeper valley. We had reached the mighty Indus, third longest river in Asia after the Yangzi and Yellow. Born at Mount Kailas in south western Tibet, its thick silt-laden waters rushed by at considerable speed, swallowing up all in its path, steadfast in its journey to the sea. Its channel was wide and the sides of the valley steep, dropping straight into the river, leaving little flat ground. At the town of Thakot, official start of the Karakoram Highway, we began our journey through Indus Kohistan (Land of the Mountains). Crossing onto the west bank of the Indus, the road now cut into the side of an ever-deepening gorge. The hills became less and less fertile. At first, streams of white rock devoid of vegetation, crisscrossed the slopes creating complex patterns against a green background. No doubt the result of slides, they slowly began to dominate the view as the slopes became increasingly steep and soon vast tracks of bare rock stretched down the mountainsides. Scorched by the endless sun the barren rocks displayed few colors and the muddy waters of the Indus added little flavor to the scenery, which now consisted almost exclusively of various shades of brown and grey.

Once known as Yaghistan - Land of the Ungoverned, Kohistan was still a remote and forbidding land. Passing through an endless line of small towns, many positioned at the confluence of rivers joining the Indus, it was clear that we had entered a territory far different from the Pakistan of the south. The West has had little impact on this part of the world. Indeed, it appeared that Pakistan itself had little influence on the inhabitants of the North West Frontier Province. Instead, they were governed by their own rules and customs, formulated no doubt, in centuries past and steeped in religious doctrine. As barren as the land was, however, these small towns seemed to thrive, some positively bursting with life. The streets, dominated almost exclusively by men (in some towns not a woman was to be seen), overflowed with pedestrians and traffic. Wooden open-fronted shops with concertina doors folded fully back, sold everything from...
cassette tapes with the latest hits to rifles and automatic weapons, while tea rooms spilled customers and their guns out onto the narrow streets. At times, the presence of the four female team members caused concern among the inhabitants of the towns. Remembering our “visitor” status we obliged by getting back into the bus, if only rather reluctantly.

As the road wound endlessly north and then east following the course of the Indus, which itself takes a detour around the Nanga Parbat Massif, signs of human habitation became more intermittent. Towns dwindled to little more than small dusty settlements, the vicious sun keeping their residents hidden in the shade. At times there seemed no end to the constant motion of the bus as it swerved around curve after curve, sometimes at speeds more in keeping with the Indianapolis 500. Indeed, one of the team aptly named our drive the Indus 500! Our fellow road users also became more scarce. With the exception of a few buses similar to our own, probably ferrying tourists, the road was used primarily by trucks. The average family automobile was a rare sight indeed. Occasional roadside “cafes” catered to the needs of these long distance drivers. Strategically located near mountain streams so as to provide water for drinking and to cool engines, they offered food and accommodation, even if it was under the stars: Specks of humanity in an otherwise lonely land.

At the town of Chilas we left the confines of the deep gorge, crossing back to the eastern flank of a still barren valley, but one in which we were not so closed in. Dusk came and went, with giant shadows being cast as the sun set behind the mountains to the west. Soon, darkness fell and we were given a truly fantastic view of the night sky. The unpolluted atmosphere allowed the stars to shine as nature had intended - the milkyway stretching its arch across the entire sky.

Our journey was broken only by checkpoints, which became increasingly more common as we moved further north. Manned by “military looking” personnel, thin barriers strung haphazardly across the road were effective at bringing all traffic to a halt. There appeared to be no definite rule as to what was required to secure passage, but on most occasions a list of passport numbers and nationalities was handed over. Once satisfied, they allowed us to continue our journey.

We arrived in Gilgit around 11 pm, our entry being slowed somewhat by three checkpoints of a more substantial nature than those on the open road further south. Our accommodation that night - Mirs Lodge, a walled “encampment” located in the middle of town, was a welcome site after so many hours of traveling. The lodge itself, a stark, white-walled building with an orange tiled roof, stood in much contrast to the rest of the town. However, it was comfortable, even if the unusually high ceilings created an eerie hollowness to the place. Their hospitality was more than generous, a very late night meal was cooked especially for us - a delicious chicken and vegetable soup followed by mutton curry. A tasty end to a long day.

**Tuesday August 1st. Gilgit to Astore**

Tuesday began at the early time of 6:50 am with the piercing monotonous tone of a wristwatch alarm which seemed to echo off every wall. The room was still dark, the only window covered by thick curtains. Outside, however, the sun was already high in a clear sky. This morning was notable in one very important respect, namely, it was the last opportunity to shower, so even if the water was not as hot as one might like, the moment could not be allowed to pass by!

The hotel served western-style breakfast - French toast, omelets and the likes and the entire team made it to the 8 am sitting. The other guests - a multitude of nationalities - wandered in and out of the dining room. While a group of Indians, their women in traditional dress, arrived from upstairs, stood in much contrast to the rest of the town. However, it was comfortable, even if the unusually high ceilings created an eerie hollowness to the place. Their hospitality was more than generous, a very late night meal was cooked especially for us - a delicious chicken and vegetable soup followed by mutton curry. A tasty end to a long day.

This bowl of greenery, in an otherwise desolate region had been occupied for several thousand years. Its ancient name of Sargin had later been changed to Gilyit, only to be corrupted to Gilgit much later. Its geographical position and fertile land had made it a desirable target for conquering empires far and near. Great powers such as China, Arabia and Tibet had all sought supremacy over the valley at one time or another. By the eleventh century, Gilgit and the surrounding area had grown into a powerful kingdom in itself, that of Dardistan (so called by the British). However, its greatness was to wane in the following centuries. In 1846 it was placed under the direct control of the Maharajah of Jammu and Kashmir, although he never really secured the support of the inhabitants. By the 1870s, the British, having expanded their control over the Indian subcontinent and afraid of Russian and Chinese aggression to the north, created the Gilgit Agency in 1877. By placing it under direct control it became the furthest outpost of British India.

By 10 am two jeeps of indeterminable age had been procured and we began the task of loading our gear - a scene reminiscent of a child trying to fit a square peg into a round hole. It soon became apparent that a third vehicle was needed and so a four-wheel drive was also commissioned. At 11 am, three heavily laden vehicles rolled out of the hotel.
compound - passengers hanging out on all sides, sunglasses on, slick with sunblock and cameras at the ready - the epitome of the "western" tourist!

By midmorning, Gilgit displayed all the hustle and bustle of any other town going about the business of the day. The main street, a dusty, unpaved, wide avenue, was crammed with men and vehicles. Honda 100cc motorbikes seemed particularly popular, probably due to their economic fuel consumption, an important fact when fuel was expensive. In fact, it was an education to see just how many people you could fit onto one motorbike and still ride it safely - or unsafely as the case appeared to be on many occasions. Observing the highway code did not appear to be a priority, even if there were at least three points along a three hundred yard stretch of road where smartly dressed, white-gloved traffic police, standing on bandstand-like structures, directed traffic.

Traveling out of Gilgit, we were given our first glimpse of some of the highest peaks in the world; Rakaposhi (25,550 ft) and Nanga Parbat (26,660 ft) were clearly visible, their snowcapped summits steadfastly set against a deep blue cloudless sky. We had truly entered "the roof of the world" and the sheer magnitude of size destroyed any previous concept of scale.

Within a short time we had left the flat tarmac roads of suburban Gilgit and cleared the checkpoints on the outskirts of town, where, in the early morning the men of the Frontier Constabulary had thoroughly checked our passage. We headed back along the Karakoram Highway to the garrison town of Jaglot where we would begin our climb into the mountains. After crossing the Indus River via a long single lane wooden suspension bridge, we began our ascent. We were now on the old Srinagar-Gilgit road. Although difficult to imagine, this winding narrow dirt track had once been the only road between the two towns. Crossing over the Buzil Pass, (13,700 ft) it was passable for only three months of the year. Known as the "Dreary Road To Slavery" it had been the main supply route for the British garrison at Gilgit and as such, was a well guarded route. Frederick Drew during his travels as a government official in the 1860s and 1870s noted the presence of considerable numbers of troops along the road, most keeping watch over the all-important bridges. It was not until 1892 that a second road was opened, traversing the Babusar Pass (13,685 ft) and then following the Kaghan Valley. In those days it took the hardy traveler nearly a month to complete the journey from Srinagar to Gilgit. Fortunately for us, using four-wheel drive vehicles, our progress would be somewhat quicker.

At first, we wound our way through a steep-sided narrow gorge, the dirt track having been cut right into the wall. At points the rock above almost formed a roof to the road. With these conditions, it was not advisable to stop in one place for too long for fear of falling rocks. Indeed, the remains of previous falls littered the dusty surface. There was little vegetation, the steep slopes and arid climate was not an hospitable one. The river, squeezed into a narrow channel, smashed repeatedly into large boulders on its way down, creating violent white water rapids. As we traveled higher, we were able to look back on the vast flat plain of the Gilgit valley, now resembling an almost insignificant smudge in an otherwise mountainous landscape. Soon, all evidence of flat land disappeared and all that could be seen were mountains. Nearer to us, the sharp ridged, barren mountains displayed huge scree slopes running down their sides giving the illusion that the slopes were as smooth as glass. Interspersed between the scree, fingers of solid jagged rock creeping down from the higher elevations broke the monotony. The dirt track we had traveled along was clearly visible - a white squiggle on the hillside, laboriously winding its way back towards Gilgit.

In the crisp clear air, free from humidity and pollutants, we were able to see for an incalculable distance. As we climbed, mountain after mountain came into view, the higher peaks capped with brilliant white snow reflecting the suns' rays with intensity.

Within the hour the valley widened and the river became less turbulent. Due to the lower road being impassable we were forced to take an alternate route and ascend the mountain. The road fought its way up the steep slope in a series of zigzags. At points, the turns were so tight that the vehicles had to perform three-point turns in order to navigate around. Reversing with such a drop was slightly unnerving, especially when performed on tires with absolutely no tread! Fortunately, our drivers were experienced at maneuvering their loads in such tight conditions and seemed almost oblivious to the dangers as they slipped between gears, each time skillfully balancing clutch and accelerator pedals so as not to roll backwards. At a point further down the road our driver gave us an even more remarkable demonstration of his talents by turning the jeep completely around on a stretch of dirt track only a couple of feet wider than the vehicle itself. For our part, bravery lasted until the jeep was at ninety degrees to the road and all that could be seen were mountains and, more importantly, the river several thousand feet below. With one passenger making a move to exit all others followed without hesitation - or notice to the driver, who was left by himself to inch back and forth until he had turned a complete one hundred eighty degrees.

The air cooled as we pushed higher. Eventually, and rather suddenly we entered an alpine type environment. Lush tall trees bordered the road giving much needed shade. As one team member noted, we could have been in Montana! However, this illusion was shattered on passing through the small mountain villages. The flat roofed wood and mud structures built in tiers were certainly not "Montana style" and our passage through them seemed to bring out the inhabitants in masse, especially the children. They appeared to view our presence with some cynicism. After all, they knew what was ahead of us, and that our tidy appearance would not last for long!

Our journey was interrupted only by the odd stop for water to cool the overworked engines and a not-so-short stop to free the 4 wheel drive vehicle from a deep patch of mud. This delay, coupled with a late start, had put us behind schedule and unable to reach our planned destination. We settled on staying the night in the town of Astore. We had

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traveled just over one hundred miles but it had taken us almost all day.

Perched above the Astore River on flat fertile terraces either side of the Rama Gah ravine, the town of Astore appeared to be the only settlement of significant size along the road, and certainly the only one capable of accommodating such a large influx of visitors without notice. It was almost dark when, at around 7 pm, we drove the steep narrow track leading to the town and immediately discussions got underway with a local official to procure lodging and food. For the former, we were able to use a Government of Pakistan Rest House, located on the edge of town. As for food, Major Aziz, official bridge builder and restauranteur (not sure which one he excelled in) kindly agreed to cook for us. So during the late evening we piled into his small restaurant, aptly named “Dream Land Tourist Inn” for rice, mutton curry and lentils followed by hot tea. All was consumed with enthusiasm while watching western music videos on a color television. It was a clear demonstration that even in the remotest regions of the world, technological progress has made it virtually impossible to escape from civilization. For the people of Astore, however, it allowed them to experience a world beyond their own, be that for the better or worse.

After eating, we immediately returned to the rest house. The accommodation was basic but comfortable (in the following days we were to learn the real meaning of basic!) and within a short time the lights were out. Not to sound ungrateful to Major Aziz hospitality, but his food did not settle well and I was up most of the night, walking back and forth on the concrete porch, trying not to startle our security guard sleeping on his “chair puai” (a four legged cot) at the far end, gun at his side. Even at 7,700 feet the night air was warm and the sky clear. Several shooting stars displayed their bright tails as they crossed the heavens and lightning from a far distant storm flickered behind the mountains, silhouetting their rugged outline with each flash. It was unfortunate that no sooner had I gone back inside in an attempt to sleep, that the call to morning prayer by the Muezzin from the minaret of a local mosque broke the silence. This was soon followed with a recital of prayers by our security guard, somewhat closer to our accommodation.

**Wednesday August 2nd. Astore to Camp One**

With hardly enough time to allow my stomach to recover from the night before, we were off again to sample Major Aziz cooking, this time a breakfast of fried “chapptis” (a form of bread resembling a thin flat pancake). Our Western habit of spreading marmalade on them seemed to amuse the local population, but it added flavor to an otherwise bland dish.

In the morning light we could view our surroundings. Although remote, the town of Astore appeared to be thriving. The winding, steep and narrow dirt track which served as the town’s main thoroughfare, located on the north side of the ravine, was alive with activity. Indeed, clearing a path for our vehicle was a slow affair with both store keepers, sitting in the shade of their premises, and their patrons on the street, viewing us with as much interest as we viewed them. However, even with such intense activity it was difficult to imagine that this isolated town had once been an Empire in itself, albeit a small one, complete with its own raja (chief) and fortress, the ruins of which were still evident at the turn of the century. It had been deprived of its autonomy by the expansion of the Sikh Empire in the nineteenth century. From the time of the British presence the town served as a convenient resting point on the long haul from the capital, Srinagar, and two British telegraph operators had been permanently stationed there to relay messages for the Crown (a lonely existence, I’m sure). The venerable Colonel Algernon Durand had travelled this way during his tenure as British Agent at Gilgit (1889-1894). Indeed, he had been entertained by the former raja on his visit and had attended a polo game held in the town! Unfortunately, our schedule did not afford us the opportunity to investigate the town further.

After bidding farewell to the restauranteur, we left Astore around 8:30 am, stopping to pick up dinner (chickens) along the way. We had swapped our jeeps for two 4 wheel drive vehicles - with good suspension, air conditioning and, importantly, large roof racks! However, our comfortable ride was not to last long. The bridge ahead of us had been damaged by recent heavy rains and was unsafe for vehicles, necessitating that we cross on foot. So after securing the luggage on the roof not an hour before, it all had to come down again. For most of us this was the first time we had put our fully loaded packs on. There were some shocked faces as team members came to the sudden realization that the packs were heavier than they looked. But we all put on a brave face and confidently marched across the sloping, wooden-slatted suspension bridge, carefully avoiding the gaps left by missing planks. Below, the river rushed by, smashing into the numerous boulders that littered its course. Once on the other side we were relieved to find two open-backed jeeps waiting, one for our luggage, the other for us. We climbed in - standing room only, and after some query as to how best to turn the jeep so it was facing in the right direction (not an easy task when the track is only slightly wider than the vehicle itself) we set off along the valley. After about twenty minutes it was time to repeat our actions. Luggage unloaded, backpacks on, cross bridge - this time a foot wide plank over a gushing stream, backpacks off, luggage and people back into two more jeeps. This time, however, we were to spend some three hours perched in a cattle-like pen on the back of the jeep. Soon, the exhilaration of riding in this unusual manner began to wear thin. Leg and arm muscles ached as we fought to keep our balance, but as much as we tried, none of us were able to stop ourselves from hitting the metal bars of our “pen”.

The road followed the river, hovering slightly above the water line. The valley was nowhere near as rugged, barren, or indeed, as deep as the previous day and our ascent was hardly perceptible. As we wound our way upstream, leaving a cloud of dust behind us, we were afforded a magnificent view of Nanga Parbat (26,660 ft). At a curve in the road where a second valley intersected our path we were brought face-to-face with this most mighty of earth’s structures, displaying its grandeur in full. While it cannot claim the title of the world’s highest peak, it can claim to be the largest, consisting not simply of a single peak but rather an entire massif. The ridge-like spine which forms the summit region is considered by
some to resemble a woman lying along her length, giving rise to the name “sleeping beauty” (much imagination needed!!). First climbed in 1953 by Herman Bulh, its slopes are steep, the south east Rupal face being a sheer 4,500 foot vertical wall. Its very name, literally translated as the “naked mountain” pertains to its vast, almost vertical walls, that are so steep as to be devoid of snow.
Thrust up at the very western end of the Himalaya Range in one of the most geologically active regions of the world, this great mountain continues to grow, rising at an estimated 7 mm a year. Along with K2 (28,250 ft), it is considered to be the most difficult of the fourteen peaks above 26,000 feet to climb and, besides Everest (29,028 ft) and Annapurna (26,504 ft), its slopes have claimed more lives than any other.

On this day, the summit and most of its snow and rock bulk was clearly visible, a rare event for this mountain, more than most, is normally shrouded in clouds. A small white billowy cloud midway up the mountain created a picturesque perfect scene. A rickety wooden bridge served as the stage for a long photographic session with Nanga Parbat as the backdrop. It was a most magnificent, but almost unreal picture, making it impossible to judge just how far we were from the "giant". There was a silence in the clear, still air, the only noise originating from the constant clicking of camera shutters. Godfrey Thomas Vigne had been the first European to view Nanga Parbat in 1835 and we, like him so many years before, could not record the view too many times.

Gradually, the valley broadened becoming fertile enough to support small villages, whose colorful inhabitants eagerly came to the roadside. By 4 pm we had reached the last permanent settlement along the road, the town of Ratu. Here, the jeeps had to refuel, a long process done by hand (no fuel pumps in this region). The team took the opportunity to stretch stiff legs and experience terra firma. It was decided that we would carry on down the track on foot with the vehicles eventually catching up to us. The track was wide and even at first, and the walk was a pleasure, having spent so long standing in the back of the jeep. However, we soon learned a very valuable lesson. Having left our packs and, in particular, our water purifiers in the second jeep, we suddenly found ourselves short, and finally completely out of water when the jeeps failed to catch up to us within the expected time. The sun was intense and there was no shade in the treeless valley. The gushing Astore River only twenty or so yards away looked inviting, but to drink without first treating its waters would mean almost certain illness. Eventually, hot and thirsty, we all sat on the roadside and waited. By this time the jeeps caught up with us as we had only been in the open for about an hour and half but it was ample time for us to become uncomfortably dehydrated. After this experience we made sure that at least one of us had a water purifier handy at all times.

Slowly but surely the track became rougher and rougher and our progress painfully slow. At times it seemed that it would have been quicker and definitely more comfortable to walk. We were taking vehicles where they had never been designed to go, testing both mechanics and our own human endurance. At one point we had to wait while the jeep carrying our luggage underwent a quick "field" repair to the throttle cable. As the sun began to move behind the high mountains to our right and the temperature began to drop, the motorized part of our adventure came to an abrupt halt. The remainder of the journey would be made on mule and foot. It was poignant to think that from here on we would be traveling in much the same manner as all those who had previously passed this way over the centuries. Man may have reached the moon but in the Himalayas such progress seemed insignificant. For here, the requirements for penetrating the remote mountains and valleys was still four hooves and a strong pair of walking boots!

Assembled on a flat piece of grassy land - in what felt like the middle of nowhere, were fifteen or so rugged men of varying ages waiting patiently for our arrival. From this point on it would be these men who would help us get to the mines. Their mules would carry both our luggage and our tired bodies! Dressed in little more than what could best be described as “Pakistani casual” wear and many with nothing more than loafers on their feet, they were to walk the entire way, often making us feel incredibly unfit as they effortlessly climbed steep slopes as if on an afternoon stroll.

No sooner had the engines been silenced than our baggage was heaved off the jeeps and stuffed into sacks. Two sacks were then tied together and hung over a mule, thus balancing the weight on the unfortunate animal. While this was done the team members, now in extra layers to ward off the cooling air, were helped onto the mules. For some of us (including myself) this was the first time on a “moving” horse! There is nothing like being handed the reins and told to get on with it when you haven’t a clue how to steer - or stop. Fortunately, the agile mules knew the best path and probably, regardless of my pulling of reins in each and every direction, would have gone their own way anyway.

Within twenty minutes or so were we ready to go, the change from jeep to mule being done at lightning speed. We rode for about two hours but it seemed like an eternity. The valley widened, taking on a classic “U” shape, typical of snow and ice gouged terrain. The ascent was gentle, with the river never far away. Large boulders littered the green carpet of short hardy grass and every now and again a shallow mountain stream, its bed a concentrate of water-worn rubble, would cross our path. As we progressed up the valley, the hills gradually turned into mountains with channels of snow and ice rippling down their sides. Aside from the porters talking to each other and egging their mules on, there was not a sound.

It was almost dark when we arrived at our campsite, quietly nestled in the bow of a river, near to the head of the valley. We were now at an elevation of 11,500 feet. Our tents, a mixture of modern brightly colored nylon, and older, tall canvas house-like structures, were already erected on the small palette of flat grassy land. Some of the porters had travelled ahead of the main group and were busy fixing our evening meal. After dismounting and attempting to straighten the “old” legs, we selected our tents and unpacked sleeping bags and the like. For dinner we all assembled in one tent to eat. The chicken curry with canned sausages (which we had brought with us) was different, but good. Despite the fact that upon arrival in camp, I had witnessed our porters enthusiastically tenderizing the meat by hitting it with a hammer against a large boulder, my appetite was not at all diminished.

After replenishing ourselves we retired to our canvas houses almost immediately. It was surprisingly warm and cozy.
inside the tents, with a candle at one end providing a relaxing subdued light. Of course, being placed at the door end it meant that we had to climb around the naked flame when getting in - hopefully avoiding knocking it over and setting the entire place on fire!

The night was cloudless with an almost full moon. The surrounding mountains were clearly visible, the lunar light casting a blue tinge on the snow and ice high above us. Except for the sound of rippling water there was silence. This valley was surely one of the last vestiges of peace and serenity left on planet earth, so far untouched by man's destructive tendencies.

Thursday August 3rd. Arrive Nangimali Village via Shounter Pass
It was just turning light when at 5:30 am our AKMIDC officer popped his head through the flap of our tent in a vain attempt to arouse the occupants. We had not slept too well, having first been too hot in my cocoon-like sleeping bag and then too cold as I awoke to find the tent acting as a wind tunnel. In the darkness I had struggled to stop a side panel from furiously flapping in the wind, using a rucksack to secure it to the floor. After that I never quite got fully comfortable again. Sleeping on the ground had also stiffened my entire body, so the first act of the day was to stretch by walking twenty yards or so across a patch of soggy grass, littered with boulders of varying sizes, to a fast but smooth flowing river meandering its way down the valley. Fed by melt water, it was a peculiar milky blue of an almost fluorescent magnitude giving the impression that it was of some depth. The sun's rays were still a long way from penetrating the depths of the valley, leaving the air still and cool. A feeling of tranquility surrounded us. However, high above, the surrounding snowy summits were already bathed in the new day's sunlight. The only sounds came from the ever present continuous rumble of running water and the dull hum of conversation from the porters.

The team was slow to rise but our porters were already huddled around a smoky fire brewing tea and preparing breakfast for us — yes, you guessed it, "chapatis" again. We ate standing up and then packed our rucksacks ready for loading onto the mules. While the porters stuffed our bags into sacks, the team left on foot. It had been decided that we acclimatize and take a more direct route to begin with, meeting up with the mules and porters higher up the mountain. Armed with only the bare essentials we set out at around 7 am. We had begun our ascent of Shounter Pass.

In single file we zigzagged "conga" style up a steep grassy slope. The effort of climbing at nearly 12,000 feet had an immediate effect and we all huffed and puffed with every step (so much for the many hours spent on the "stairmaster" over the previous months!). The going was made a little more strenuous by the fact that there was no path. The route was, to say the least, arbitrary, causing our steps to be irregular; some short, some long - the only consistent factor being the relentless uphill grade. Every now and again we stopped to rest and admire the view, which became more and more spectacular as we got higher. Looking back, our camp, now in the process of being dismantled, resembled a mere dot in a monumentally huge landscape. Deep ice-filled gullies scarred the mountains on the opposite side of the valley. Massive ice walls hung over vertical cliff faces high on their sides, the leading edges just waiting to be pushed over and crash into the valley below.

Once we rendezvoused with the mule team we were able to ride, a welcome relief. Although we had only climbed some four or five hundred feet on foot, it seemed much further. At first, the going was smooth, but as we climbed higher the terrain became more rugged and patches of snow began to appear on the rocky ground. When the trail became too steep we would dismount and walk until it evened out again. Slowly but surely we climbed to the top of the pass, traversing several snow and ice fields along the way. Although the mules kept a sure footing in the snow some members of the team crossed the fields on foot, laboriously kicking toes into the hard icy snow so as to prevent a slip and a possible fatal fall. A short rest stop was needed every 20 or 30 steps.

At just before 11 am we reached the top of the pass, a small shallow U-shaped depression between two spires of jagged rock. At 15,000 feet this was the highest point on our journey and, more importantly, our entry point into the territory of Azad Kashmir. At this altitude the air was cool and wispy translucent clouds swirled around us. We took the opportunity to rest and enjoy the magnificent scenery which enveloped every angle of view, almost overwhelming the perceptual senses. Looking back, we were able to see the valley along which we had traveled to get to our first camp and beyond that, magnificent snow-capped mountains stretched as far as the eye could see. On the other side of the pass, Azad Kashmir presented itself to us. Again, snow-capped mountains dominated the higher elevations but far below, the snow and rock gave way to lush green slopes and deep valleys.

At 11:10 am we officially crossed into Azad Kashmir. Each of us in turn welcomed to this historic land by our AKMIDC officer, a native of the territory. Our entry via this route was the first by a foreign team and, significantly, the first by foreign women. As we peered over the sharp edge of the pass an expanse of white ice lay immediately in front of us — a magnificent glacier stretching down the mountainside. Aside from the numerous boulders strewn across its surface, the only discernible feature in this otherwise featureless and eternally frozen landscape was the narrow sharp groove which ran down its center, and the waves of ice ridges radiating outward from it. Their undulations becoming larger and more intense on the higher sections of the glacier, which clawed its way up the mountainside far to our right. Some members of the team tried their hand at sliding down the first one hundred feet or so of the glacier, others took the longer route, slowly walking down, following a narrow path of trodden snow. As we descended the cloud cover thickened behind us, partly obscuring the top of the pass. A strange silence ensued, it was as if the rest of the world had suddenly been shut out and we were alone.

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On a rocky outcrop near the lower edge of the glacier we stopped for lunch and basked in the warm sun. A small stream of melt water allowed us to replenish our water bottles and much effort was expended in pumping it through the purifier. Soon, the mules and porters who had stayed at the top of the pass to have lunch caught up with us and we were able to ride again. Slowly, the last remnants of snow faded away and the ground adjusted to an even slope. Short coarse grass sprouted from around the rocks and soon it carpeted the entire slope. The trail wound its way endlessly down, for most of the way we were able to ride but on the steeper sections we dismounted and walked. In one small valley we had to cross a rapid flowing mountain stream via a narrow bridge. Secured on top of a small rocky pedestal on each side of the stream, a narrow foot-wide bridge crossed the “boiling” waters. Its construction was from two flimsy tree branches with rocks and sod packed between. The lack of any hand rail and its tendency to bounce with each step made the crossing by each of us an adrenaline packed experience. Once committed there was no room for error, or hesitation, or indeed, turning back. Further down the valley we passed a spectacular waterfall, its frothy white water roaring furiously as it tumbled down at a monumentally steep angle. The remnants of ice bridges hollowed from the inside out, stretched across its channel, stark evidence of the severity of winters in this lonely valley.

Slowly we made our way down. Near to the valley floor, at a point where the trail opened out, we were met by several officers of the AKMIDC who had taken the trouble of walking from the mining camp. They welcomed us with hot tea, boiled potatoes and hard boiled eggs. Perching our tired bones on suitably flat rocks, we enjoyed both the food and scenery. From our picnic site we could see almost along the entire length of the valley, its narrow arm stretching far into the distance towards the Neelum Valley and, ultimately, the “line of control”, where Pakistan and India battled for supremacy. Our destination, the village of Nangimali, was still several miles away and hidden from view. The valley, although remote, was not without human inhabitants. To our right, a small gypsy camp could be seen, their tents erected besides a mountain stream. These travelers roamed the highlands during the summer months, retreating to lower ground as winter approached. To our left, several small permanent settlements eked out a solitary existence, each group of homes surrounded by small terraces of crops. In a valley which received several meters of snow during the long winter, it was unimaginable how these people survived the cold and isolation, virtually cut off from the rest of the world. At the lower elevations forested areas clung to the steep slopes, but higher up, the green turned to grey and white as walls of rock rose viciously steep to over 17,000 feet. Snow-filled gullies replaced vegetation and great spires of rock pushed their jagged tips through the tops of the cloud. To our right, the valley walls were less imposing, their character less rugged and rising several thousand feet lower than their counterparts. Strangely, it was devoid of the trees and tall vegetation which seemed to thrive on the other side.
Soon we were off again, most of us walking, the mules trotting on in front, glad I’m sure to have us off their backs. A narrow, well-worn path wound its way down the last steep few hundred feet to the valley floor. Shortly after setting off, the clouds which had gradually thickened all day began to dispose of their moisture in the form of a light drizzle. Typically, several of us had left our waterproofs in our packs, which of course, were on the mules some distance ahead of us. Fortunately, luck was on our side, a full-scale downpour holding off.

Upon reaching the valley floor we mounted the mules and followed the trail which led along the edge of the river. Its waters were swollen and it rushed past us at considerable speed. But flat ground did not necessarily mean an easy trek and our path took us across several gushing streams pouring down the mountainside. Some were not so “stream-like”, their mouths widening in anticipation of joining the main river. At one point my guide casually handed me the reins, slapped the mule on the back and sent us both through one such “stream”, which turned out to be several feet deep. Fortunately, the mule, the calmer of the two of us, seemed to know the best place to cross. I just sat there, feet out of the stirrups, knees hoisted high to avoid getting wet and hoped that he did not lose his footing as he felt for every step in the fast flowing turbid waters.

Soon it was time to walk once more. Crossing to the opposite side of the river on a rickety footbridge, again deficient in handrails, the team marched on. Within a very short time, differences in pace caused the group to spread out along the trail, which to the dismay of most, seemed to either go up hill or down hill, but never on the flat. It was like a roller coaster ride - but on foot! On several occasions great rivers of ice originating from far above flowed across our path necessitating a careful traverse over their slippery mud-infested surface.

The last mile or so was exhausting and it was late afternoon when we caught our first glimpse of Nangimali Village. Nestled at a slight bend in the valley at an elevation of 9,700 feet, the village consisted of fifteen or so dwellings scattered about a lush green terrace. From a distance it was hard to distinguish the brown earth-colored structures from their surroundings, only their box-like shape giving their man-made origins away. Nearer, it became apparent that the village was, in fact, a permanent settlement built for occupancy all year round. Most of the flat roofed abodes, held together by stone and mud walls with wooden rafters interposed between, seemed to defy the laws of gravity by sloping in every direction, precariously so at times. Each was surrounded by a small walled enclosure of cultivated crops. The inhabitants of the village, however, were wary of our arrival, preferring to stand in the shadows of doorways and porches, content to observe rather than interact. Foreign nationals were not uncommonly seen in this remote region. In addition to the native abodes the mining company had built two stone huts which stood in much contrast to the local dwellings due, not least, to their stark corrugated silver-colored metal roofs which stood out a mile in the otherwise brown and green landscape. This was indeed a remote place with few amenities, but to our weary team it meant hot food and a place to rest. We had arrived!

As the team staggered into camp we were served hot tea followed not long after by dinner - rice, mutton and lentils. Afterwards there was not much time to socialize, not that any of us really wanted to anyway, since the generator which fed power to the few light bulbs in camp had to be turned off in order to conserve fuel. So on full stomachs we hurried to prepare ourselves for the night. Two team members, including myself, employed the valuable time packing our ankles with ice to help reduce the swelling from “accidents” during the day in the hope that the pain and stiffness would be gone by the morning. (One team member had fallen oil rocks and I had been thrown off my mule!). At 10:30 pm the generator was turned off, the light bulb dimmed and then complete darkness. The only sound came from the rain hitting the metal roof and from a solitary drip originating from a leak in the ceiling splashing incessantly into the mud “carpet” between two cots. I hoped that no other leaks matured during the night, particularly over me, but I was asleep before I could worry seriously about the consequences and to be honest, so exhausted that I probably would not have cared anyway. Once in my sleeping bag nothing would have persuaded me to move!

**Friday August 4th. Nangimali Village to Nangimali Top Ruby Mine.**

The weather had definitely turned for the worse during the night. By the time morning arrived the blue sky we had enjoyed over the past several days had disappeared behind bleak heavy-looking grey clouds which hung ominously low in the valley. The air was thick with moisture and there was a definite chill to the new day.

Breakfast was the same as the day before, and the day before that, so it was dispensed with quickly and without fuss. As the mules were readied, the team set off on foot. Almost immediately, we crossed over a wooden footbridge and proceeded along the side of the valley at an unusually comfortable rate of ascent. The path was wide and even allowing us to chit-chat as we walked. Of course, the easy part could not last and after about a half hour, we cut off the main trail and began to climb steeply. Fortunately, the mules and porters had caught up with us so we were spared from making the arduous climb on foot. The mules were not so lucky and they were soon breathing deeply as they strained to carry us up the grassy slope, which had become wet and slippery with the previous nights rain. Our porters, on the other hand, simply marched on, unaware of the steep ascent. After two hours we reached the higher mining camp — one stone hut with the customary corrugated metal roof, anchored seemingly indiscriminately to the side of the mountain at an altitude of 11,000 feet. Even on this most isolated slope an air of civility was exercised and upon arrival we were served hot tea and cookies. However, there was no time to socialize and enjoy the early “afternoon tea”. We still had a long climb ahead of us. Once again we set off, this time for Nangimali Top, site of the world’s highest ruby deposit and until recently the highest operational ruby mine. (That title is now held by its sister mine, Lower Khora.)

From this point on we would be traveling light, our packs staying at camp, for this one-hut mountainside retreat was
Once again it was clear that no task, however straightforward, is easy in this part of the world! Ties commandeered from sleeping
men and women were used as headbands, keeping the occupant dry! As the rain fell with increasing severity, the trail became especially slippery. Between the wet grass and muddy paths the team soon spread out along the mountainside. Trapped inside bulky waterproof shells, unable to easily hear one another above the continual sound of stiff fabric rubbing against stiff fabric as one foot was put in front of another and, with limited side vision because of our hoods, the walk back was not simply a long one, but also, a lonely one as well. At 5 pm, in pouring rain, an exhausted, wet and bedraggled team began to arrive at camp, most of them turning their heads away from us.

We approached the summit first by mule and then on foot, crossing an extensive and rather steep snow field before reaching the base of the rock face. From this point we began our final ascent. Following a not-so-well-defined trail we scrambled up in single file. It was an exhausting exercise, we were nearing 14,000 feet and ascending at an angle of around 45°. In addition, much energy was expended just concentrating on planting each foot securely so as to avoid slipping. It was a long way down and a slip would be a positively painful affair.

At around 2 pm we reached our destination, Nangimali Top. The air was still and silent and we were completely enveloped in thick cloud which cast a cold damp chill around us. Once at the top, it became evident that the summit was in fact a long ridge. On one side, a vertical cliff face dropped away several thousand feet, the jagged walls disappearing into the clouds below. Some cataclysmic event had obviously taken place in which, quite literally, the whole side of the mountain had been sheered off. The other side, the side on which we had made our approach, consisted of a long steep slope running the length of the mountain.

The mine itself - two benches ninety meters apart, located at an altitude of 14,000 feet, lay silent, all production now being concentrated at its sister mine lower down. Indeed, with the exception of the mine itself, there were no signs that the summit had ever been the target of an extensive gem hunt. We were able to view bench number one - a cut some forty or fifty feet in length beginning at the cliff face and running at ninety degrees to the ridge, becoming shallower as it progressed away from the edge. On the main wall the grey calcite bands containing the rubies were clearly visible, sloping downwards in long uneven lines. Both the thickness of the bands and the distances between them varied considerably. It was not difficult to understand why it had taken several years following the first find of a ruby-bearing boulder in a Himalayan mountain with umbrellas held high. In retrospect, it is hard to say which method was more effective at finding the rubies in situ and execute a mining operation in this remote and physically demanding environment.

After a brief survey of the cut we gathered at the “tea room” for lunch. Located some fifty feet or so from the cut and perched right on the edge of the cliff, this small ledge was surely one of the most unusual dining rooms. In almost complete oblivion to the sheer drop on two sides, we all eagerly crowded on to it so as to enjoy some much needed food.

It was unfortunate that the weather did not afford us a view, but this did little to detract from the exhilaration at having reached our goal. After a nourishing lunch of lentils and chapatis we returned to the cut, first for a brief but informative lecture by AKMIDC staff and then to prospect for rubies in the rubble. Several small fragments of pink ruby in matrix were recovered along with specimens of pyrite, an accessory mineral in the calcite. All material was handed over to AKMIDC security staff for inspection back in Muzaffarabad (we did not see our “treasures” again until Islamabad). Due to the deteriorating weather conditions our visit to this remote location was brief, possibly an hour and half at maximum. This was not a place to get stranded.

Before beginning the long trek back to camp, the male team members were searched; female members were, however, spared this intrusion. We then proceeded back the way we came. By now some team members considered themselves sufficiently experienced to almost run down the snowfields, sliding as they went. Even those of us who preferred a not-so-daredevil approach went down at a very respectable pace. By the time we had reached greener slopes, the rain had begun to fall necessitating full waterproofs. But while the team bundled up in expensive mountain wear, the Kashmiri natives simply put up their umbrellas! It was an amusing sight to see them strolling down the side of a Himalayan mountain with umbrellas held high. In retrospect, it is hard to say which method was more effective at keeping the occupant dry! As the rain fell with increasing severity, the trail became especially slippery. Between the wet grass and muddy paths the team soon spread out along the mountainside. Trapped inside bulky waterproof shells, unable to easily hear one another above the continual sound of stiff fabric rubbing against stiff fabric as one foot was put in front of another and, with limited side vision because of our hoods, the walk back was not simply a long one, but also, a lonely one as well. At 5 pm, in pouring rain, an exhausted, wet and bedraggled team began to arrive at camp, most sloshing around in their boots.

The small mine hut could not accommodate such a large number of people, so instead, four tall grey canvas tents had been erected on a flat mud terrace next door, exclusively for our use. Inside each, cots had been arranged, each leg resting precariously on a flattish rock in order to stop the whole assembly from sinking into the rain soaked muddy floor, which became ever more fluid as the rain continued. A small generator supplied a limited amount of power, lighting a single light bulb in each tent and several others in and about the camp. Again, as was the case at the lower camp, the use of the generator was restricted to the shortest time possible.

The first order of business after arrival was to change into dry clothes before becoming too cold, since it would be difficult to get warm again. This all had to be done without letting feet or dry clothes touch the floor - demonstrating once again that no task, however straightforward, is easy in this part of the world! Ties commandeered from sleeping
While we were there they blasted, first on the rock face and then inside the adit in an attempt to extend a small drift.

At 7 am other team members had begun to poke their heads through the tent flaps and soon we were all assembled for breakfast. Immediately after, we began our journey to the Lower Khora ruby mine. The mules had been given the day off so our approach would be all on foot. Located 1,500 feet above the camp, the climb was at first very steep, causing our legs to ache soon after starting out. Eventually, the trail evened out and our route traversed the side of the mountain, slowly ascending as it went. The even ground made the walk an easier task than on the previous day. In single file we made our way towards the mine. In a now familiar fashion the clouds rolled in during the late morning and early afternoon obscuring both our destination and the valley and mountains beyond. It was cool and damp.

We reached Lower Khora (12,500 ft) around 2 pm. Situated only a mile south east of Nangimali Top but several thousand feet lower, the deposit represents the eastern end of the ruby mineralization tract (Nangimali -the western end). Unlike the higher deposit, at Lower Khora several ruby-bearing zones have been identified.

Located on a sheet of barren rock, access to the mine was gained only by traversing along a narrow trail, just three or four feet wide, cut right into the side of the sloping rock wall, which stretched several thousand feet down into the valley below. Before entering mine property we deposited our packs and put on hard hats. We then proceeded through a wrought iron “garden gate” wedged between the rock face and a stone pillar erected on the edge of the trail next to the drop (obviously to detract uninvited visitors from going around the side). The trail continued in a similar manner on the other side, becoming at one point, quite steep and rough, necessitating the use of hands to help with the traverse.

An excavated hollow in an otherwise flat sheet of sloping rock, the mine appeared to be in full production. We had become accustomed to having the mountains to ourselves so it was a surprise to suddenly come across thirty or so miners, dressed in their mine uniforms of blue sweaters and grey trousers, all busily searching for rubies. The only power supplied was by a single generator which had, we were told, been brought up from Nangimali Village by hand— in one day (one had to wonder how it got to the village in the first place!). Thinking of the effort it had taken us to get to this point, it must have been an unbelievable demonstration of muscle and willpower to heave the heavy contraption up the slope. All around us miners swung picks and hammers of varying sizes in an attempt to smash the hard rock into smaller manageable chunks. One fist sized, the prospective ruby bearing rocks were given to three miners squatting on a small rock ledge, who laboriously smashed them into ever smaller pieces, picking out every crystal or sliver of pink and depositing it through a slit in a small wooden box, secured by a flimsy padlock. The debris was then simply thrown over the side of the cliff.

While we were there they blasted, first on the rock face and then inside the adit in an attempt to extend a small drift. It is customary at most blasting sites that everyone be moved a considerable distance away, but not here! In the case of the latter we remained only fifty feet or so from the adit. As the blasts were set off we heard a dull thud accompanied by an equally dull shockwave passing through the thick rock and up through the soles of our feet. On blasting the rock face...
the sensation was more intense. We all retreated inside the adit and waited. Several blasts were set off, again sending shockwaves through the solid rock. Standing within the body of the mountain, the vibrations were magnified, the thud of the blasts echoing around the worm-like hole.

We spent about an hour and a half at the site and were given the opportunity to pick around the loose rock in the hope of finding some Kashmir ruby ourselves. Most of the team were fortunate enough to find at least one specimen, although as with our visit to Nangimali Top, all samples had to be handed over to AKMIDC security officers. While we picked over the rubble enthusiastically, the miners continued to work, oblivious to our presence. It was an eerie scene as an endless sea of thick clouds swept up from below enveloping the site in mist. For brief moments the air would clear and we would be able to see for some distance, but a second later another wave of cold damp cloud would roll in, obscuring all detail.

After passing back through the security gate we stopped for lunch before proceeding down to our destination, Nangimali Village. It was slow going, the constant pounding up and down mountainsides over the previous days was beginning to take its toll on the body. In particular, the knees took an excessive amount of punishment, especially when descending the steep slopes. One team member had to be carried partway, piggy back style, due to sore knees. Other team members experienced similar problems which impeded their progress downhill. As had happened the previous day, the rain soon arrived in the form of a rather nasty constant downpour and with it comfort levels took an immediate plunge. Stuffed inside waterproofs, it quickly became hot, uncomfortable and very damp. In addition, the nearly constant trudging down steep slippery trails in wet boots was the ideal breeding ground for blisters on ankles and toes, which once formed, made each step excruciatingly painful.
Around 6 pm we staggered back into Nangimali village, soaked and tired. Our packs had been brought down from the higher camp by our porters during the day so immediately upon arrival we changed into dry clothes and tried to get warm. Unfortunately, during the late afternoon the temperature had dropped, so this was no easy task. That evening a barbecue had been arranged for us. No, not hamburgers but mutton on skewers! It was difficult not to appear ungrateful but mutton had definitely lost its appeal, especially when it meant sitting outside, struggling to get as close to the open fire as possible in order to get some relief from the cold night air. But just when all seemed lost a miraculous event occurred. One team member, our Italian contingent, had carefully packed pasta and olive oil and soon we were each served a bowlful. Utter pleasure abounded, a bowl of pasta had never looked or tasted so good and probably never will.

At 10 pm the generator was turned off and darkness prevailed. It was a relief to snuggle down into a sleeping bag, if only to warm up.

Five days after beginning our expedition we had completed our objective, namely, a visit to the ruby mines of Azad Kashmir. But the adventure was far from over, and in the following days, our return journey would be made at no less an arduous pace as our trek in.

Sunday August 6th. Collecting Around Nangimali

Of the remaining days only Sunday could truly be said to have “not” tested us physically. Following a late wakeup call and an equally late breakfast, consumed in a more relaxed fashion than on previous days, most team members set out from Nangimali Village with a renewed enthusiasm for the day ahead and, no doubt, with great expectations as to what they would find. This was to be our first real opportunity to rockhound and somewhere out there that huge, red, transparent ruby crystal was just waiting to be found!

Our first stop of the day, located about a mile upriver from the village was a small boulder infested mountain stream. Such streams are notoriously rich in finds, their channels acting as natural funnels for material from above. Indeed, it was in one such stream that the first evidence that somewhere in the surrounding mountains lurked a ruby deposit had been recovered.

In addition to looking for ruby, of which we found none, we also tried our hand at gold panning. Admittedly, some of the pans employed were a little on the small side - they were metallic plates from the kitchen! Again, we came up empty-handed, with only a mass of garnet fragments left at the bottom of the pans. Despite our lack of success the morning was pleasant, the sun at last appearing from behind the clouds. Who needed gold or rubies when you could sit on a rock in the middle of a gushing Himalayan stream and absorb the sun’s warm rays?

After about two hours we made our way back to camp for a quick lunch before setting off in the opposite direction. A twenty minute walk brought us to another mountain stream, again packed with boulders from above. Soon team members were spread out along its course, all eyes firmly focused on the ground in search of the grey calcite containing the rubies. The mines were high on the mountain directly above, so any loose rock or mine debris had a good chance of being caught in the stream channel and subsequently washed down. Within a very short time several small rounded boulders containing pink blotches were found. The finds served to heighten the hunters’ enthusiasm, even with the usual late afternoon shower turning into a full-scale downpour. In fact, no one seemed to mind that we were getting wet once more. As the weather worsened we abandoned our claims and headed back to camp. Aside from the fact that it was raining, the walk back along a wide and relatively flat trail was comfortable. I was afforded the company of two porters who insisted on continuing a conversation with me even though we did not speak a word of each other’s language!

By 6 pm we were all back at camp trying to figure out, yet again, what dry clothes to put on and, how best to dry our wet ones. After dinner there was no time to waste, an early start the next morning necessitated packing everything but sleeping bags.

Monday August 7th. Return over Shounter Pass to Astore

Monday began at the very early time of 4:15 am. It was still dark, both inside the hut, the generator not having been turned on, and outside, where the sun was still a long way from penetrating the valley floor. Thick grey clouds covered the entire valley and the rain continued to fall. Our early start was necessitated by the fact that we had to cross the pass and get to the town of Astore in the same day. In short, we were attempting to travel a distance that had taken us two days on our inward trip, in one day. There was no room for error, with no tents or extra food, any delay might mean a night spent in the open - and a cold and hungry one at that. Our first goal of the day was to cross the pass before midday.

The planned arrival of the porters and mules at 4:30 am came and went. It was after five when they finally strolled into camp. However, their lateness did give us time for breakfast even if it was limited since the mining camp had run short of food supplies. Eventually, under low cloud but with the rain having let up we left Nangimali Village at 6:30 am. As on previous mornings the team set off on foot while the mules were loaded with our packs. We traveled back along the same path we had taken to come in - not that there was any choice, since it appeared to be the only path along the valley floor. Two miles or so up the valley the mules and porters caught up with us and without hesitation we jumped onto the poor animals. By the time we reached the beginning of the climb over Shounter Pass the clouds had cleared from the lower elevations of the valley revealing the lush green lower slopes. But there was little time to enjoy the scenery as we pressed towards the top. Once on the ascent, our path differed from the original route we had taken,
enabling us to ride most of the way. Soon, the grass slopes gave way to steeper more rugged terrain, with large and small boulders littering our path. We were now on a scree field and our path a somewhat arbitrary one, as we slowly picked our way across the steep slope. As agile and experienced as the mules were, however, one could not help but worry as they carefully placed each foot on the rocky ground. The idea of bare hoof on slippery smooth rock was not the most comforting of thoughts (rubber-soled hoofs would definitely have given a boost of confidence) but the rule of thumb was that if one foot slipped, there were three others to steady the animal. To give credit to the sturdy animals, they slipped only rarely.

Eventually, on reaching the glacier it was time to walk. For most, a thoroughly exhausting climb up a steep slippery slope, made more so by the constant need to kick the toes into the snow in order to gain a secure footing. In single file, team members, porters and mules fought their way to the top, all breathing heavily as they went. At 12:45 pm, a little behind schedule and with a light icy snow falling, we reached the top and said farewell to Azad Kashmir. Although it was with a little sadness that we were leaving this peaceful land, it was a relief to reach the top. The highest hurdle had been conquered. There was little to see with a heavy sheet of cloud firmly entrenched at that height. Indeed, the top of the pass itself had only become visible when making the final push.

Once at the top there was no time to rest. Almost as soon as the last mule, heavily laden with packs, struggled over the sharp ledge, we were off. Aside from a couple of team members who rode because of bad knees, we walked, trailing across steep scree slopes, snowfields and finally grassy slopes. Like rest stops, lunch was a short affair, made even shorter by a cloud burst of rain and hail accompanied by several lightning flashes and thunder claps which quickly persuaded us to move on rapidly, even if we had not quite finished eating. It was to continue to rain for the next few hours making the trek even more uncomfortable.

In a rather disorganized fashion we pushed on and soon the whole entourage was scattered over a considerable distance. Different groups taking different routes down. At times we became dangerously separated. (In these mountains it is not simply good enough to think you know where someone is, rather, it is imperative to positively know). The trails were wet and slippery, with very little up from the laborious and sometimes agonizing task of walking downhill, which placed constant strain on the knees. As we neared the site of our first camp the slope became even steeper and the trail less well defined. Several team members, including myself, fell behind. Left to follow porters who appeared to take the most direct route, rather than the easiest, we found ourselves going almost straight down instead of crisscrossing the mountainside in a safer, less physically demanding descent.

At around 4 pm we finally reached flat ground, the site of our first camp some five days earlier. All evidence of our earlier visit had disappeared. It was as if we had never even passed this way. By now there was a twenty minute or so gap between the front group and the stragglers. Too much of a gap! From this point we could ride, not that sitting on a horse, cold and wet, was much better than walking. In fact, it was probably worse, the lack of physical movement causing body temperatures to drop and joints to stiffen more rapidly.

Our route would take us back down the valley the way we had come, but the inclement weather made the journey a tiresome and seemingly endless one. The two hour ride felt like an eternity, especially towards the end. Stuffed in waterproofs, we just had to sit there and “ride” it out.

Finally, at 6 pm we spotted the jeeps waiting for us, the rain in an almost predetermined fashion stopping as we arrived. It was a welcome sight, not simply because it meant we could get off the mules - who I'm sure wanted us off their backs as much as we wanted to get off, but also because it meant we now had a good chance of reaching Astore that night. There was almost no conversation between exhausted team members. To do so would have required energy and there was not much of that left. Our porters, however, happily chatted amongst themselves as they strolled along in the pouring rain, seemingly unaware that they were soaked through.

While the mules were relieved of their loads, our packs were thrown into the back of a jeep, we hurried around an open fire that our porters had built, in an attempt to warm our cold bodies. A rather futile task under the circumstances. Regardless of smoke we got as close as possible to the roaring flames, but unfortunately, with hardly enough time to allow the heat to penetrate through our wet clothing it was time to move on again. After saying goodbye to the porters, without whose help and mules we would not have reached the mines, we piled into the jeeps, some team members standing in the “pen” on the back and some sitting up front. For those of us fortunate enough to secure a place inside the vehicle there was little consolation except for the fact that you could sit. Since there was a absence of window panels, it was no warmer inside the vehicle than outside.

 Darkness fell and the sky cleared as we made our way towards Astore. In a vibrant moonlight which served to suppress nature's colors, the hillsides were clearly visible, sharp black shadows stretching across the slopes detailing their rocky surface with considerable clarity. The river too became highly detailed, its waters glistening as the lunar light reflected off the white water caps. The journey would have been a more poignant one had we all not been so tired (and because of the monotonous tone of Pakistani music playing at an uncomfortably high volume in our jeep). Even so, gazing upon this monochrome wilderness, enveloped in shades of black and grey, a sense of peace overrode many of the discomforts of the long ride.

As we continued, the air warmed, the lower elevation making a noticeable difference in temperature. The road, smoother now, allowing for a more comfortable ride, ran near to the river, its constant roar obscuring all other sound (except for the music, of course!). The roadside vegetation became more lush, tall trees reaching the very edge of the
Numerous motels, their rooms now converted into small stores backed away from the roadside creating mini shopping.

Within about three hours we reached the suspension bridge over the Astore River. It was still undergoing repairs so this was as far as the jeeps could go. In a manner almost routine to us by now, packs were unloaded and, in a last wave of physical exertion for the day, we hauled everything and everybody across the bridge on foot. On the other side, the packs were once more hoisted onto the roofs of two 4 wheel drive vehicles, which had been waiting patiently in the darkness for our arrival. The moment we were all aboard we set off for the short (relatively speaking) drive to Astore.

It was after 9 pm when a tired and hungry team arrived at the government rest-house in Astore. Immediately after depositing the packs we were off to frequent our favorite restaurant in town Major Aziz’ “Dream Land Tourist Inn”. Our host did not appear to be in any way put out by our late night sitting and eagerly started cooking dinner upon our arrival. Regardless of the fact that the menu was much the same as we had eaten for the past week, we devoured everything that was put in front of us.

At 11:30 pm we returned to the rest house. There was not the time, nor the inclination, to stargaze. The only goal was to get into sleeping bags. It had been a long and exhausting day, one which had pushed most team members near to their physical limits of endurance.

**Tuesday August 8th. Return to Gilgit.**

After spending the night in an almost comatose state, allowing the body to recover somewhat from the exertion of the day before, we were allowed to sleep relatively late, well, until 7:15 am anyway. Although the morning was warm, clouds covered the sky and a fresh coating of snow could be seen on the higher ground (above 13,000 ft). It was a relief that we had crossed the pass the day before. After breakfast—no need to say where—we packed our belongings, a task performed at a more leisurely pace than ever before and loaded them onto two 4 wheel drive vehicles, just before 10 am we set course for Gilgit, leaving behind Astore - and its inhabitants, busily going about their daily business.

The journey back to Gilgit appeared much shorter than it had been coming. Perhaps this illusion originated from the more comfortable ride, the 4 wheel drive vehicles having air conditioning and full suspension. There was also no need to stop for water along the way. The scenery was as magnificent and inspiring as it had been the first time and although we had to travel the same route back, there was little time to get bored. There were few travelers on the dusty road. Indeed, it was probably busier a hundred years ago when the British were entrenched at Gilgit. We encountered just one lone jeep ferrying a couple of Westerners into the wilderness. Clean-shaven and neatly attired, you could see their amusement as they viewed our weather-beaten faces and clothes that could stand up by themselves. But ultimately the last laugh would be ours, confident that they too would return from their adventure in much the same state as we from ours. All entering this remote land eventually emerge as victims of the environment. The mountains do not discriminate!

By 2 pm the flat expanse of the Gilgit Valley came into sight, its lush, green carpet as much as its flatness standing out clearly against the barren surrounding mountains. Soon we crossed the long suspension bridge traversing the Indus and made our exit from the mountains, leaving behind a remote and peaceful world.

By mid-afternoon we entered Gilgit, our accommodation once more, Mir’s Lodge. It was the first time in the entire trip that we had completed our travels for the day while it was still light. So directly after lunch it was time to “shop”. While some team members headed off to meet with a local mineral dealer, others made the short walk to the main thoroughfare.

The wide unpaved street was full of activity, but as in other towns it was a men-only affair; women were not to be seen. Open-fronted stores lined either side of the street selling everything imaginable from old mountaineering equipment left behind by the numerous expeditions which had passed through on their way to the high peaks, to racks of famous Western brand perfumes. Sunglasses also seemed to be a popular item for sale, not that I can ever recall seeing anyone besides Westerners actually wearing them! In some stores large bright yellow cans of cooking oil, one on top of another, lined the inside. Still others displayed racks of raw meat. Suspended from hooks in the open air, they attracted the attention of every fly in the vicinity - and probably beyond. Adding to the aroma of the place, rows of vibrantly colored sacks of spices littered the roadside, their owners squatting patiently beside them in the hope of a sale.

However, it was the silk stores that caught the attention of most visitors - and we appeared to be the only Western visitors that day. Store after store, packed to capacity with rolls of silk and other cloths, notably, woolen Kashmiri shawls, enticed the prospective buyer. It was not surprising to find such a concentration of fabric stores, after all, China was only a few hours drive north and Afghanistan was not a day’s journey west. Gilgit was indeed an international trading post and a fascinating one at that. Once inside the stores it was sometimes difficult to leave, the gracious but determined owners persistent on showing us all their wares, and if that did not keep us on the premises, they delayed our departure by wanting their photographs taken. But sale or no sale all were hospitable, sometimes to an acute degree, one storekeeper even buying us sodas for our trouble.

As we made our way along the street it became evident that Gilgit had at one time been a popular resort town. Numerous motels, their rooms now converted into small stores backed away from the roadside creating mini shopping...
malls, their smooth white walls now cracked and dirty. The heyday of tourism appeared to have passed and the structures which had been built to accommodate visitors had gone the way everything else does in this lonely region. It had simply reverted back to more practical usage: nothing goes to waste!

As we browsed, the sun slipped behind the mountains to the west and slowly, but surely, darkness prevailed. There were no street lamps so the only light came from the dim fixtures in the stores. As they began to close just after 7 pm, the hustle lessened, as did the traffic. A few stores remained open, notably the ones in which we showed interest. Much bartering on price was conducted, sometimes at length. It was an expected form of business but one which most Westerners are neither familiar with or truly capable of.

Although we had all arranged to meet back at the lodge at 9 pm for dinner, it was 9:30 before the team began to show up. One group had been to look at rugs, another popular product. A second group had been delayed by an extended session of price bartering over a suite of ruby crystals. Finally, at 10 pm the entire team sat down to dinner and by 11:30 pm we had all retired for the evening, content with our purchases and safe in the knowledge that we did not have to carry our additions up any mountains!

Yet another long day of travel lay ahead of us as we awoke at 7 am. Breakfast was a quick affair, as was packing since we were due to meet with a local mineral dealer before leaving Gilgit. Around 9 am most team members piled into a single 4-wheel drive vehicle, too many for comfort, and raced across town. On a quiet street we entered a walled courtyard of a private home to view a large assortment of mineral specimens laid out on newspaper and rags. In particular, large aquamarine and tourmaline crystals were offered. A selection of ruby crystals was also offered for sale, their origin being mainly Hunza, a valley to the north of Gilgit. Unfortunately, for both the dealer and the team, he had wrongly anticipated our budgets, his much inflated prices discouraging most buyers. With time being short there was little opportunity to negotiate and most of the team walked away empty-handed, but not disappointed. Once more we climbed into the vehicle and returned to the lodge.

With the baggage already loaded onto the roof of the waiting bus (smaller than our previous one) we all climbed aboard and immediately set off for Muzaffarabad. Our 10 am start was a little later than intended. It would take us the next thirteen hours to wind our way south to the regional capital of Azad Kashmir. The drive back along the Karakoram Highway gave us the opportunity, at least for the first part of the journey, to see the sights we had missed when traveling north in the dark of night.

In those thirteen hours we were only to stop a few times, and then only once for anything more than a brief photographic opportunity. Our first stop, only half an hour or so outside Gilgit, was to view a unique sight. A view that encompassed three of the world’s great mountain ranges; the Himalayas, the Hindu Kush and the Karakorams. On an otherwise unobtrusive stretch of road, a small white sign perched atop a rocky outcrop marked the vantage point. To the east, the Himalayas came into view. To the west, the Hindu Kush stretched down, and behind both, the blackness of the barren Karakorams stood out against the blue sky. In front of them all, the raging Indus continued its never-ending journey south. We all took turns having the compulsory “tourist” photograph taken against the superb backdrop, before jumping back into the bus to continue south. There was really too little time to fully enjoy the spectacular view and to comprehend the magnitude of what we were actually seeing.

From there we began what was to become an almost endless drive, following the muddy waters of the Indus once again. From a clear blue sky the sun relentlessly scorched the rock. Outside of the bus there was little shade, severe terrain and climate limiting vegetation to only the hardiest of the plant kingdom. Every now and again another deep valley would intersect with the Indus, emptying out its rivers and streams of clear blue melt water into the grimy swell. Like a giant ink spill the vividly colored waters would resist mixing with the brown Indus, at least for a short distance, forming long streaks of blue as they flowed downstream. But eventually the might of the Indus took control, slowly absorbing the clean mountain waters.

By mid-afternoon, with most passengers becoming restless in the cramped confines of the vehicle, we stopped for afternoon tea at a small but well manicured motel. On a terrace overlooking a bend in the Indus we enjoyed a refreshing cup of tea followed by several bottles of soda. We were now over six hours into our journey and nearing the point at which we would depart from the Indus Valley.

Within a very short time we finally said goodbye to this most mighty of rivers. It would continue to wind south, flowing down the middle of Pakistan, eventually spilling into the Arabian Sea at the populous coastal city of Karachi. Before long we reached the site of the landslide that had delayed us by several hours on the very first day of our expedition. Although the road was open it was still a narrow, muddy single track. The driver carefully maneuvered his charge across, wheels spinning in the deep mud. From the window the edge appeared menacingly close, especially to those of us on the “drop” side. At one point our close proximity to the edge became clearly evident when, even on peering out, it could not be seen. A suggestion from one passenger that we all lean in the opposite direction added some humor to the situation, but the reality of the danger was brought crashing home by the sight of two trucks laying on their sides in the river below. Stark evidence of the treacherous road conditions.

By nightfall, the rain had set in with a considerable amount of thunder and lightning accompanying it. As we neared Muzaffarabad the rain became more intense. However, the restricted visibility and slippery road surface did little to...
dampen the enthusiasm of our driver, who continued to drive at no less a speed than he had during the rest of the journey.

Once in the vicinity of Muzaffarabad we were again required to pass through a series of checkpoints, creating frustrating delays to an already very long journey. Having secured safe passage we entered Muzaffarabad. Built in a lush valley at the confluence of the Jhelum and Neelum (known as Kishangana before partition) Rivers, the lights of the town could be seen spreading up from the valley floor onto the mountainsides. Under heavy cloud cover, darkness obscured detail, however, from the multitude of lights it was clear that the town was of considerable size. Indeed, it seemed to take us forever to reach our base for the night, winding around the mountainside for almost the entire length of the town before finally descending into the town itself on a narrow stretch of road. It was 11:30 pm when we pulled in front of the Hotel Neelum View, a residence of some size, positioned at the junction of the two rivers, directly opposite the sixteenth century Red Fort built by Muzaffar Khan. After some confusion as to whether or not we were at the correct hotel, we finally checked in and collected our room keys. As had happened on many other nights during the trip, the hotel was gracious enough to provide us with a late dinner, delicious servings of chicken curry and, importantly, french fries! Once dinner was finished we all proceeded to our respective rooms for some much needed sleep.

Thursday August 10th - Friday August 11th. Conclusion
We were to spend Thursday in Muzaffarabad, affording us the opportunity to view daily life in the regional capital of Azad Kashmir. When Godfrey Thomas Vigne had visited the town during the early 1840’s he noted that it contained about one hundred fifty abodes surrounded by cultivated land. In 1995 it appeared to be a growing urban area occupying most of the long narrow valley. Concentrated mainly along the banks of the river but also spreading up the lush mountain slopes the town was a strange mixture of old and new, traditional and modern. New two- and three-story buildings and modern homes, equal in elegance to anything in the west could be seen standing alongside older, more traditional architecture.

After a visit to the offices of the Azad Kashmir Mineral and Industrial Development Corporation at which we were afforded all the information we required concerning both the ruby locations and other gemstone sites in the region, we were entertained at the home of our AKMIDC officer for lunch. Following a lovely luncheon we visited the home of a local official. Again, the hospitality was overwhelming, even if the custom of separating males and females into different rooms was somewhat alien to us. Later in the afternoon, two team members were yet again entertained by another AKMIDC officer.

During the evening we all gathered at the old Red Fort alongside the river, its crumbling walls standing as testimony to both its age and the many battles it witnessed. The event was a barbecue, attended by staff of the AKMIDC and local officials. Held on the roof of the fort, both the food and the company was enjoyable. In the cool night air, with the moon making an appearance from behind a light covering of cloud, it was the perfect setting on which to end an exciting and adventurous trip.

The following day before leaving for Islamabad we made our last stop in Muzaffarabad - a refugee camp on the outskirts of town. Its residents had been displaced by the military conflicts between Pakistan and India, most having crossed the disputed border leaving their possessions and in some cases loved ones behind. Living in mud- walled structures with canvas roofs, and with only the very basic of amenities at hand, their existence was stark testimony to the horrors of war - and a divided Kashmir.
Suggested Readings & References

A Photo Selection

Karen took a huge number of engaging photographs while on her journey. These are but three of my favorites. Editor

Just south of Gilgit. Three mountain ranges visible. The Karakorams in the center, the Hindu Kush on the left and the Himalayas at the right.

Small boys on the road from Gilgit to Astore.

Nearing the summit: Trekking across the snow on the way up to Nangimali Top Ruby Mine.
Section VI
The Best of ‘96:
Selections from the
Bulletin of the New York
Mineralogical Club
Colombian Gold Adventure
By Peter Nalle

Part I
Some years ago, I was approached by a syndicate of Midwest dentists who were investing in a gold operation in Colombia. They were concerned about the amount of money going in and the lack of any tangible results coming out. One of them visited the place and brought some samples back to be assayed. The results were zip so he asked the president of the assaying firm what he should do. “Get a hard-nosed miner to take a look-see,” was the answer so I got into the act.

I had worked in Colombia before and loved the place. The mine itself was not far (ten hours by jeep and then another eight by trail mule) from Medellin. (This was before the drug problems!). Medellin itself was lovely. Its 8000-foot altitude always keeps the temperature mild, like being in perpetual spring. In those days, the people were very friendly and the town was a mix of beautiful old colonial buildings, churches, modern offices and apartments tucked in the mountains.

The countryside surrounding Medellin was heavily forested and mountainous. Deep ravines and valleys with small rivers at the bottoms made the environs look like the West Virginian coal mining land but with a Latin American ambiance. There were no strip mines, super-highways or even railroads. Here and there would be a small farm cleared in the forest at a wide space at a river bottom or on a flat spot on a ridge.

I would have had to charge my full hourly rate if I had to travel by mule and jeep. To save time and thereby reduce my fee, it was decided to travel by helicopter. In those days nobody shot at helicopters as they do now.

Off we went, the two local men running the operation, another from the Colombian Bureau of mines, the pilot, and myself. As we flew over a green sea of tree-covered ridges and valleys, I tried to keep track of where we were. It was clear that the pilot had no idea and was just following along a compass point. Finally, he admitted to being lost or at least he could not find the mine. I pointed out a small farm with a tired one room house, a cattle pen and an out house. I suggested we swallow our pride and land in the pasture and ask someone. I knew we were not far from the mine but it could be hidden in a valley, just out of sight. Our pilot was very skeptical but the rest of us voted against him. So we landed.

As we set down, a thirteen year old, barefoot boy, in ragged jeans ran out of the house. Next came two girls in equally ragged dresses who were perhaps nine or ten years old. They were followed by an assortment of four kids, ages four to seven, dressed in shorts or flour sacks. Finally, a naked child crawled out of the house followed by a pregnant woman in gingham dress with a babe in her arms. Many dogs and cats arrived on the scene and a couple of goats and a tired old cow looked on.

We started discussions. The oldest boy took charge as, by default, he was the man of the house. He explained in a fractured Spanish-Indian dialect that he knew exactly where the mine was but he could not give directions and would have to show us. Clearly he was angling for a ride in the helicopter. We were not at all interested in taking him along and then having to return him to the farm; time, fuel and common sense were against it. After extended negotiations, he settled with fairly good grace to tell us the secret of the mine location in exchange for a sack of candy bars which we carried for such emergencies.

We waited as he went through a dramatic start for his disclosure. After all, he was the man of the house and had to maintain the standards and dignity that went with the job. We waited silently and finally the truth came out. He pointed theatrically behind the little house. The mine was in the valley just on the other side of the hill in back of their farm.

We took off in a crescendo of crying, shouting, barking and arm waving. Our pilot commented that, if we put the mine in production, there would never be a shortage of labor. Over the hill, down in the valley, were three primitive cabins and a small stamp mill driven by a wooden water wheel. All were nearly covered by jungles vines and plant growth. We had found the mine. What happened next is another chapter in this continuing saga.

Part II
I interrupted the saga of the Colombian Gold mine just after we had found it by helicopter in a deep, wooded valley after a young farm lad told us where it was. The camp consisted of three vine-covered log cabins, a shed and a small stamp mill run by an overshot water wheel. A small boulder-strewn river ran along the side of the camp and supplied water for the mill. Two men and their wives came out of the better and larger cabin to meet us. They insisted we join them for lunch. I demurred. “No, no we have been expecting you and our wives have made a little meal,” they responded, so we went in to lunch. There was a vast spread on the table. Frioles (beans) in many forms, barbecued mystery meat (probably cabrito, young goat), tortillas, bollos, salsa, melon and, of course, cerveza. I kept thinking about the mine, but there seemed to be a conspiracy to keep me eating until nightfall or at least until I could no longer walk. There would be no time to check things out.

Just as I was starting to get grumpy, who should come over the hill but the young farm boy who had told us where the mine was. After grabbing a full meal in thirty seconds, he said that, if the local folks were unwilling to show me the mine, he would. It became apparent that he and his young buddies had explored the workings in depth. He knew more about the diggings than the two men on the site or the gentlemen from Colombia. Young boys, worldwide, tend to
explore caves and mines. (I did!) Reluctantly, the two local men, accompanied by the geologist and the engineer from Medellin, set out with me and my young guide for the workings. The men from Medellin clearly had no working knowledge of the mine whatsoever. What they knew came from written reports. They had hired the two men on the site to start tidying things. They came from another area and had very little local knowledge. It all came down to the thirteen-year-old kid to show us around. The Medellin men added a few historical details such as former production of fabulously high-grade ore. I found out that their information came from an old report on the gold mines of Bolivia done by the Bolivian survey.

As we headed for the mine, we stopped to look at the mill. The mill was featured in a report to the syndicate as “a ready-to-go, hundred-ton-a-day gold mill.” I have seen better in mining museums in old mine ghost towns. The water wheel was falling apart. “Just a leetle fixing, Senor.” Termites were carrying the stamp mill away and half the metal parts were missing, recycled into some other Colombia venture, no doubt. Sometime ago, the dam had washed out. My mental notebook said scratch the mill and start over.

Onto the mine, with the boy skipping ahead. As we scrambled along the overgrown trail, I thought, “Oh well, if the mine is as good as they say, getting a new mill will be no problem.” I tend to be optimistic when it comes to mines. We entered a tumbled-down portal which was, as I was told, on the Veta Grande. We followed along in the tunnel looking at a rather nondescript quartz vein maybe half a meter wide. Here and there were little stringers of pyrite — “mineral superior.” I carefully cut a crude channel sample across the vein wherever I was told the grade was the best. The Medellin folks came into their own. The vein, they said, outcrops one kilometer on the other side of the hill and since everyone knows an orebody goes down three times as far as it is long, the ore went three kilometers into the ground. This I was told calculated out to be umpteen zillion tons of ore, even without considering the fact that the vein got wider at depth. “Oh?,” I said. “Of course, all veins get wider at depth”, was the answer. “Why was the mining stopped?” “The mine flooded”, they said, “but just before the flood, the old timers were in the very best ore.” It is odd — in old mines the very best ore always seems to be in the flooded part of the mine or behind a cave-in. My general observation is that finding high-grade ore in an old Spanish mine is like finding enough chicken for a sandwich on a roast after my kids had worked it over.

We worked our way upwards through old raises with rickety ladders or no ladders. The vein was essentially vertical. In spots, the stoping (mining) had been widened out and I took samples in the room or at the skinny pillars at these points on the assumption that the ore was better at these locations. Whenever we seemed to come to a dead end, our young guide showed us the way on. We were clearly in parts of the mine that none of the others had seen. Every so often, we would come across an adit that broke out into the almost perpendicular rock slope over the stream. Finally, our guide indicated the tour was over and we would leave by one of the adits to the cliff face and then climb up a rope to a trail on the top of the ridge. I could not help but wonder what the rope was attached to at the top since it was about a one-hundred meter fall to the rocks and water below. We got out and I still had my samples intact. With the crew that I was with, I was not about to let the samples out of my hands. Just a little free gold added would turn a dog into a great prospect. [I once had the experience of looking at some placer gold samples from Peru with a microscope and it was clear that the supposedly well-worn alluvial gold consisted of fresh gold fillings; someone had decided to give me a good sample.] Once on the top, one of our group pointed off to a far hillside in the distance and cried: “There is the outcrop of the other end of the vein.” I didn’t argue. The whole countryside was covered with quartz vein outcrops. Looking back, I think the lad was getting even with us for not giving him a ride in the helicopter.
We struggled down through the brush to camp. I had a cerveza and sat down. "What do you think?", I was asked. "Interesting.", was my comment. They could sense my skepticism and one of the local chaps said, "You haven’t seen the best yet. We just have time." So off we went to the river and one of the fellows jumped behind a great boulder and came back with a pan of gravel. He proceeded to pan out a nice streak of gold. "How nice!", I said, "Let me try." "Oh, no Senor, you might get your feet wet." Of course, they were already wet and muddy, but I was not allowed to try my luck. Perhaps I did not know the right place to get the sand. Perhaps I could not get the gold to add to my pan! It was getting dark so we had to cut short the adventure in the river and fly back to Medellin which, unlike the mine, was easy to find because of the bright lights. En route, I heard tales of the wonderful placer gold that was available for the picking if only they had some money. Naturally, the placer mine would be a new deal, entirely separate from the vein mine and with more capital infusion required. I am not sure what they were smoking, but the whole trip seemed like fantasyland.

Actually, I do believe there was gold in the river and I also believe it would be impossible for a foreign entity to mount a successful placer mining effort. The size of the huge boulders meant that either very large equipment would be required at great cost or, that hooka (small suction and diving units) be employed using individual operators. In the first case, the ore or gravel would be seriously diluted and, in the second case 90% of the gold would never be seen by the legitimate operators.

The next day, after a morning of struggling with a typical Latin American phone system, I was able to contact the gentlemen who wrote the report on the mine for the Bureau and we set up an afternoon meeting. It turned out to be a successful and pleasant meeting. He had many old maps and assays from old records. He was interested in the mine from a personal and historical point of view. We talked about this and that and Spanish mining methods and I gradually zeroed in on the problem that was facing me. Where did the high-grade assay come from? The original maps and assay plans were quite reasonable, given the geology of the mine, but later ones were out of sight. Finally it dawned on me that the old timers were not trying to sell the mine but rather create records that would help operate the property. According to the bureau engineer, the modern samples were supposed to be "good" samples. Good can be interpreted in two ways. One way means accurate or representative samples. The other way means high-grade samples or samples showing the best available ore. The samples given to the syndicate group were of the latter type. The engineer, with some embarrassment, explained that, instead of cutting a sample across the vein, he took as much of the gold-rich sulfide material as he could get. Yes, he knew that this was wrong but that is what the boss wanted. "They were good samples, weren’t they?" I later found out that the boss had a considerable interest in selling the mine or putting it in production at no cost to himself. Digging deeper, I found that the contract with the land and mine owner "boss" and with the syndicate called for a 50% carried interest. That meant that the syndicate put up all the money and the mine owner got one-half of the gold, free of all charges. This is an unheard-of deal in the real world. To make matters worse, I found out that the two men in Medellin were getting all of their living expenses paid including two very nice apartments, food, good-looking, live-in "housekeepers" and automobiles. Once a year they received paid trips to the US. In lieu of a salary, they each got a 3% carried interest in the mine for each year they worked, taken from the syndicate’s share. The syndicate’s share was steadily diminishing but their obligation to foot the entire bill remained fixed. The tooth fairy was alive and well in Medellin.

I did not say much — I wanted to get out of the country safely. Immediately upon arriving in New York, I called my clients and set up a meeting. My comments were that unless they could negotiate the carried 50% interest down to something more in line with the real world, they should move out. I showed them typical South American and Canadian deals. Furthermore, the ridiculous arrangement with their two Medellin consultants should be terminated and they should be put on a salary with a living allowance. An option to buy in at various points along the way might be included with an incentive for the two men to extend the job as long as possible. I concluded that, if they could clear up these two details, the area would be an attractive wildcat prospect but would take more or less a million dollars and four years of hard work to prove out with no guarantee of success.

As it turned out, the landowner, an important political figure and former head of the bureau, would not budge and threatened all sorts of dire things; the two engineer/geologists saw the end of a good deal and came back to the US; the assay reports from the samples I took were returned with NDA (no detectable amount); and the dentists cut their losses and quit. I suspect the landowner politician has switched from gold to cocaine. I look back on the study as a great experience. I don’t consult in Colombia anymore.
Southern Comfort or . . . Digging Crystals in Arkansas

By Melody & Michael McEnaney

Here we go on another one of our many travel adventures. This time we decided to visit Hot Springs, Arkansas and Mount Ida to dig for quartz crystal clusters and points. In The Lapidary Journal (March 1995) we had read an article titled “Mt. Ida Magic.” That truly whet our appetites, rockhounds that we are. Being members of The New York Mineralogical Club also helped open some doors, or should I say mines.

We opted to stay in Hot Springs, figuring we would need a nice mineral spring bath, hot pack, and massage after some hard days of digging. Most all of the crystal dig sites are located in Mount Ida, which is 45 minutes to an hour away (approximately), depending on who you are driving behind.

Originally we had planned to visit The Wegner Mine and Fisher Mountain Mine. However, on our way there we came across Wright's Rock Shop, located right on Route 270. It had a large assortment of rocks and minerals to choose from, plus some lapidary equipment. My husband Michael asked the woman working there if she knew of a really good dig sight. She recommended Coleman's Mine. She said that's where her son dug for most of the specimens they were selling. Leatherhead was another mine she mentioned. Coleman's was closer and it was raining, so we thought it best to go there. The woman was kind enough to draw us a map.

Now there are two Coleman Mines, owned by two brothers, Ron and Jim. Ron's mining fee is $20.00 per person, and Jim's is $10.00. Anything you dig up is yours to keep. We heard from the locals that both mines crystals are equal in clarity and size. We went to Jim's for $10.00 per person, which you pay when you get to the mine. It had been raining that day and the two days before we even arrived. You can't imagine the thick gooey clay that clung to our clothing and waterproof boots. At times I sank so deeply into the muddy clay, that I needed Michael's help to pull my feet out. We found many small to medium points, but only a few decent-looking clusters. All in all, the mine was pretty good. We checked out some of the clusters that the owners had dug out. They were beautiful and reasonably priced. They told us they also turn over fresh dirt every day, weather permitting so fresh new crystals are always being exposed.

The next day we stopped at Vapor Valley Rock and Gem Shop, right in Hot Springs, owned by Charles Holmes. Charles showed us some fabulous clusters. A few had been coated with just the right amount of titanium, giving them a brilliant fluorescent rainbow hue. He also told us to try our luck at the Leatherhead Mine, owned by Tony Thacker. This mine is also in Mt. Ida not far from Wegner's Mine.

Up at Leatherhead Mine, he told us, we'd meet “Caveman” first. He's the caretaker who lives up there to guard the mine. The Rainbow People who live in the surrounding hills and mountains, have been known to sneak up to the mine at night to steal crystals.

Off we went. It was the first lovely sunny day since we had arrived. There are a lot of very rough dirt roads that lead to many of the mines, and a few of them also have very steep inclines, so make sure your car and tires are in good shape. We got there around 10:00 AM. Out of a small - and I mean small - trailer, a man walked out toward us. He was tall and rugged, and wore a cowboy hat. We say in unison, "Are you Caveman or Tony?" He smiles a broad grin and says, "No, I'm Junebug. Caveman should be back shortly, and Tony is at his house." We told Junebug that Charles from Vapor Valley Rock and Gem had sent us, and he'd said we should speak to Tony about digging. Junebug (“Bug” for short) was kind enough to he drive us to Tony's place in Pencil Bluff in his pickup truck, about a half hour from the mine.

From Charles' description we knew Tony would be a character, and he was, truly a descendant of the cartoon character Snuffy Smith. He had a long beard, wore a camouflage cap and dark sunglasses, and let's not forget the heavy southern accent. Junebug introduced us, but Tony already knew we were coming, as Charles had left him a message that we'd be coming. They definitely have a good ol’ boy network out there. Tony and his wife Terri have enough dogs to open a small pet shop.

Tony had just returned the night before from working the Denver Rock Show. We both started helping Tony, Junebug, and J.T. unpack the crystals without even realizing it. J.T. is the silent one of the pack, whose talents lie in discovering new dig sites. I must tell you, the size and, pardon the pun, crystal clear clarity of his clusters was unbelievable. Many of his points were so large they could have been used for door-stoppers. After hanging out there for a bit, Junebug took us back up to Leatherhead Mine, where we met Caveman. It was already about 2:00, and pretty warm, about 85 degrees, for the month of September. Junebug started to pull away new pockets with the heavy machinery.
Michael and I dug until 5:00 PM. We dug and carried out about three 5-gallon buckets filled with prime specimens.

Leatherhead’s mining fee is $20.00 per person for the day, and you keep whatever you dig up. Keep in mind, many mines only let you dig in the piles, not the actual fresh mining area. So make sure you ask the owner or the caretaker where you'll be digging. Leatherhead is also a relatively new mine, about seven years old, so it has many good years of prime mining ahead.

The next day Tony met us at the mine. We dug all day and looked like it. When the sun is out it is much easier to spot crystal points, glistening in the clay. Clusters are very abundant at Leatherhead, and we dug up so much, that we had to ship many of them back to New York, as we could not carry them all. Now if you’re not the type who likes to get a little dirty, don’t despair. Tony’s prices are the most reasonable we had ever come across, and believe me we've priced crystals from New York to Brazil. Even with all we dug out we still bought some from him, as we simply could not pass up such a deal. Also, Tony will ship anywhere.

After we had dug our fill, Tony and his crew invited us to their annual pig roast, where playing horseshoes, and recounting mining stories are a favorite pasttime. So if you want some real down-home southern comfort, visit Leatherhead Mine. Come and meet Tony and Terri Thacker, Junebug, and Caveman, some of the most gracious folk in those parts.

[A note of caution: Make sure you research just a bit, or ask the locals about the various mines. Some of them not only charge a fee, but may also charge you per pound, whatever you dig out. Rumors abound about one mine in particular that's notorious for switching your beautiful find with one of lesser quality. So beware!]

Mike Walter  “The Science and Craft of Gemstone Polishing”
Long-standing club member Mike Walter gave a clear and methodical lecture on the subject of gemstone polishing. Polishing, according to Mike, is the last step in lapidary work, preceded by cutting and grinding.

Mike then listed and explained the 21 variables involved in the polishing process:

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The Boleite Suite of Santa Rosalia, Baja California, Mexico

By Mike Kessler

On March 13, 1996 Mike Kessler, NYMC member and M.A. Geology, gave us a presentation about the boleite suite. The following article is a summary of that lecture. Drawings are by Mike as well.

In the early 1890s, Edward Cumengé, a French engineer, sank a shaft in hopes of ventilating the seven miles of tunnels that belonged to the Amelia Mine. He came across four species of minerals that came to be known as the “boleite suite”. These crystals were produced by the interaction of the weathering products of the copper ore bodies produced by the hydrothermal fluids of local intrusions and sea waters which penetrated the same sediments. This area has been tectonically active, causing the coastline to periodically submerge, then emerge. Crystals of boleite, cumengite, pseudoboleite and percylite were identified by Cumengé as lead-copper oxychlorides.

Boleites are small, dark blue, tetragonal crystals having cleavage, a hardness of 3.5, a submetallic luster and a pseudo-cubic habit resulting from three interpenetrant twins. Boleites are secondary in origin, form in montmorillonite clays of several colors, and are most often less than one-eighth inch in size. The other species begin to develop as overgrowths on the boleite cubes obviously when the parent solution has changed.

Although boleites have been discovered in 18 other localities including Arizona, Chile, and New South Wales, the three other species are indigenous only to the Santa Rosalia area. Boleites as big as 2.5 centimeters found in the Amelia Mine brought prices as high as $10,000. In 1993 the largest cumengite was discovered in the Amelia Mine measuring 3.5 centimeters. Prices fell shortly after when the market was flooded with boleites. After the Amelia Mine suspended operations in the 1920s, boleites were not uncovered until 1972.

Edward Swoboda in 1972 sank an inclined tunnel looking for these crystals. He hired Simone Navarro, retired lead miner from the Compania Minera Santa Rosalia, a state owned company. Simone succeeded in finding the third level of the Amelia Mine at 600 feet just by instinct without the aid of compass, level or transit. This enabled Swoboda to find boleites by sifting a backfilled tunnel. Most of what he discovered were loose crystals. Boleites fall out of their host rock quite easily with moderate handling. Swoboda published his adventure in the Lapidary Journal (Jan, 1976), “Boleo - A Classic Locality Revisited”.

In 1993, Bob Sanger, a field supervisor for a Canadian exploratory Company, was introduced to Simone Navarro. Knowing of each others' reputations, they instantly became friends. It took two years of searching, but in 1995 Bob mailed to me in Brooklyn, New York, 25 matrix specimens weighing a total of 1500 grams and exposing 410 crystals. He also sent 130 loose boleites, some interlocking varieties and two perfect cumengites. At the Tucson show (1995) a one quarter inch specimen sold for $90. As these crystals get larger, their rarity increases and so does their price geometrically.

Presently, the Amelia Mine is privately owned. Bob, in association with his technicians Buscho and Chino of San Lucas, has videotaped the search for these crystals down the shaft to the third level at 550 feet to see these crystals in the tunnel wall. This is available for a nominal fee. For the adventurous, the temperature here is 110º F and there is no air movement in any side tunnels where the crystals are located.

Santa Rosalia has much more to offer to the collector besides this dangerous trek into a mine that has collapsed in four places. Besides having identified 150 minerals here, collectors find minerals with a “boleo” habit from the tailings piles, fossils from corkscrew hill, including great white, mako and thresher opalized sharks’ teeth, antique bottles from old mining camps, gem chrysocolla from the nearby extinct volcanic vents, and world class fishing. Bob has opened a small bed and breakfast nearby and will organize collecting trips into the local area. Call these numbers (Mike Kessler (718) 646-738, Bob Sanger (619) 473-8752) for information. Bob says: “Come and write your own adventure!”

The latest find is a gem chrysocolla laced with red jasper and white chalcedony. That’s red, white and blue with a hardness of seven. I have one specimen and it readily takes a high polish.

Rules for Museum Visitors

Things never change! In 1727 Caspar Neickelio published a book entitled Museographica. In this work he listed hundreds of mineral collections throughout Europe. He also provided a list of 25 behavioral guidelines that you should follow when visiting these public, private, academic or royal collections. Surely many (all?) of these rules should still be adhered to (in spirit if not in form) as you view the members’ private collections during our club’s open house weekend tours.

Everyone should appear at the museum (i.e. private collection) with cleanly scrubbed hands, so he won’t soil something rare and clean which does not tolerate dirt from the touch of dirty hands.
1. Furthermore, visitors from other countries should remember to wear neat, respectable clothing; because the old proverb, *vestis ornat virum* ["clothes make the man"] still applies, and everyone would prefer to keep company with a well-dressed person.

2. But the most important thing of all to possess is an exemplary inner spirit (which brings with it mannerly outward conduct and virtuous behavior), so that the owner of the collection or his curator-in-charge (spouse, boyfriend, girlfriend, significant other, etc.) will be encouraged to show off most clearly and thoroughly the natural and artificial rarities of the museum.

3. Either at the beginning or at the end of the tour one can inquire about the origin of the museum, its initial collections, their nature and classification, and other particulars.

4. One can also ask about other information, which kinds of specimens comprise the System of Rarities, so to speak; whether they are widely available or cannot be found elsewhere; and also about which other specimens are the most rare. Notes can then be made for when those pieces are encountered during the tour; they can then be examined more thoroughly.

5. When viewing an important piece, one should not be ashamed to ask his guide in a polite manner (a) whether its nature is understood, what it is, whether manmade or a product of nature; (b) what its name is; and (c) if a piece of art, who made it, what is its function, and what should it be admired for? If it is a natural object, however, one should ask about its medicinal usefulness, and especially where it was found. Consequently, a compendious slate [big notebook] for writing in, where everything noteworthy or remarkable can be jotted down in abbreviated terms, will be necessary and useful.

6. He who has some drawing ability will find it very useful, because he can capture in a quick sketch the rare and curious specimens, then prepare a more detailed depiction at home. [A camera might also work!]

7. If one has collected copperplate engravings [or field guides] of various kinds of rare specimens prior to the visit, they will be of great advantage, because they can be compared against actual specimens in the museum to see how well they correspond.

8. A good microscope [or magnifying glass] will also find employment.

9. When making notes on specimens, one should record the approximate color and size, because many items can be rare for their extraordinary size but still be small.

10. Some people are of the opinion that one should not spend as much time examining artworks, antiquities and exotic rarities as he does on natural history specimens. But it is my belief that the more rare the piece (natural or artificial) the more time will be required to properly reflect upon it.

11. Generally speaking, it is not good to spend too much time examining individual specimens. One should observe moderation in the examination of each object. [Give someone else a chance?]

12. Furthermore, one should limit the time spent admiring any particular object because the ignorant will sometimes make themselves appear ridiculous by spending too much time in the admiration of objects which are not especially rare or remarkable.

13. On the other hand, some are too incurious and blasé, behaving as if the objects are nothing new to them. Such behavior is irritating to the guide, and he will become annoyed. Such visitors further display their ignorance by treating in a perfunctory manner a specimen which is plain in appearance but is actually quite rare. Therefore the middle road should be taken.
14. Caution must also be taken in a museum because a person can, through carelessness, knock over or damage a specimen which will break, bringing disgrace upon himself. [Or death, a lawsuit or a huge expense.]

15. It is also not polite to reach for a specimen in order to examine it. The honorable person will ask the guide to hand it to him, which is much more courteous.

16. The first of these rules mentions the importance of having clean hands in a museum. Here I would like to recommend that everyone be wary of having sticky hands and light fingers. Even though this remark may seem unsavory, it must be mentioned, because I have seen reputable looking people behave deplorably in this respect. Therefore, I want to set this out as a main rule, since many seem to believe that it is no sin to steal rarities.

17. One should make note of the number of cabinets and storage spaces, as well as the objects contained in them.

18. One must form an image in one's mind of the general layout of the museum . . .

19. . . . until such time as there is opportunity at home to record the full layout of the museum, including the partitioning of the cabinets and other important aspects.

20. One should not miss the opportunity to visit a museum on repeat occasions, because we will discover more the second time than the first, and even more during the third, thereby perfecting our knowledge of the collection.

21. A person should not be content with visting only one museum, but should instead visit many, because one collection always contains specimens different from those in another.

22. When visiting a collection in the company of others, one should converse freely, because one person will sometimes see things which the others had not noticed. Moreover, it is through such verbal repetition that the specimens will be better imprinted in one's memory.

23. Finally, one should not visit a museum totally ignorant and unprepared; that would be about as useful as dragging a donkey in there. Consequently it would be wise to leaf through some appropriate books first . . .

He who observes the above rules will experience the benefits of visiting a museum. But, because many people are totally inexperienced and ignorant of all sciences, they will leave the museum as knowlegeable and as clever as they entered it, and it will satisfy them to report merely that they have seen many colorful rarities. That is not the right way. [Source: Mineralogical Record, Volume 25, Number 6, November-December 1994: The History of Mineral Collecting, pps.43-45.]
Purchasing Minerals: Rock-Solid Advice
By Mitchell Portnoy

We all love adding minerals to our collection. And purchasing minerals from dealers at shows, meetings, symposia, or by mail order is a part of mineral collecting. (You might recall that it was I who once expressed the opinion that the best mineral collecting tool is the credit card)

With this in mind and with some encouragement from John Betts, I decided to tap the vast experience and expertise of many of the club’s members. We are fortunate to have numerous dealers as well as an abundance of seasoned collectors (and many who fit into both categories). I sent out a letter to them asking the following questions:

1. “What are the most common mistakes that beginning (or even more advanced) mineral collectors make when purchasing or acquiring minerals for their collection?”
2. “What advice would you give to collectors when purchasing or acquiring minerals for their collection?”

Responses came back rapidly. Here is a chart of those who responded (and their initials that I reference within the article). I want to thank you all for sharing your thoughts with other club members. [Note: When a member’s initials appear after a bullet point, the words may be either a direct quote, paraphrase or express the member’s general opinion.]

| Joe Arons (JA) | Don & Audray Lapham (Lap) | Ed Murphy (EM) |
| John Betts (JB) | Lee Lowell (LL) | Peter Nalle (PN) |
| Lawrence Conklin (LC) | Bill Mancuso (BM) | Tony Nikischer (TN) |
| Richard Hauck (RH) | Don Miller (DM) | Jonathan Smith (JS) |
| Jacob Kaufman (JK) | | Dave Trevas (DT) |

Preliminary Considerations
Focus Your Collection

✔ This simply means to have a collecting goal—i.e., you want one of every species at the lowest possible cost, you want azurites from every known occurrence, you want only things you’ve collected yourself, you want tellurium-based minerals, or pseudomorph, fluorescent, thumbnail, micromount specimens. You can place as many or as few limitations on your collections as your pocketbook and tastes allow. But without some limiting focus, collections tend to grow haphazardly, with a wide range of sizes and qualities, diluting the overall appeal and value of the collection. (TN)

✔ One should always keep in mind in what direction the collection is headed. What types of minerals are wanted, what sizes are appropriate, and what specialities are desirable. Of course, a plan of action and budget are essential when going to a mega-show such as Tucson, Denver or Springfield. I like topaz but I am over-extended in topaz. I carry a little card with acquisitions I am looking for and at the bottom it says: “No Topaz”. (PN)

✔ Most beginners spread themselves too thin, while serious collectors tend to specialize. Collectors should try to limit their collection to good quality specimens whether large or small. Try to assemble minerals from one area, be it NYC, or a particular quarry or the N.J. zeolites, or specialize in pseudomorphs, twinning, geodes, crystal habits, inclusions, etc. Other collecting categories could be particular Dana classifications such as carbonates, sulfates, sulfides, vanadinites etc. (JK)

✔ Decide if you want to specialize (i.e., all micros, or all quartz family, or all rarities), or just generalize in what really takes catches your fancy. (LAP)

✔ One may build a study collection and/or one for display. In either case, include undamaged specimens showing typical form for the species. (JA, JB)
The collector should first define what he or she likes (not an easy task in the vast world of buying minerals), so that he won’t need to dispose of a bunch of specimens that he later, for whatever reason, comes to despise...how can he lose? (LC)

My premise is: as collectors we are looking for unusual, uncommon, reasonably priced aesthetic minerals. Ordinary amethyst cathedrals from Uruguay, Arkansas quartz points, “peacock ore”, and similar “mass produced” minerals have no place in our collections. (JB)

Do Some Prepwork

Lack of familiarity with the mineral being considered for purchase can be a problem. It is more the rule than the exception that one is attracted by the novelty of an unfamiliar mineral. Unfortunately the purchase is made and the research is done ex-post facto. Therefore, the research should include knowledge of the various colors of the particular mineral. When selecting a mineral specimen for color, it is important to pick out the one with the most intense color...this may require several visits to various dealers. One rule for collectors should be: “research before purchase”. (BM)

Considering a Purchase

“Quality” is Important

Whether field collecting or silver pick, specimens must adhere to species’ crystal habit, which may be hexagonal, octahedral, etc. (DT)

The specimen must be free of “dings” (damaged crystals) and poor terminations. Such poor specimens are “leaverites” (i.e. leave them right where you find them). (DT, EM)...But, a well-repaired specimen may do until something better comes along. (JA)

Buy by quality and NOT by price — believing that a $100 piece is twice as good as a $50 piece or that a $5 one can’t be any good is a big mistake. (RH)

Look carefully. There may be another species or two on the piece; the specimen may be underpriced. (EM)

Check for repairs - we once saw Herkimers on matrix with a decidedly green color. Thinking we had missed some-thing in our years of digging Herkimers, we later discovered it was the sun shining on the glue the owner had used to create his own gorgeous (?) matrix specimens. (Lap)

Check for phonies - a lot of the large trilobites from Morocco, for instance, are factory-made and not Mother-Nature created! (Lap)

Location, Location, Location

You must obtain and preserve precise locality information for a specimen. This is far more important than what a specimen is, simply because one can always have material analyzed to determine the what, but there is no reliable means of accurately determining the where. Specimens are generally evaluated according to their quality and rarity. A collection of minerals without precise locality information is worth significantly less than a well-documented collection. An unusual locality can add a substantial premium to the value and uniqueness of a piece, but failing to preserve locality information reduces the specimen to its least common denominator: i.e.: how it looks as compared to all other specimens of that species. Furthermore, by failing to record and preserve locality data accurately, many opportunities to build, study and enjoy a collection are lost: i.e., a) building locality suites, b) collecting one species from many diverse places, c) looking for and recognizing unique associations that may occur at only a single locality, etc. (TN: also JK, Lap, JA)

Labeling

Be sure the specimen is properly labeled, including locality and other pertinent facts and that the label stays with the piece. An unidentifiable piece loses much of its value. (DM: also LL, JK, Lap, JA)

Prices and Discounts

The price you pay for a mineral specimen should be equal to that another purchaser would be willing to pay you. (BM)

When purchasing minerals, buy the best quality specimens you can afford. When you buy low quality (“junk”) it will be junk 5-10-20-30 years from now. (LL; also JA, JB, LC)

Mistake #1 would be settling for less than the best that one’s budget can afford. The “good bargain” is a mediocre piece, soon forgotten and relegated to the back of the drawer or cabinet. (DM)
The question of price and negotiation depends entirely on the circumstances. As with antiques, it never hurts to ask for a discount. (PN)

Remember, virtually all mineral specimen prices are negotiable. As one of New York City’s prominent art gallery owners (a good friend) put it— “prices can always be adjusted.” (LC)

However, remember that trying to get dealers to take large discounts off their minerals when they really cannot, in most cases, implies an insult. (EM)

**Show Behavior**

- Shop the show. Shopping (walking) around a show quickly with a pad and pen, to take notes is a good idea. Then start weighing quality and comparing prices. (EM)
- See what is new and what “new” dealers are at the show. (EM, JB)
- Try not to pass by something you are strongly attracted to - it may not be there when you return! Try asking the seller to set it aside for a short period of time (say ½ to 1 hour, no more). This gives you time to look around and also to think a little harder about it. Be sure to return to the seller within your “set aside period” and let him know whether or not you’re still interested. (Lap)
- A trap that I fall into sometimes is putting off buying a mineral that I want and that meets my budget and other criteria. Then, on reconsidering and going back, I find the mineral gone — sold. I don’t believe that one should rush into a purchase, especially for an expensive item, but my instinct is fairly good. If it is truly a good specimen, then waiting until the end of the show for a better one won’t work. Usually, only the “dogs” are left. (PN)
- If I see a specimen that I really like, whether it be for aesthetics, interesting locality, or some other unusual property, and if the specimen is $25 or less, I recommend buying it without too much delay. I have kicked myself for letting a relatively inexpensive specimen get away from me. The same applies to a more expensive specimen, but it must pass another layer of mental filters: is this really worth the asking price, do I really want this, does it compliment my collection. Then I examine the specimen carefully, looking for defects (nothing is perfect so don’t expect perfection), and evaluating the quality of the specimen versus the asking price. I know that if I purchase several specimens from the same dealer, I can usually bargain the price down from 10% to 25%. So, sometimes I try to put together a package deal that will bring down the price of each piece. If I am not convinced the specimen is worth the price, I leave the dealer and go about my business. If I am still thinking about the specimen later, then I go back for another look and go through all the mental trials again. If I return a third time, I probably really do want the mineral, and if I don’t fork over the money I’ll be disappointed later. I am a believer in following my intuition, and if I hear a voice telling me “yes”, then I try to follow. Of course, you have to stay within your present financial limits, as buying rocks is fun, but you still have to pay the rent and buy the groceries. (JS)

**And What About All These Dealers?**

- Buy from someone who handles a wide variety of minerals. Buy from an “educated” source rather than one who only knows prices. (EM, LC)
- Buying a damaged or mislabeled mineral is a regrettable error and in part can be avoided by dealing with reputable dealers, insisting on good data and not operating in a darkened bar or back room. (PN)
- Comparison shop among the various mineral dealers. Don’t buy from a given dealer because you have to have his label on the specimen. (LL)
- Be sure name and location are correct — not all dealers are knowledgeable or scrupulous. (JA)
- My advice is to engage the dealer in conversation, especially one with a good reputation, and use his knowledge of his display to your advantage. Tell him what you are looking for, what you specialize in, or inquire about new discoveries. Ask the dealer what he has that other dealers don’t have, or if he has any minerals that he collected personally. Inquire for old specimens from old collections or from well-known collections. (JB)

**Be Careful but not TOO Careful**

- Most dealers will cheerfully allow you to “trade up”. (LC)
- When purchasing minerals from unique localities, don’t wait for another chance to make a purchase, for the opportunity may never occur again. (LL)
- If you go to a show with $300 to spend, you will build a better collection, if you spend it all on one great specimen. The risk is you cannot find it and you go home empty-handed. That’s no risk - just add that money to your budget for the next show you visit. (JB)
- My advice to a collector is to buy what he or she likes, what he or she can afford, and ignore fads. He should rarely, unless he is an expert, buy “the mineral of the year at Tucson,” for instance. He should never buy
specimens on the installment plan. He should save up his money, have cash in his pocket, literally, and enjoy better buying power at his favorite mineral dealer. (LC)

✔ Be careful, some dealers may not take a “return” if you change your mind although, in my experience, most will if the items remain undamaged, with their original label and packaging. (EM)

### Post Purchase Considerations

#### Display

✔ Consider where and how the specimen will be displayed. The proper lighting and mounting will add much to the enjoyment of the collection. This helps to counteract the normal tendency to amass too much material, wherein we realize too late that all available space in closets, basement and garage is filled with rock-filled boxes. (DM)

#### Catalog Your Collection

✔ Labels are easily separated from specimens over time. Misplace the label, and all the history of a piece (how it was obtained, from whom, at what cost, from which locality, with what associations etc.) can be lost forever. Not only should collectors preserve old labels, but every effort should be made to attach a number to a piece. Have that number correspond to a journal, a ledger, a computer database etc. that preserves all the information about a piece. If a label is unfortunately lost, the data is still retrievable, and the value of the piece can be maintained. The cataloging process also helps us study and learn about our specimens, occasionally convinces us to get rid of lesser duplicates, and often stops us from buying things we may already have. (DM, LL)

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I don’t regret the minerals I bought, I regret the ones I didn’t buy.  

*Richard Hauck*

#### Upgrade & Improve Your Collection

✔ After a series of acquisitions comes the hard part. Be merciless in separating the “keepers” from the “leaverites”. (JK)

✔ Some specimens can be improved by trimming, cleaning, brushing, acid baths. (JK)
**Mineral Prices: Why So High?**

By John Betts

I am a part time mineral dealer. I get many questions about the prices of collectible mineral specimens. Novices are the most confused because they have yet to understand the confusing factors that affect mineral values. The following is a hypothetical chronology of prices and events of a typical mineral specimen.

**The Beginning**

All minerals start in the ground. A specimen is not worthless (because collectors may still lust after the undiscovered specimen) but it does not yet have a price tag. It will lie there undisturbed, as it has for millions of years, until one of two things happen. Either it will erode from the solid rock, work its way into a sedimentary deposit and start another cycle of rock formation OR man will intervene and do something with it. It could go to a smelter to be refined into a commercial / industrial resource. Or it could become a collectible mineral specimen. I am going to focus solely on this latter path.

**Price Evolution**

A collector digs it up and stores it wrapped in newspaper in his basement. It typically will remain in this state for two or three years, until his wife threatens to toss out all of the “junk” in the basement. 

\[ \text{Price} = \$0.00 \]

The collector washes it off for the first time and decides it is still worth keeping even though most of the other material he collected should have been left in the ground. He trades it at a swap along with ten other pieces to a collector that can see through the iron staining and dried pocket clay. He gets an amethyst from Brazil in exchange. 

\[ \text{Price} = \$0.50 \]

The experienced, new owner dissolves the pocket clay and iron staining in acid to reveal the real beauty of the crystals. It is now clean and lustrous. 

\[ \text{Price} = \$5.00 \]

The specimen is donated to the local mineral club for their fund raising auction. It sells for $12.00.

\[ \text{Price} = \$12.00 \]

The new owner trades it away at a local swap to a savvy collector who knows the location has just been closed and no more specimens will ever be found. Owner values it at $25.00.

\[ \text{Price} = \$25.00 \]

Years later, Mineralogical Record runs an article on the lost location. The author identifies a rare left-handed twin crystal form as unique to the location. The owner doubles the price to $50.00.

\[ \text{Price} = \$50.00 \]

The owner dies leaving most of his collection unlabeled. His heirs have no idea of what to do with the collection. A local mineral dealer calls the widow and offers $1800 for the whole collection and will not charge her extra for moving it. The price paid each specimen approximately $0.50.

\[ \text{Price} = \$0.50 \]

The specimen does not sell for two years. The small-time dealer discovers there is no money in selling mineral specimens. Decides to sell wire wrapped amethyst pyramids instead. Sell his whole stock for 20% the labeled prices. The specimen goes for $10.00.

\[ \text{Price} = \$10.00 \]

The new owner is more knowledgeable and recognizes the true origin of the specimen. He researches the location and makes a Xerox copy of the article in Mineralogical Record as a sales prop and prices it at $100.00.

\[ \text{Price} = \$100.00 \]

An “instant” collector, who has just started collecting minerals again, now that he makes enough money at age 35 after giving up collecting in high school, buys the specimen for $90. He is happy. He got 10% off!

Meanwhile, there is so much demand for minerals from the old location that prices climb. Brian Wayne Lees-Thompson (All names used herein are fictitious and are not based in any way on actual persons.) reopens the mine, attracting attention to the location again. Because of savvy marketing and the perceived shortage of specimens, prices are set at numbers that look like long distance telephone numbers (though the small specimens are only priced at numbers that resemble zip codes).

\[ \text{Price} = \text{numbers that look like long distance telephone numbers} \]

After two years the market is saturated. (After all, how many people are there in the world that will pay over $10K for a mineral specimen, 500?) Mr. Lees-Thompson can’t give them away. Prices drop to 10% of post-reopening prices. The minerals from the mine become a commodity worth about as much as Uruguayan amethyst! Meanwhile our specimen is sold to a new owner for $150.00.

\[ \text{Price} = \$150.00 \]

He shows the specimen to an experienced collector who owns a microscope. They spot rare inclusions of baloneyium. They write an abstract that is accepted for presentation at the Rochester Mineralogical Symposium.

\[ \text{Abstract accepted} \]

They give a 15 minute presentation. It is offered for sale for $500.00.

\[ \text{Price} = \$500.00 \]

It sells immediately to a locality collector that specializes in only that location. It is placed in a position of honor in his collection. The abstract is published in Rocks and Minerals magazine. The collector is offered $1000 for it and he refuses.

\[ \text{Price} = \$1000 \]

As the owner’s age goes up, so does the mineral’s value in the owners mind. But he also knows that he can’t take it with him when he passes on. He offers it to a local museum for $5000. The museum has an annual
acquisition budget of $1000. They try to find a donor to purchase the specimen for the museum.

In the meantime, the owner dies. The heirs know nothing about the collection—they just want to move into the house. So everything is hauled away by the trash hauler. The mineral specimen ends up in the local landfill and starts the rock-forming cycle anew.

So What Is a Mineral Really Worth?
This silly chronology illustrates that the price is determined in varying parts by aesthetics, rarity, location, associations, uniqueness, marketing, and scholarly study. As with art, value increases with knowledge of the subject. There is no absolute value. There are no hard and fast rules. (Adler, 1981)

If there were not mishaps along the way, the greater fool theory would prevail. Each owner would buy it and sell it to a greater fool that will pay more. Eventually it works its way up the price ladder until it reaches a practical limit. As a collector, all that matters is whether there is a bigger fool out there to pay more than we did. And there is.

References

The 1996 Eastern Federation Field Trip
By Don & Audray Lapham
The field trip this year was to northern New York State collecting sites and was indeed a successful and satisfying one. We were on a week and a half whirlwind, with not even enough time to do the laundry (unless, of course, we decided to forego a day of collecting). Attendees hailed from twelve northern and southeastern states. It was a congenial group—no slackers here. In the end, it was rather sad to part with people who had become friends, just when we were beginning to put names and faces together. The weather was perfect—in the sunny 80’s all but the last day or two, when it rained at night only and was overcast during the day.

Our very able leader provided us with an informative booklet about a month before the trip was to begin. It described collecting sites, equipment necessary, maps, suggested campgrounds and motels, plus other helpful and useful information. We were to visit two collecting sites each day, begin at 8 a.m. sharp each morning, and our free time would be from approximately 5 p.m. to 8 p.m. At that time, we were to meet for programs, next day’s plans, snacks, etc. Needless to say, that free time was spent showering and straightening up, cooking and eating and not much else. But, we were in rockhound’s Heaven! Our tour began with a get-together at a campground in Canandaigua in the Finger Lakes region on Saturday, August 10. Our leader gave us an overall view of our next week and a half, examples of minerals we hoped to find, and snacks.

The first trip on Sunday morning was to the quarry in Penfield, near Rochester. We collected dolomite, fluorite and sphalerite crystal specimens, calcite scalenohedrons, large pieces of clear selenite, celestite in large massive pieces and a few celestite crystals (one tabular terminated crystal measures 1” by 2½”).

In the afternoon, we visited the quarry in nearby Walworth. This quarry is well-known for its sphalerite crystals, and we were not to be disappointed. They had recently blasted in the sphalerite-bearing zone and crystal specimens were plentiful. We also found some nice pale fluorite cubes in matrix. It was an excellent collecting day! Walworth received most votes at the end of our trip as the favorite collecting site.
On Monday morning, we traveled toward Buffalo to the Frontier Stone Quarry in Lockport. We tackled a 3-4 foot boulder with a lot of nice pale yellow calcite scalenohedrons showing in sizes up to about 2". This one boulder yielded several flats of good specimens. We also found some micro pyrite bars nestled in vugs of crystalized pink dolomite, some clear selenite, and celestite. Though we spent nearly our entire time in that quarry dismantling the one productive boulder, others found small amounts of yellow sphalerite crystals and fluorite crystals. Lockport also received a sizeable amount of votes as a favorite site.

These three aforementioned quarries have been fairly generous in granting access to their properties to insured clubs, but it is said that they plan to switch to a (once a year?) pre-planned open house day for all clubs to collect at the same time.

Monday afternoon was spent at a site in Alden, voted second favorite at the end of our trip. Though not nearly as productive as most of the rest of the sites, this proves that abundance is not necessarily the goal in mineral collecting. Alden is a fossil site, yielding several varieties. The most desirable are pyritized (looking like solid gold) Ammonites, Cephalopods, etc. Most abundant were pyrite nodules in the shape of balls or tubes, although a few small Ammonites and Cephalopods were found that day. We heard of Ammonites up to fist size from this location . . . ah, to dream!

On Tuesday the group pulled up stakes and headed for the Ace of Diamonds mine in Herkimer. We opted to skip this site, as we have dug Herkimers for many years and certainly didn't need any more. Besides, we figured, who can find anything much in a half-day's dig at Middleville? Well, we underestimated our group. About a dozen people worked together, emptied the remains of a pocket and apparently found another one. That evening they divided up a really decent number of crystals. We headed instead for that night's campground, Crystal Grove in St. Johnsville. Since we were pulling a large trailer, we separated from the group a few times in order to put down our roots (i.e., trailer) and travel about more freely. We looked around the grounds at Crystal Grove and found that it had changed considerably since being taken over by new owners in the past year or so. Quite a bit more ledge area is now exposed in the large field, and the digs back in the woods have also been enlarged.

Crystal Grove was the chosen site for Wednesday's dig, but we decided to ride up North to investigate a garnet/diopside road cut in Speculator. We were basically disappointed in that site and stopped on our way back at a site along a beautiful babbling brook, where we found a few pieces of labradorite.

Wednesday afternoon's dig was to be at the Benchmark Quarry in St. Johnsville, where we were permitted to collect from 4 to 7 p.m. We returned from Speculator for that, as we had never been there before. We found a very large (almost 5" diameter), fully girtled crystal point, as well as some nice pyrite on pink dolomite. Others found some decent specimens as well, including a very pretty small doubly-terminated black crystal and a nice, small black quartz scepter. However, we were all basically disappointed in this place. I think we expected to find Herkimer specimens all over the place, as this is a working quarry, with access usually very restricted. We did see large empty pockets about half way up the quarry wall, but rumor has it that "nighttime invaders" clean those out.

On Thursday we were on the move again to a campground near Gore Mountain in North Creek, where the first site on the agenda was the Barton Garnet Mine. We had been there before and chose to leave the group to explore another road cut (which eluded us). We returned to meet the others for lunch at the Jasco Rock Shop in North River. After lunch we hiked up the mountain at nearby Hooper Mine for more garnets. While broken specimens are plentiful here, we did manage to find a few with full crystals. We labeled this site as not really interesting history of this mine, and then offered to allow us onto another part of the property where we might find garnets. We do believe anyone found anything in that area.

On Friday morning, we headed for the Tahawus Mine to collects ilmenite and magnetite from the dumps outside the gate, since we did not have permission to go inside. However, our leader drove inside, found the caretaker, and obtained permission for us to enter. The caretaker spoke to us for about a half hour on the very interesting history of this mine, and then offered to allow us onto another part of the property where we might find garnets. We don't believe anyone found anything in that area.

Shortly, we were traveling again to the Pierrepont area, where we were to spend the rest of our trip, though at a couple different campgrounds. After settling in our trailer, we met the group in West Pierrepont where we were looking for tremolite crystals. While we did find a few specimens of tremolite in matrix, and others found some nicer material, this site was not very exciting. We were beginning to wonder if our good luck of the beginning of the trip was waning. But we had hopes in knowing that the Powers Farm uvite location and the Chub Lake quartz/heamatite location were yet to come and should help to maintain our interest for another week. Little did we know that some of the other mines would be equally, if not more, exciting than even some of the earlier ones.

Saturday morning we dug at the Powers Farm in Pierrepont for uvite tourmaline and uranlite. We were astonished to see the difference in this site, even though it has been about 12 years since we were there. A local dealer had some really impressive pieces he had recently excavated by digging a very deep hole. About 8 members
of our group joined together to dig in one spot in the effort to get as deep as possible in a short period of time to reach fresher material. This worked very well and some nice specimens were found. However, some others found at least equally as impressive material with not nearly as much work. That afternoon, we visited the Pierrepont Show, divided up the "loot" from the morning's dig, and then enjoyed the barbecued turkey dinner put on by the Show committee. After dark, we visited a nearby fluorescent road fill site we had looked over in the afternoon. We were looking for fire tremolite, though not too much was found. This is a well-picked-over spot.

Sunday, we visited the ZCA Mine at Pierrepont. We had been offered first chance at some freshly dumped material in one particular spot there and were shown a 3" specimen with pyrite pyritohedrons, rivaling those from Peru, that had been picked up there the previous day. In our half hour head start, we didn't find anything nearly that good, but the "general public" admitted shortly after us broke open some very productive boulders. We can't really complain, as we found a lot of small pyrite cubes on matrix, a couple sphalerite crystal specimens, and radiating tremolite.

After lunch we went to the Route 58 diopside location in Edwards, where our leader had obtained permission from the property owner for us to go back into the woods behind the road cut. This was appreciated, as not too many people are permitted access, and we had never been beyond the road cut. We did find some diopside and scapolite in orange calcite, but nothing that interesting.

Monday morning we went to the popular Talcville Dump for about one hour collecting purple hexagonite. It is surprising that this old, basically open site still yields a seemingly undiminingishing amount of hexagonite, some of it pretty decent. Our leader was then able to obtain permission to enter the ZCA's Hyatt Mine for the rest of the morning. This had been on our original schedule, but was cancelled when three mine workers were injured in a mining accident the previous day. We found nice, mostly cubic pyrite specimens just everywhere. There was a small amount of serpentine, as there was in some of the other area dumps, but not nearly as much of this was seen as we had collected in the area 12 years ago. Most of the group went to the Bush Farm in the afternoon for brown dravite tourmaline, but we once again chose to move our trailer to the next campsite in Natural Bridge, where we would finish out the week. We also finally took the time to get some laundry done.

Tuesday was our collecting morning at Chub Lake for hematite and quartz. This is another site that is hardly recognizable from 12 years ago. We had seen some museum quality specimens recently excavated there, so our hopes were high. Even though we returned there by ourselves on Thursday after the tour was finished, we were not very successful.

Lunch this day was pre-arranged by our leader at a local diner. All 24 hungry rockhounds squeezed into this very small establishment to enjoy the salads and sandwiches set before us. It was a welcome relief from having to make lunches early each morning to bring along to the digging sites. In the afternoon, the ZCA "Batcave" Mine was on our schedule at the ZCA property in Balmat. Collecting there consisted of pyrite, willemite and ilvaite. To our knowledge, nothing spectacular was found there that day. Some of the more athletically-inclined in our group proceeded further down hill on that hot day to the "Batcave" area. They saw the mine tunnels and a large S-shaped fault in the serpentine country rock that had been exposed when the underground mine shaft was intentionally collapsed. It is currently being filled in via the mine's dump trucks and not much time was spent in that area.

As it turned out, our last day, Wednesday, was a very interesting and productive one. In the morning we visited the Gouverneur Talc Co. mine in Fowler, where the mine Geologist joined us for a very interesting tour of the mine workings, all the while filling us in on the history and current progress of the mine. It was a long walk down the road into the bottom of the open pit, which we understand can reach about 120º on about a 70º sunny day up top. Fortunately, it was overcast, but the sun started to come out later as we started the long trek back up. At any rate, we collected about two flats of quite clear white talc and several flats of really good hexagonite, which several of the group were able to work right off the wall - nice fresh material.

We decided to lunch again this day at the local diner, and met the mine Geologist after lunch for a tour of the Gouverneur Talc Co. in Harrisville. We were all pretty amazed to see the dumps just full of more blue calcite than the 24 of us could ever want, need, or expect to carry (especially in our already overloaded vehicles). But, collect we did anyway. After witnessing their afternoon blast, we did some collecting and then quit early - we had had enough! A few extra minutes rest was most welcome. Besides, we were staying on a few more days to do some collecting on our own. While at the Harrisville site, we learned that the desired product of that mine is tremolite, used in the ceramics industry, while the blue calcite is a waste product. The talc found at the Fowler mine is also used in the ceramics industry and in the paint industry as well. It seems that the talc and tremolite veins of the Gouverneur Talc Co. and the zinc veins of the Zinc Corp. of America crisscross each other, and they cooperate with each other by notification when the desired material is found.

That evening we had a very informal meeting, where horror stories of our previous week and a half were traded, and where we informally voted on our favorite sites. The worst injuries of the tour were to a man who
already had severe back problems falling on a pry bar and hurting his back further, and to a young lady who hit her thumb instead of the rock with a hammer - but not too badly. Though we knew from the beginning that the man was headed for back surgery when he returned home, we did not know until that last evening that he had injured his back again early in the tour. He was right out there collecting with the rest of us every day. One young man had to have the engine replaced in his car toward the end of the tour, causing him to miss a site or two, and one of the leader's assistants had all sorts of problems with his motor home, but all in all it was a good trip - no, a great trip - and we can't wait until the next one!

As mentioned earlier, we spent Thursday back at Chub Lake and then ended our two weeks on Friday with a morning ride down into the depths of the Hyatt Mine with a tour being provided for the Society of Mining Engineers. In the afternoon we returned to the blue calcite site for some interesting pseudo-cubic (?) quartz crystal specimens that were located after we had left the site on Wednesday.
Section VII
Minerals in the News
A Miscellany
The September 1995 issue of *Geotimes*, published by the American Geological Institute, is devoted to coverage of recent developments in mineralogy. The cover page shows a photomicrograph of natural etch features (trigons and microlamellar structures) on the octahedral face of a South African diamond, taken in transmitted light and highlighted by special illumination and shadowing.

Prof. John B. Brady, who teaches mineralogy at Smith College, Northampton, Massachusetts, reveals something that will come as no surprise to club members: “Minerals are the most interesting objects on Earth, and they are fun to study!” He chastises his colleagues who have forgotten this simple message, and explains how he has transformed his course to generate more student enthusiasm. His course emphasizes a hands-on approach: collecting minerals and rocks in the field, analyzing mineralogical data, and performing experiments in the lab to test scientific questions. Students are encouraged to work together and to share their knowledge and skills.

A hot new research topic in mineralogy is the study of mineral surfaces, according to Michael F. Hochella, Jr. (Dept. Geological Sciences, Virginia Polytechnic Institute & State University). Surface features down to the atomic level can now be analyzed using a scanning tunneling microscope, invented in the 1980s. Mineral surfaces are where chemical reactions occur between exposures of rocks and soils, the atmosphere and running water. Thus, mineral surfaces help regulate the long-term evolution of the earth’s surface as well as the daily geochemical interactions with our environment. Therefore, a close examination of mineral surfaces is important in understanding diverse processes such as the formation of ore deposits, acid-mine pollution, formation of soils, and migration of petroleum.

Microbes play a significant role in the formation of a wide variety of minerals, including carbonates, phosphates, oxides, sulfides, silicates, as well as silver and gold. Grant F. Ferris (Dept. of Geology, University of Toronto) points out how bacteria can exist under a broad range of conditions ranging from -7°C to 120°C, and in extreme environments—from Antarctica to the ocean bottom and deep underground. Microbes may have existed as far back as the rock record on earth—for at least 3.8 billion years!

Microorganisms produce minerals by passive growth processes and by direct metabolic activity. Bacterial precipitation of amorphous silica in hot springs, such as those at Yellowstone National Park, Wyoming, provide good examples of the former type of biomineralization. Formation of sulfide minerals, such as pyrite, by sulfate-reducing bacteria, is an example of the latter type of biomineralization. Oxidation of soluble, reduced forms of metals by bacteria produces iron and manganese oxides (e.g. magnetite), also uraninite, and metallic gold and silver.

Bacteria may be harnessed for future technological uses. These include microbial metal absorption and mineral precipitation to clean toxic mine and industrial wastes, and possibly for secondary recovery of precious metals, such as gold and silver from dilute waste-water. Bacteria may also help in the recovery of oil, by precipitating carbonates to cement porous and permeable strata in oil reservoirs.

Three microscopic diamonds embedded in crustal rocks from Fjortoft Island, off the southwestern coast of Norway, are shaking up theories of diamond formation and plate tectonics. Diamonds crystallize at temperatures over 1,300°F and pressures 35,000 times that at the earth’s surface, 60 miles deep. They are subsequently carried to the earth’s surface by explosive volcanic eruptions that create kimberlite pipes.

Thus, a team of geologists was quite surprised to discover the tiny diamond crystals in gneiss—a metamorphic rock produced by heating and compressing surface sediments at depth. However, gneiss is usually too buoyant to be dragged down by plate motions to even greater depths inside the earth’s mantle where diamonds form. Only two other occurrences of diamonds from metamorphic rocks are known—in northern Kazakhstan and in eastern China.

Some scientists suggest that the Norwegian diamonds may have come from the diamond saw blades used to cut and slice the gneiss, or from ancient diamond placer deposits incorporated into the sediments that ultimately metamorphosed into the gneiss. More studies will be needed in order to fully understand these anomalous deposits.
Hi-Tech Diamonds

The unique physical properties of diamonds, writes Allan Collins, in the Oct. 28, 1995 issue of New Scientist, makes them eminently suitable for many hi-tech applications. Diamond transmits heat better than most metals, but hardly conducts any electricity. It also can withstand extreme pressures, temperatures, and radiation. Furthermore, diamond possesses a wide energy gap that separates the valence band of electrons from the higher energy conduction band. Diamond is therefore transparent over visible, infrared, and microwave wavelengths, which lack sufficient energy to enable electrons to cross the gap. Only short ultraviolet light contains enough energy, so that diamond absorbs at those shorter wavelengths. These special properties have led to a number of important scientific and industrial applications.

A diamond window was installed on one of the Pioneer space probes to Venus in 1978 in order to collect infrared spectra from the Venerian atmosphere. Diamond was the only substance both transparent in the infrared and able to withstand the extreme atmospheric pressures. The high thermal conductivity of diamond also makes it useful in removing heat from semiconductor devices used in the electronics industry.

Because of the high expense of pure, natural crystals, thin films of synthetic diamond are increasing being grown by the chemical vapor deposition method. In this process, hydrogen and methane are heated to several thousand degrees Celsius, whereupon methane decomposes, depositing diamond on a silicon wafer. The hydrogen etches away any non-diamond forms of carbon (such as graphite). These thin diamond films are being used as heat sinks in electronic equipment. Future applications may lead to more tightly-packed computer chips, enabling the creation of faster computers with larger memories.

A Giant Crystal of Iron at the Earth's Core

The inner core of the earth may be a single crystal of iron, writes William J. Broad, in the April 4, 1995 New York Times. Although the earth's outer core consists of molten iron, extreme pressures within the inner core forces iron to solidify in spite of temperatures exceeding 7,000°F.

Recent studies of seismic waves produced by deep-seated earthquakes, such as one 395 miles beneath Bolivia last year, suggest that waves traveling through the inner core in a north-south direction move four seconds faster than those traveling east-west. These directional speed differences are known as anisotropies, which are analogous to the optical anisotropy responsible for birefringence in non-cubic minerals. Calculations by Dr. Cohen of the Carnegie Institution and Dr. Lars Stixrude of the Georgia Institute of Technology imply that the iron is arranged in a close-packed hexagonal crystal lattice, in which each iron atom is surrounded by a dozen neighbors, forming hexagonal prisms. In order to replicate the observed seismic data, the crystals would have to be nearly perfectly aligned in the largest such alignment known in nature! This raises the possibility that the inner core is one very large single crystal of iron.


Inclusions in diamonds, while decreasing their value as gems, convey a wealth of scientific information about the earth's interior. A single inclusion of the mineral staurolite, found in a diamond from the Dokolwayo kimberlite, in northern Swaziland, by scientists from South Africa and Scotland, provides direct evidence of extensive recycling of crustal rocks deep inside the earth.

Staurolite is a silicate mineral typically found in clay-rich sediments that have been metamorphosed at moderate temperatures and pressures within the earth's crust. Diamond, on the other hand, form at temperatures above 1000°C and at depths below 120 km. Thus, the presence of this staurolite crystal in diamond proves that crustal material has been dragged down by subduction to the great depths where diamonds typically form. The staurolite's survival may have been enhanced by incorporation within a more pressure-resistant mineral such as garnet, or by the absence of silica, with which it would have otherwise reacted to form higher-pressure minerals, such as kyanite or garnet. Another, as of yet unexplained puzzle is that the carbon isotope ratio of the diamond with the staurolite inclusion is characteristic of mantle rocks, rather than of organic carbon from crustal sediments. The latter would have been expected, given the presence of the staurolite. A small percentage of diamonds, do, in fact, contain carbon of crustal origin, but evidently not in this case.


An international team of scientists associated with the Ocean Drilling Program has drilled cores into an actively-forming massive metal sulfide deposit 3,650 meters deep, in the middle of the Atlantic Ocean, at around 26° North latitude. This modern metal deposit closely resembles ancient massive sulfide deposits preserved in volcanic rocks from Cyprus, Oman, and Newfoundland.
Episodic hydrothermal activity, for over 20,000 years at this site, has created a mound, 200 meters in diameter and 50 meters high, containing an estimated 4 million tons of metal sulfides, both above and below the sea floor. The mound is mineralized in four zones, consisting of, from top to bottom, a massive pyrite breccia, followed by an anhydrite-rich zone, an intensely silicified, brecciated, pyritized basalt, and finally chloritized basalt breccia, at depth. Chalcopyrite and pyrite are precipitated from “black smoker” chimneys, whereas sphalerite is deposited in “white smoker” vents. The abundance of anhydrite within the mound was unexpected, and suggests deposition from hot solutions, over 150°C, since the solubility of anhydrite decreases with increasing temperatures.

Native Aluminum and Silicon from Volcanoes (Nature, June 15, 1995)

Russian mineralogists and volcanologists have discovered small grains of native aluminum and silicon, from a fumerole at the Kudriavy Volcano, on Iturup Island in the Kurils, northwest Pacific Ocean. The aluminum grains are enclosed by aluminum hydroxyl chloride. The native silicon occurs both as threads and as diamond-shaped crystals within the aluminum, and also as separate crystals within chloride-rich spherules. Associated minerals include quartz, pyrite, plagioclase, K-feldspar, pyroxenes, garnet, and sulfides. This volcano has previously yielded rhenium sulfide, an extremely rare mineral.

What is a Mineral? — Not Such a Simple Question!
(See The definition of a mineral, E.H. Nickel, Canadian Mineralogist, vol. 33, 1995, pp. 689-690.)
Club members naturally desire to gain a better understanding of the objects of their interest. This starts with a good working definition of what constitutes a mineral. As it turns out, this is not so straightforward. The International Mineralogical Association Commission on New Minerals and Mineral Names decides which newly discovered materials to accept as minerals, and which names are valid or not. They define a mineral as “an element or chemical compound that is normally crystalline and that has been formed as a result of geological processes”. While, at first glance, this is a fairly clear definition, further consideration reveals a number of exceptions and fuzzy areas! Thus, a non-crystalline material (such as opal) is technically not a mineral. But a metamict material (that became amorphous as a result of natural radiation damage, such as some zircons) is a mineral, if the material was originally crystalline. The only liquid mineral is the metal mercury. A solidified liquid (such as ice) is also a mineral. Materials from the Moon, other solid planets, or meteorites also qualify as minerals, if they meet the above criteria. Geologic processes are not exclusively terrestrial!

A gray area concerns materials that are biogenic (formed by living organisms), man-made, or man-made, but subsequently modified by natural processes. A material (such as a pearl, coral, or mollusk shells) that is made by a living creature is not considered to be a mineral, even although it is chemically and crystallographically equivalent to minerals such as aragonite or calcite. On the other hand, substances made by organisms that have later been altered by geologic processes (e.g. struvite in bat guano) could be classified as minerals.

Man-made materials (e.g. synthetic gemstones) are not accepted as minerals. But to confuse matters, formerly the International Commission had accepted some artificial materials that were subsequently altered by nature as minerals (e.g. weathered slags from ancient mines or new compounds formed in mine fires). This is no longer the case. Yet, material that results from weathering (or other natural processes) of rocks (exposed in a road cut, for example) may become new minerals, even if human activity initiated the process—provided that such activity was not done deliberately to create new minerals (for example, by purposely exposing piles of rocks to the elements).

A New Blue Mineral from Morocco
An unknown fibrous, vividly-blue mineral was purchased at a roadside stand by British geologist Anna Grayson, while on a field trip in Morocco (Nature, Mar. 21, 1996, and Dr. Gordon Cressey, private communication). The specimen was brought to Dr. Cressey at the Natural History Museum in London for identification. The new mineral is unusual for its large size and striking blue color. It has been featured on the BBC radio in England during the National Science Week in March, and due to the popular response, is now on display at the Museum. Since the initial announcement of the discovery, other people have donated specimens of the identical material to the Museum, one piece having been bought along the same road over 30 years ago!

Under an electron microscope, the mineral is seen to consist of sub-microscopic fibrous to bladed crystals, less than one ten-thousandth of a millimeter across, somewhat resembling asbestos. X-ray fluorescence analysis shows the presence of silicon, aluminum, calcium, magnesium, iron, and oxygen, all common constituents of many rock-forming silicate minerals. Under a polarizing microscope, the fibers appear intensely pleochroic, changing from bright-blue, to bright-purple, to colorless. The blue color is probably caused by a charge-transfer process, in which the iron exists in two different valence states, such that an electron can “hop” between adjacent atoms, absorbing energy from the red and yellow portions of the visible spectrum, and allowing blue and purple
light to be transmitted.

Dr. Cressey is currently attempting to unravel the blue mineral’s crystal structure. Due to the extremely small particle size, conventional x-ray diffraction is not too useful, so he is employing transmission electron microscopy combined with electron diffraction to image rows of atoms at two million times magnification. At this stage of the analysis, the bladed fibers appear to belong to the orthorhombic or monoclinic crystal systems (axes are close to 90º apart). The structure is entirely different from known mineral groups. The mineral contains up to 20% water by weight, which is tightly held in zeolite-like channels or cavities, but the fibrous crystal habit resembles amphibole asbestos, some fibrous zeolites, or sepiolite.

**Ascent of Ilmenite from the Depths**

Microscopic rod-shaped inclusions of ilmenite (FeTiO₃) in olivine crystals from the southern Swiss Alps, near Lake Maggiore, suggest to geologist Larissa Dobrzhinetskaya and her colleagues from the University of California (Riverside) that a large chunk of the surrounding Alps may have come to the earth’s surface from depths of over 400 kilometers (see New York Times, April 9, 1996 and Science, March 29, 1996). This discovery is very puzzling, because in the absence of volcanic activity, deep mantle rocks tend to stay put. Plate tectonic theories may have to undergo major revisions in order to accommodate these new findings.

The far-traveling rocks consist of peridotite, a type of mantle rock dominated by forsteritic olivine, with lesser amounts of a deep red-violet pyrope garnet and apple-green pyroxenes. Further analyses revealed the presence of rod-shaped inclusions of ilmenite and three previously unknown polymorphs of iron titanium oxide in olivine. Some of these polymorphs are stable only at the high pressures existing more than 400 kilometers deep within the earth. All four phases are believed to be relics of a single, even higher-pressure phase that has now vanished. As the rock decompressed on its upward ascent, the iron titanium oxide rods progressively transformed to the low-pressure form of ordinary ilmenite. But some of the higher-pressure forms managed to survive the upward journey. In at least one case, different polymorphs were found at different ends of the same rod! At the great pressures implied by the new iron titanium oxide polymorphs, even olivine must have existed in a different form, perhaps as wadsleyite.

**Iridium Metal— The “Smoking Gun” of the Asteroid Impact that Doomed the Dinosaurs**

Two microscopic grains of pure iridium metal were discovered in impact-melted rocks that were recovered from the Chicxulub crater, buried beneath the Yucatan peninsula in Mexico, by Benjamin Schuraytz and his colleagues at the NASA Johnson Space Center, Houston, TX (Science, Mar. 15, 1996). The two particles, detected using a scanning electron microscope, measure 4 by 2.5 by 0.5 micrometers, and 5 by 4 by 1 micrometers, respectively (one micrometer = one millionth of a meter). The particles appear to be aggregates of still-smaller grains, some showing crystal faces indicating an overall cubic symmetry.

Native iridium is an extremely rare mineral on earth, but it is more abundant in iron meteorites. The two iridium particles therefore provide compelling evidence that the now-buried crater was originally formed as a result of an asteroid impact, which spread iridium-rich dust over most of the earth’s surface, thus contributing to the extinction of the dinosaurs and many other forms of prehistoric life, around 65 million years ago.

**Diamonds from Wyoming**

The diamond-producing potential of Wyoming appears very promising, according to W. Dan Hausel, senior economic geologist at the Wyoming State Geological Survey (Geotimes, Feb. 1996). The Colorado-Wyoming kimberlite province includes over 100 kimberlite intrusives, a major lamproite field, and heavy mineral anomalies that are favorable indicators for diamonds. (Lamproites are another type of rock that may host commercial quantities of diamonds. An example is the Argyle deposit, western Australia). The Colorado-Wyoming area has already yielded over 120,000 diamonds in the last 20 years, making it the prime diamond-producing area in the U.S. Diamonds recovered at the Kelsey Lake site, along the Colorado-Wyoming border, include several gem-quality stones weighing up to 14.2 carats. Another significant new discovery in southwestern Wyoming was announced last November by a Canadian mining company.

**Cheap and Fast Diamond Coatings?**

Pravin Mistry, a British metallurgist working in the U.S., may have accidentally discovered a cheap, fast, and efficient way of coating objects with thin layers of diamond film, according to the Mar. 12, 1996 New York Times (see also New Scientist, Mar. 23, 1996). If his process proves commercially and economically feasible, it will have numerous applications in industry, medicine, and the military. By unintentionally substituting carbon dioxide for nitrogen in an experiment to apply coatings of titanium diboride, Mistry and his co-workers formed a thin film of
diamond, instead. The new process uses four strong, finely-tuned laser beams which heat a small spot on the surface to 10,000 C. The carbon dioxide gas is the source of carbon, which at this high temperature becomes an electrically-charged plasma that somehow interacts with the surface, forming a well-bonded layer of diamond.

Mistry claims that his new method is several thousand times faster than the conventional chemical vapor deposition process, in which methane is broken up into its constituent hydrogen and carbon atoms at high temperatures. The carbon atoms deposit as diamond on the surface of the object to be coated. However, many of these thin films actually consist of mixtures of diamond and graphite, another crystalline form (polymorph) of carbon. Furthermore, these thin films tend to flake off. Diamond film coatings also face strong competition from cheap synthetic industrial diamond abrasives made in China by a high-pressure, high-temperature process.
"Young" Diamonds from Siberia (From Nature, June 1, 1995)

A team of scientists from Woods Hole, MA and Novosibirsk, Russia, has found "young" diamonds from the Mir kimberlite pipe, Siberia. Analysis of the distribution of trace elements in chrome pyrope garnet inclusions reveals great variations in chemical composition both within and among garnet grains from a single diamond crystal. Such a high variability in composition indicates rapid crystal growth, in which the growing crystal did not have enough time to come to equilibrium with the enclosing melt. Therefore, the diamonds from the Mir pipe must have crystallized fast, shortly before the explosive eruption of the kimberlite, around 360 million years ago. The Siberian occurrence contrasts with the usual situation, in which ancient diamonds (up to 3 billion years old) are brought to the earth's surface in much younger kimberlite pipes (hundreds of millions of years old).

Life on Mars? A Mineralogical Perspective
(Based on items in The New York Times, August 7-8 and Science, August 16, 1996)

Part I

On August 6, a scientific team led by Dr. David S. McKay of the NASA Johnson Space Center announced that they had uncovered evidence of former life on Mars. They claim that the close proximity and distinctive textures of carbonate and iron minerals alongside organic (carbon-containing) molecules in a martian meteorite indicate signs of bacterial activity. Inasmuch as minerals lie at the heart of this controversial finding, a closer look at this martian meteorite and its mineral make-up should be of interest to Club members.

The 4.5 lb meteorite, ALH84001, containing the presumed life-forms, was found twelve years ago in Antarctica. It is only one of twelve meteorites believed to have come from Mars. These meteorites, collectively known as SNC (standing for the rare Shergottite, Nakhlite, and Chassigny classes), differ in some chemical characteristics from other known meteorites. The main reason, however, for suspecting that these rocks came from Mars is the close match between isotopic compositions of trapped gases inside these meteorites and the Martian atmosphere which was analyzed by the Viking Landers in the late 1970s.

The ALH84001 meteorite is an igneous rock that crystallized from a melt 4.5 billion years ago—and is therefore almost as old as the Solar System. It consists largely of coarse-grained orthopyroxene, with minor amounts of olivine, maskelynite (a shock-melted plagioclase glass), chromite, pyrite, and apatite. The rock is criss-crossed by fractures that were filled by "globular" carbonate minerals around 3.6 billion years ago—long after the original formation of the rock. It was then blasted off the surface of Mars around 15 million years ago, probably by an asteroid impact, and wandered in space until around 13,000 thousand years ago, when it landed on the ice fields of Antarctica.

The organic molecules—PAHs, or polycyclic aromatic hydrocarbons—are closely associated with carbonate minerals in the fractures. Intact carbonate globules are rounded and appear orange in visible light. They are surrounded by white and black rims. High magnification with a scanning electron microscope reveals that the black rim particles consist of cubic and "tear-drop"-shaped magnetite ($Fe_3O_4$) and pyrrhotite ($FeS$). Some magnetite and iron sulfide minerals have also accumulated toward the center of the carbonate spheroids. This central iron sulfide has a rectangular habit and may be greigite ($Fe_3S_4$).

Dr. McKay and his team assert that the rock was carefully handled to avoid contamination. Since the PAHs increase toward the interior of the rock, rather than remaining concentrated on its exterior, the PAHs are most likely indigenous to the rock. They point out that the magnetite and iron-sulfide particles strongly resemble magnetosome particles produced by some terrestrial bacteria. The possible bacterial origin of these particles is further supported by the location of oxidized iron in magnetite right next to reduced iron in pyrrhotite and greigite. This close juxtaposition of oxidized and reduced forms of iron would require a very special (and highly unlikely, in their opinion) set of geochemical conditions, if they were produced inorganically, in the absence of biological activity. In addition, segmented, tubular particles are seen perched on the globules and strongly resemble terrestrial bacteria, but are 100 times smaller than their earthly counterparts.
The announcement of possible signs of former life on Mars by Dr. McKay and his team of NASA and university scientists (see Part I, last month’s Bulletin) has aroused great popular interest and controversy. Dr. William Schopf, an expert on ancient microfossils from the University of California at Los Angeles, quoted Carl Sagan: "Extraordinary claims require extraordinary evidence". He and others were quick to point out that the organic molecules— polycyclic aromatic hydrocarbons or PAHs— are not only formed by living organisms, but are also found in carbon-bearing meteorites from the asteroid belt and in interstellar clouds. The smallest bacteria on Earth are at least 100 times larger than the Martian examples. Unlike other Martian meteorites, this specimen, ALH84001, shows scant evidence for the presence of water in hydrous minerals such as clays, or in hydrated salts.

A key piece in this puzzle is the nature and origin of the carbonate globules. Opinions span a wide range of possible temperature conditions. Dr. McKay claims that, on the basis of carbon isotope values, the carbonate minerals formed at fairly low temperatures. Other researchers, however, find instead that the strong chemical zoning across the carbonate globules (e.g., showing high magnesium and iron-rich rims and calcium-rich cores) and absence of co-existing hydrous minerals indicate that the carbonates formed at very high temperatures (e.g., above 650º C). These elevated temperatures were probably caused by an impact event on the surface of Mars, around 3.6 billion years ago, long after the meteorite crystallized from a melt. As a result, the rock became heavily fractured and CO₂ from the Martian atmosphere was introduced into the fissures, where the carbonate minerals subsequently crystallized. Needless to say, such a violent, hot and dry environment is not especially hospitable for living organisms! Another contradictory finding is the isotopic composition of sulfur from the iron sulfide minerals. According to University of New Mexico geochemists James Papike and Chip Shearer, the sulfur isotopes in the Martian meteorite do not match the characteristic “fingerprints left by biological activity” in terrestrial rocks.

In spite of the inconclusive nature of the evidence presented to date, the possibility that life may once have existed on Mars presents such a potentially momentous scientific and philosophical discovery, that further research into this issue is clearly warranted. The search for life on Mars will be a high priority for any future space missions to the Red Planet.

Rubies from the Roof of the World

Last August, New York Mineralogical Club member Karen Rice, together with ten other people, journeyed from New York to Islamabad, Pakistan, and thence to the Nangimali and Lower Khora mines, northwest Pakistan, in search of rubies from the roof of the world. Karen recounts her adventures in this remote, physically strenuous, yet spectacularly scenic terrain, in the June 1996 issue of JCK (Jewelers’ Circular Keystone).

After a lengthy 16-hour ride along the treacherous Karakoram Highway, leaving the modern capital city of Islamabad and heading for the town of Gilgit, in the foothills of the Himalayas, the intrepid voyagers found themselves transported to another world, from another time. As they ascended, the travelers were rewarded with magnificent views of the massive Nanga Parbat (26,660 feet). Located at the western end of the Himalayas, in one of the geologically most active regions of the world, this mountain continues to rise at around 10 mm/ yr, in striking contrast to the average Himalayan uplift rate of approximately 1 mm/ yr. As the terrain grew increasingly more rugged, the group had to switch from the comfort of a bus, to jeeps, mule back, and finally had to climb the 15,000 foot-high Shounter Pass into Azad Kashmir on foot.

The expedition set up a base camp at Nangimali Village, from which they climbed to the Nangimali Top ruby mine at 14,000 feet, the world’s highest mine. The mine consisted of two benches, 90 meters apart, traversed by ruby-bearing calcite bands. Although the group was permitted to prospect for rubies, they had to turn over any finds to mine security staff for checking. The following day, the group visited Lower Khora, a 12,000-foot high ruby deposit. There they watched miners smashing the hard rock with picks and hammers into smaller and smaller pieces from which they extracted ruby crystals. From time to time, miners would blast, setting off mini-avalanches of loose rock.
The return trip was marked by deteriorating weather, leading to snow and ice over the mountain passes, bruised and aching feet and knees, and general exhaustion. Still, the team successfully traversed the mountain pass, reached their jeeps, and continued their descent to Islamabad. The chronicle concludes with a brief survey of the history of Kashmir.

The reader is treated to a detailed account of a journey to a fascinating, exotic land. Curiously, considering the length of the article (27 pages), much was left unsaid. Although written for a gem-oriented audience, very little description was given of the rubies from Nangimali and Lower Khora. No mention was made of other gem occurrences of Kashmir, whether modern or historical. Finally, this reader was left in suspense as to whether the prospectors were permitted to keep any of their finds.

**Unique Ruby-Sapphire-Tourmaline-Chromium Mica Rocks from New Zealand**

Rodney Grapes and Ken Palmer (in the *Journal of Petrology*, v. 37, 1996) describe a unique ruby-sapphire-tourmaline-chromium-mica rock from the Southern Alps, New Zealand. These colorful rocks have been recovered from glacial moraine and river beds, but have never been found in situ. The dark red to blue corundum crystals often form interpenetrating doubly-terminated, barrel-shaped hexagonal dipyramids, but these are not sufficiently transparent to make good gems. The corundum crystals are spectacularly zoned, going from colorless to pale pink at the extremities to dark ruby-red or deep violet-blue toward the center, where blue corundum appears in sector zones. The corundum crystals are embedded in an emerald-green Cr-mica matrix, surrounded by grayish-green chlorite. The dark olive-green tourmaline crystals occur in veins within the mica matrix. Based upon the combination of minerals and chemical composition, Grapes and Palmer deduce that these rocks formed at around 450°C, as the result of strong chemical alteration of quartz and feldspar-rich schist enclosed in serpentinite.

**Trillions of Diamonds from Asteroid Collisions**

A new place to hunt for diamonds may be in the rocks of ancient craters blasted out by powerful asteroid collisions, according to William J. Broad (New York Times, June 11, 1996). Although the connection between diamonds and impact craters has been known for over a hundred years, the quantity and size of recently-discovered diamonds vastly exceed earlier finds. In the early 1960s, Edward Anders’ group from the University of Chicago, had detected microscopic features in the Canyon Diablo iron meteorite from Meteor Crater, Arizona that could have formed only under the extremely high pressures and rapid heating and cooling caused by a shock wave through the meteorite during impact.

In the 1970s and 1980s, Russian scientists investigated mining impact craters for diamonds. One site in northern Siberia, the 60-mile wide Popigai crater, which formed 35 million years ago, has yielded peanut-sized diamonds. Although the Popigai diamonds look promising because of their relatively large size, most impact diamonds are too small and too highly-shocked to exhibit gem potential. This has not deterred one unnamed company from prospecting for gemstones in an undisclosed North American crater, according to Dr. R. A. F. Grieve of the Geological Survey of Canada.

Billions of tiny diamonds have also been recovered from the shock-melted rock (suevite) associated with the 15-mile wide Ries Crater in southern Germany. (This crater is also the source of the attractive yellowish-green moldavite tektites—believed to be impact ejecta). Minute diamonds have also been found in numerous locations, world-wide, mixed together with iridium at the geological boundary between the Cretaceous and Tertiary periods, 65 million years ago. It is widely believed that this iridium (and diamond)-rich layer represents fallout from a major asteroid collision that blasted out the 105-mile wide Chicxulub crater in the Yucatan Peninsula, Mexico.
Section VIII

From the Internet

As you have heard, the global Internet is an immense source for fun and information. Mineralogy and mineral collecting are no exception, for websites abound! All articles reproduced here are done so with the author’s permission.
Our Mineral Relations
[Ron Bozicnik; The A ssay (4/ 94); Jim Hilsgen, Editor Lithosphere Richard Busch, E ditor June/July 1994 Fallbrook Gem and Mineral Society, Inc; Fallbrook, CA]

The field of geology has always been full of special inter-kingdom relationships. Many of them are known to modern prospectors who routinely make chemical tests of plants to determine what metal traces their roots have absorbed out of the ground.

If you are looking for gold, for instance, it would behoove you to note where horsetails grow because these ancient plants have a fondness for it. One botanist recently reported a case of horsetails absorbing gold in the proportion of four ounces per ton of plant material. And a kind of mold was recently discovered in Russia that can extract up to 98 percent of gold in liquid solution. Wild buckwheat, native to the western United States, has a similar affinity for silver and is known to be abundant near silver mines. Likewise, the wild poppy and the dandelion are clues to copper. In the American Southwest, locoweed often marks uranium deposits. Tumbleweed and milk vetch are the tip-off for selenium.

Animals share in this attraction for minerals, too, because all protein molecules seem to welcome a few metallic atoms in their complex spiral latticework. Australian sheep have been known to die for lack of a tiny amount of cobalt in the soil, and other animals have succumbed because they needed a tiny trace of copper or manganese. The latter metal, in fact, is so vital to ants that miners in the mountains of New Mexico have been reported to use anthills to plot the courses of manganese veins.

Majuba Hill, Nevada
[Scott Kleine, Nevada Mineral Collector, Reno, Nevada]

Preface:
For those of you who do not know where the Majuba Hill mine is, or do not know of the minerals that can be found there: Majuba Hill is in the Antelope District, Pershing County, Nevada. It is a source for 84 different mineral species, many of which are rare and very desirable, though micro. Majuba Hill is particularly renowned for its world-class clinoclase and olivenite, and is the type locality for two beautiful, secondary arsenates; goudyeite and parnauite. For detailed mineralogic, historic and locality references, see: Jensen (1985) “The Majuba Hill Mine, Pershing County”; Mineralogical Record, Vol. 16, #1, and; Jensen(1993) “Update on the Mineralogy of the Majuba Hill Mine, Pershing County”; Mineralogical Record, Vol. 24, #3. Once in a great while, a mineral collector makes an outstanding mineralogical find at Majuba Hill. This happened to me, and I would like to share it with you.

The Story:
On Saturday, March 16th, 1996, my good friend Jesse Wellman and I drove over to Majuba Hill, about a three hour drive from Reno, for a day of mineral collecting. When we arrived at the entrance to the mine, we inspected the recent vandalism to the timbering at the entrance for a while, and pondered why someone would do something so sinister to this world-class mineral locality and historic mine site. After judging the mine safe to enter and unloading my equipment from the bed of his truck, Jesse took off and drove over the hill next to Majuba, to take care of some other pending work, that he had to do before he could go collecting. So, as soon as I was ready, I proceeded directly into the mine and to the Copper Stope, about 1000 feet inside. Once inside the stope, I went over to an area that I had previously heard about some olivenite occurring at before. This olivenite occurrence was about 12 feet off of the floor, on the South Rib of the stope. It consisted of a small area of removed rock, along with some minor olivenite on small, exposed fracture surfaces in the fallen material, in the nearby floor muck. I used the long ladder that was conveniently propped up against this part of the rib of the stope to gain access to this area. Once I climbed up to this area, my attention was drawn to a colorful, ~1cm wide, horizontally-persistent fracture zone that consisted of a series of small, anastomosing veinlets and tiny vugs of intergrown, contacted, medium-green olivenite crystals to 2mm. This convinced me to work this area, since I felt that I had a chance of finding some larger vugs with good, uncontacted crystals in them. I really wanted a very nice, self-collected olivenite specimen for my own, personal collection, from Majuba!
Over the next couple of hours, I exposed more of this olivenite zone and found a few decent ~1cm vugs that contained some small, 2-3mm, light-to-medium olive-green, semi-sticky, TERMINATED crystals. Finding these crystals began to build my excitement a little, since I felt that they were somewhat better than usual. So I continued to further expose this zone, as to increase my chances of finding something even better. As I removed material off to the right of the where I originally started collecting at, I noticed that the rock itself was becoming more altered and the olivenite vugs were increasing in size and occurrence. The crystals themselves were greatly increasing in quality and size, towards this direction, as well, with some local spots containing scattered, dark-green, stocky, lustrous, semi-free-standing crystals to 4mm in vugs to 2cm, even better than the smaller, medium-green, semi-fibrous crystals of olivenite that I had been finding earlier. Over the next hour, or so, I continued to work in this direction and kept finding better and better crystals and larger vugs, and even found a couple of nice, richly-coated hand specimens! I was really having fun! About this time, Jesse had just returned and joined me in the stope, to do some of his own collecting. He was interested in finding some of the more unusual species that occur in the floor muck, in the stope. After visiting with him and showing him some of the specimens that I had collected, Jesse went over to the other side of the stope, as I continued to work off to this right-hand side of the mineralized, olivenite zone. As I worked, I came across a large, ~1.5m x ~1m x ~0.75m, slab of mud-covered rock, on the rib, with a small fracture running behind it, directly in the path of the olivenite-rich zone that I was following. After some prolonged effort, I was able to pull this slab of rock off of the rib with my longbar. When this slab, that must have weight 500-600 pounds, fell off of the rib, it exposed a *MOTHERLOAD* of incredible, 4-10cm vugs of stocky, deep-green, lustrous, 0.25-1.0cm olivenite crystals, half of which were on the wall, the other half were in the fallen slab! After yelling a long-forgotten, primal call, I climbed down off of the ladder and looked at the boulder...It was completely run through with spectacular olivenite!!! I called Jesse over to see this supreme discovery, and to reassure him that my cry was not one of pain nor injury. Once he arrived, we both sat there looking at the olivenite boulder, spellbound, for several minutes, taking in the moment. On the boulder's upmost surface, several magnificent olivenite vugs could be easily seen through the dust that had settled on them, after their fall to the floor of the stope. The best one of these vugs was about 7cm long, 2-3cm wide, and about 1-2cm deep, FULL of the most brilliant, deepest-green, aesthetic crystals that I had ever seen! Numerous other, smaller vugs graced the boulder's surface as well, hinting at what was still to be found deeper within it.

After regaining some thought control, I took the disposable camera, that I had coincidentally brought with me, out of my pack and began taking several pictures of the exposed surfaces on the olivenite boulder and the subsequently-exposed rib face, also studded with incredible olivenite vugs. Then, I began the exciting job of trimming down this large boulder and collecting all of its contents, while Jesse chose to go back to his spot on the other side of the stope (which he began collecting at with a renewed vigor!). This olivenite boulder was composed of literally hundreds of incredible specimens all stuck together, separated by mineralized fractures containing zones of rich, beautiful, sparkling vugs and surfaces of vibrant olivenite crystals. Some these vugs were almost 10cm across and were richly lined with hundreds of small, 1-4mm, free-standing, very brilliant, transparent crystals, while others had monstrous, 0.5-1.0cm, stocky, blackish, individual crystals sprinkled sparingly in vugs lined with punky, brick-red goethite. A few of these vugs even contained some doubly-terminated crystals! Other specimens in the boulder had light, lime-green coatings of agardite under the olivenite crystals, making for spectacular contrasts between the two species. Along some of the largest fractures running through it, the boulder was so altered that it felt and sounded like a cinder block, and was mainly composed of the vuggy, reddish goethite with large, 0.5cm, lustrous, blackish-green olivenite crystals tucked way in some of these highly-oxidized vugs. The largest single crystal, on matrix, that I found there was a flat-lying, slightly modified, well-terminated, very lustrous, transparent, deep-green monster, measuring 0.7cm long, 0.8cm wide and 0.4cm thick! This was truly a dream-come-true find for me!

Once I was finished breaking down the olivenite boulder, which took me almost 8 hours to complete, I tried to collect as much as I could off of the rest of the existing zone on the rib, but the rock was extremely hard and solid behind where the boulder came from and thus it became increasingly difficult to get more of the rock off it. I was also exhausted and didn't have enough energy left to stand on that ladder and pound on the olivenite vugs above my head anymore, though there were plenty of superb specimens still needing to be collected.

Now that I had finished collecting, I turned my attentions to the job of wrapping the hundreds of specimens in the dozen open-face flats that lay strewn around me, out of harm's way. While I was wrapping specimens, Jesse came over and showed me some very interesting and unusual clinoclase, on prismatic quartz, specimens that he had just found. Then, he gave the still-exposed olivenite vugs on the rib a try. It took him almost 2 hours to finish collecting the remaining vugs in this face, but what he did find was extremely good, with one hand specimen containing a 6 x 4cm vug of 0.5cm, very lustrous, blackish-green crystals, with some being very aesthetically stacked on top of one-another, with many doubly-terminated crystals topping several of these stacks!
After packing the contents of what I had trimmed down from the olivenite boulder and rib, I had a total of 8 flats of this incredible olivenite! I had only brought 6 whole cardboard beer flats with me, with tops and bottoms, as well as 8 rolls of toilet paper, so I had to use some of the beer flat tops lids to packs specimens in, until, alas, I ran out of TP, as well. I had to leave the rest of the olivenite boulder pieces in ~20cm, untrimmed chunks and put them all in the 5-gallon bucket that I had brought with me. This way, the inner olivenite crystal zones in these pieces would be safe from any damage, while in the bucket, and I could bring them home and trim them later, at my convenience.

I finished wrapping the specimens just about the time that Jesse grew tired of pounding on the rib. Though extremely tired, we had collected *EVERYTHING* we possibly could from the olivenite zone and boulder. We arrived back in Reno at 4:00am, 20 HOURS after we left for Majuba, completely and utterly exhausted.

Two weeks later, the cleaning process of all specimens that I had collected that day was complete... and YES! Both Jesse and I now have several *INCREDIBLE*, self-collected olivenite specimens gracing our mineral collections, to remind us of that most spectacular of collecting experiences at Majuba Hill.

### Nevada Trip

[Scott Kleine, Nevada Mineral Collector, Reno, Nevada]

I have just returned from a 4-day collecting trip to many different mineral localities here in Nevada. I want to share the experiences of this trip with you and tell you about the great minerals that my friends and I found. This is a log of that journey.

**July 3rd, 1996**

With my truck packed with 4 days of food, water and other provisions, I drove over to Jesse Wellman's house, at about 6pm, to start our collecting trip. Once ready, we drove to Eureka, Nevada, about a 4-hour drive, to meet up with another friend, Greg Ferdock. After visiting, we settled down, in an "out-of-the-way" place for the night.

**Fourth of July**

We awoke at about 7am and drove into Eureka to get gas, before they closed the streets for their big, Fourth of July celebration. We then drove South, through the town of Duck Water and intersected with Highway 6. Leaving Jesse in Duck Water for the day, to do some "business", Greg and I continued on. After another 40 miles, or so, West on this highway, we turned off North and began a long and torturous, 4-hour trek through a maze of feeble, eroded dirt roads, creek beds and washed-out dead ends, before we found the way to our destination; the Morey District! Here, within this district, are numerous, steep declines and shafts which explored and produced high-grade silver mineralization. With some directional assistance, from another friend of mine, we found a steep decline and vertical stope that housed our quarry: silver sulfosalts on and with rhodochrosite! It was a tough, dangerous climb down into this mine, requiring MANY safety devises and high levels of climbing experience. But, when we finally got there, with the assistance of TWO ropes, we found rich plates of 1-5mm, curving, rhombohedral, pink rhodochrosite with quartz crystals and owyheeite. We also found, photographed and collected a spectacular vein consisting of very large, hard, 1-5 pound, 2-4 inch-thick slabs with 1-2 inch, crystalline, pink rhodochrosite veins and bright quartz vugs with other, thinner veins of pyrargyrite mixed with other, various silver-bearing, crystalline sulfosalts. These slabs are PERFECT for polishing, cabbing and slabbing! We were really having fun!... until Greg and I had to start packing this VERY HEAVY material out of the mine. Pack by pack, buckets, sample bags and flats, ALL had to go back up the two ropes that got us to this collecting site. Finally, out we emerged, with fine specimens in hand!

With Jesse finally returning from Duck Water, we camped right at the entrance to this mine, for the night, as we felt that we might want to collect more, in the morning. We celebrated the 4th with a FEW beers that night.

**July 5th**

With the sun waking all of us up by 7am, we ate our breakfast and deliberated; should we collect more specimens in this mine, or explore the other, numerous mines located nearby? We decided to go back down into this mine that we had already been into, to collect more specimens, until the afternoon.

While heading down to the bottom of the stope, I noticed a surface of rhodochrosite crystals, on the side of a pillar, that would make a nice handspecimen, so I stayed there to collect. Jesse went down below me, into a far extension of the stope, to collect more of the big, thick vein of the rhodochrosite. While I was collecting, I came across a zone of nice, acicular crystals of owyheeite on and with rhodochrosite, which was easily the best of this species that we found that day. Greg joined me, on the attack of this pillar. He decided that he wanted to work the back bridge of the pillar, while I continued to work on the right face of the pillar and continuing stope rib. Greg had just found a very nice vein of rhodochrosite with a little owyheeite. As he started to really get into it and pound hard, all of the sudden his chisel broke through... into the other side of the pillar! His killer vein had just become "stoped out"! After ribbing Greg, for awhile, we continued to collect. I was becoming extremely low on...
After eating some lunch, we headed for a big complex of mines that looked the most promising. Each time we came to a different obstacle, within one of the mines, we would take turns on who goes through it first, so that each one of us would get a chance to be the first person through and see the "virgin" area ahead. On one, I had to squeeze through a TINY hole that we had opened up though a back-filled area. It was a very good thing that I was very comfortable underground! Jesse also had to squeeze through a different hole, while Greg got the biggy; a 60', very steep climb down a stope, using a rope. All in all, we didn't find anything, as the stopes had all been heavily back-filled, which didn't give us any access to the deeper working which had produced the unoxidized minerals. All we found there was black, sooty pyrochroite that had once been beautiful rhodochrosite. Oh, well...

At 3pm, Greg had to leave and go back to work, in Elko. Jesse and I decided that we were finished with this district, so why not explore the other, myriad of mining districts all around us? We left the Morey District and headed for the Tybo District, which was about 30 miles away. Once there, we found out that a large mining company had "locked up" the district, which left us no opportunity to explore the very large, underground mines there. The one redeeming feature about this district, and Nevada in general, was the GREAT, beautiful views; Huge, deep canyons, old, historic houses, mine head frames, mountains, sweeping valleys... They were all there in there grand, unique glory.

By this time, I only had about 4 gallons of gas left, and was starting to get a little worried, so Jesse and I headed for Tonopah, which was only about 50 miles away. We gassed up there and had a couple of great, chicken-fried steak dinners at the Mizpah Hotel. There was still some light in the sky, as we left Tonopah, so we decided to drive over to the now-defunct Hall mine, about 30 miles to the North, to see if we could get a tour of the mine by the caretaker there, the next day. We got off of Highway 95 and got on the Gabbs Pole Line Road and headed North, but it got so dark, so quick that we couldn't find the turnoff that we had to make. So we stayed the night out in the middle of a very grand, GIGANTIC valley. It got so dark that night, without a single cloud in the sky, that we were able to see star constellations that we had never been able to view before, as the mountains surrounding the valley were far away and low on the horizon, and there was a very late moon that night. It was truly an awe-inspiring sight that few people ever get to see. It really makes one feel "small".

July 6th

We were awakened the next day by the heat of the sun, at about 7am. We got up, ate a quick breakfast and headed for the Hall mine. We easily found the paved road that lead to this mine and drove up to the locked gate at the entrance to the mine. Disappointed, we found that nobody was there, though there was a coffee pot, in our view, that was still half full of water. All we could figure was that the caretaker was in town, for some reason.

So we left the Hall mine and continued on the Gabbs Pole Line Road, on our way to Gabbs and the Gabbs Basic Refractories Pit. On our way over to Gabbs, we stopped by the Paradise Peak mine and asked about a tour of their mine. But only the lone caretaker was there and he couldn't give us a tour. So, continuing on, we made it to Gabbs and stopped for a cold drink and ate some lunch. Afterwards we went up to the Basic Refractories Mine and asked them for a tour. BUT AGAIN, there were not enough people there and they had some "big problem" that day with some equipment. I guess that will teach us to come on a regular business day and NOT on a big, 4-day weekend! It was very interesting just to at least see this mine, though. They mine refractory minerals there, such as brucite and magnesite and are making a great profit, with a mine-life expectancy of another 30-some-odd years. Now that is a successful mine!

Continuing on Highway 361, we intersected with Highway 50 and got some more gas, as we were getting ready to head out into the "boonies" again. From there, we drove West on Highway 50 and turned South on the road to the Raw Hide District. There, we saw the big dumps of the Raw Hide open pit mine, from across the valley, but with new wisdom in our minds, we didn't ask for a tour.

We continued on and went collecting at a locality for nice, BIG plates of lustrous barite crystals. Also, at this mine, is what I believe to be a unique, minerologic association: orpiment and realgar inclusions in barite crystals! It took us a while to find some good zones of the included barite, but when we did- WOW! We found 0.2-2cm, freestanding, lustrous, transparent, tabular barite crystals with splottes and growth-zones of greenish-yellow orpiment. A few of the crystals also had realgar, but they were VERY hard to come by. Some of the specimens had nice, aesthetic, included barite crystals *ON* tapered quartz crystals! I also found a fault zone, deep within the mine that had loose breccia fragments to 1', covered with 0.2-1cm, unincluded, but very attractive barite crystals. This fault zone was very interesting in the fact that there was no need to us a hammer on the plates, as there were just sitting loose in this 2-foot wide breccia zone. All we had to do was to gently pull them out with our bare fingers. These specimens have so many barite crystal on them, that on some, it is difficult to decide
which side you want to display! After Jesse and I finished collecting this fissure zone, we continued to collect up higher in the mine, until it got dark.

That night, Jesse cooked up a "witches brew" of two Liptons Noodle mixes, corn and summer sausage... It was actually pretty good, considering that we had no milk or butter for the noodles. Tired, we watched yet another, incredible sunset metamorphose into a spectacular, starry night, while thinking of our last day of mineral collecting, still ahead.

**July 7th**

After waking up and eating breakfast, we decided to continue collecting barite crystals. Jesse continued collecting an incredible fracture zone, lined with excellent, aesthetically-included barite crystals, while I continued to collect a tight fracture zone of included barite that I had found. We decided to finish collecting, as the specimens began to decline in quality and increase in effort to collect. We removed all of the specimens, that we had collected, out of the mine and headed for Fallon, for a well-deserved, buffet lunch.

We returned to Reno just in time for a huge, evening-time thunderstorm to start showing off. We had a GREAT trip, all 800 miles of it and we have a lot of great minerals and great experience to show and tell. I hope that you have enjoyed this log of our journey and I hope that it will encourage YOU to go collecting and share your stories, too!
Arkansas Collecting
[Glenn Pearson, Chesapeake, VA, Rhound@aol.com]

Brookite Localities
Going into Magnet Cove (on the Old Highway), the locality is across the road and up the mountain from the cemetery. Once you have gotten to the top of the mountain, you will see where others have dug out holes to get to the Brookite deposits. They are attached to some really awful looking Smoky Quartz, and are a lot of work to get out. Be sure to take your pick axe, shovel, sledge hammer, food and water.

Wavellite Localities
Just before you get to Mount Ida, (some 40 miles to the west of Hot Springs), on the west side of Mount Ida, there is a locality up the first dirt road you come to going North that is west of where State 27 turns North. Go up the dirt road about a mile and hang the first left that you come to, you will see the old State Highway Department gravel quarry, and if you look around in the rock you will find lots of good specimens of wavellite. It comes off the side of the Mountain about 70 feet up, and it is not easily accessible to climb, not to mention that there are blasting caps lying around, so be real careful!

Diamond Mine at Murfreesboro
The Diamond mine is pretty much a Commercial Tourist trap now, but there are several locals that go out and work it on a daily basis. One of the locals told me that you need to look in the places where it drains first, and then look in the rest of the area. As I am told, you can tell a diamond by the fact that it is sort of greasy and so dirt does not stick to it very well if at all.

Magnet Cove
While in Magnet Cove, 2 miles North of the cemetery, there is a dirt road going East, take it and follow it to the old Iron Bridge, about 3 miles. Get out, head up river, you will see the Iron Pyrite in the water. It is in the bank at water level. Wear gloves, take your pick, you will find all that you want.

More Arkansas Collecting
Hello, Well I spent six days in Mount Ida, and dug for quartz on four of them, kinda under the weather for two days, or I would have dug on them too. I really can’t give you any accurate descriptions of what I may have found, as all specimens are still covered with clay and mud and wrapped up in newspaper. I do have four, 5 gallon buckets full of stuff, some of it may be “leaverite”. I am pretty sure I have some good stuff, at least that is my opinion, being a first timer in Mount Ida.

Dig #1, Wegner's Enchanted Forest Mine. This mine has not been worked in a couple of years. There were points all over the area from pencil lead size to shovel handle size and one half to 2-3 " long. Also dug in a couple of small pockets and pulled out a few decent pieces. They are not actively digging here because they are working another mining area for phantom crystals.

Dig #2, Fetcho's Mine (Fiddler's Ridge Rock Shop). Again a lot of surface material here as in Dig #1, Also worked a pocket here and pulled out some pretty decent crystals and small clusters and a couple of double terminated points. This is an active mine but no active mining had been done in a few days.

Dig #3, Wegner's Phantom Mine. They have a ten pound limit here at this active mine if you work the pit area, after that it is $1.50 a pound. The phantoms are special and that is why the additional cost when collecting in pit area. Unfortunately the pit was flooded and the pumps were not running, so no opportunity to look for the good stuff here. Just scratched the dump areas, nothing special here. By the look of things they had not dug here in at least two weeks.

Dig #4 Ron Coleman Mine. (This mine is north of Hot Springs, not in Mt. Ida) This is an active mine, with fresh dumpings from the pit area. No one is allowed into pit area, but you can dig through the tailings they dump at the top. Two fresh loads were brought up near the end of the day. Did pretty good here too, alot of points, some small clusters (2-3 xtls). I also found a point here that is a little bigger than a softball.

I had a good time and the folks were pretty friendly. If you want to get museum pieces you will have to buy them. I always felt like I got my fee back in crystals, although I didn't do as well in dig #3. Ocus Stanley had best prices wth Fiddler's ridge running second. I did some digging with my silver pick. There are many mines I did not go to, due to lack of time and bad case of sunburn from Dig #4.
And Still More Arkansas Collecting

[Betty Commean, FFE (all-volunteer) project, BettyCom@aol.com]

Dear Rockhounds,

In response to the message requesting info on crystal collecting sites, I am submitting the following 13 fee-for-entry crystal collecting sites. This info was obtained from the Mt. Ida Chamber of Commerce, Arkansas. The info was compiled as part of our fee-for-entry collecting site project. If you would like to see more lists like the following, please respond to our next message asking for fee-for-entry site information, coming soon to a computer near you. Enjoy!

Ron Coleman Mining Inc.

It costs $20 a day for adults, $5 for children ages 7-16 and children ages 6 and under can dig for free. Digging hours are from 7 a.m-5 p.m., Monday through Saturday and from 8 a.m.-5 p.m., Sunday from mid-September through February. During the rest of the year, the hours are 7 a.m.-6 p.m., Monday through Saturday and 8 a.m.-6 p.m., Sunday. In addition to the mining area, other facilities include a main building that houses a retail shop and a wholesale showroom. To purchase tickets for digging, go to the main building located off Scenic Byway 7, about 14 miles north of Hot Springs. (501) 984-5396.

Coleman's Rock Shop and Crystal Mine

The digging fee is $10 a day for adults and children under age 10 can dig for free. Digging hours are 7 a.m. to dark daily year-round. To buy tickets and to get directions to the mine, stop at Coleman's Rock Shop on Scenic 7, about a mile north of Hot Springs Village and 16 miles north of Hot Springs. (501) 984-5328.

The Old Spanish Crystal Mine -

It costs $10 a day for adults to dig; children under age 9 are free. Visitors may dig from daylight to dark daily year-round. To reach the mine, travel a mile north of Hot Springs Village on Scenic 7 Byway and turn right at the sign for the mine. Travel a half mile to the site. (501) 984-5732.

Wegner Quartz Crystal Mines

Wegner's operates several locations: the Phantom Mine where the fee is $20 per adult (half price for children) for four hours, including transportation to the site; the Crystal Forest Mine where the fee is $15 per adult (half price for children) for four hours, including transportation; the Old Mountaintop Mine with a fee of $8 per adult; the salted mine, an easy spot for seniors and children with a fee of $6 per adult, $3 for children; and the sluice mine where visitors can pan for precious and semi-precious stone with a fee of $5 per adult and $2.50 per child under age 12. Wegner's also has a tourist center where visitors may purchase quartz and other minerals and fossils, along with a snack bar. In addition, there is a campground with electric hook-ups and showers. The hours are 8 a.m.-5 p.m. daily. Call during winter for hours. To reach the site, travel six miles south of Mt. Ida off Arkansas 27 on Owley Road and follow signs. (501)867-2309.

Ocus Stanley & Son Crystal Dealers

Owner Sonny Stanley lets visitors dig at the Fisher Mountain Mine for a donation of $2 a day. Visitors may dig as long as they want beginning about 8:30 a.m. each day. To get the key and a map to the mine, stop at Stanley's shop on U.S. 270 at Mount Ida. Tours of the Stanley Mineral Museum are available upon request. For more details, call (501) 667-3556.

Starfire Mines

The fee is $10 a day for adults and $5 a day for children ages 15 and under. There are no set digging hours. For more information stop at the retail shop located 1 2 miles east of Mount Ida on U.S. 270 next to the Colonial Motel or call (501) 867-2431.

Robins Mining Co.

The digging fee is $10 a day for adults, $5 a day for children ages 8 to 16, and no charge for children age 7 and under. The hours are 8 a.m.-5 p.m., daily from Memorial Day to Labor Day and 8 a.m.-5 p.m., Monday-Friday during the rest of the year. Stop at the retail shop on U.S. 270 at Mount Ida to pay the fee. For more information, call (501) 867-2530.

Mystic Mountain Crystals near Mount Ida

For information on fees and hours, stop at my retail shop on U.S. 270 about two miles west of Mount Ida or call (501) 867-3921.

Fiddlers Ridge Crystal Mine

It costs $10 a day to dig and visitors can dig from 9 a.m.-5 p.m. daily year-round. To pay to dig stop at the Fiddler's Ridge Rock Shop on U.S. 270 about seven miles east of Mount Ida. (501) 867-2127.

Leatherhead Mining Co.

The fee to dig is $20 a day for adults and children age 12 and under are free. To reach the mine, travel about three-and-a-half miles south at Mount Ida on Ark. 27 and then watch for signs to turn onto Owley Road. Travel three-and-a-half miles to the mine. Hours are 8 a.m. to dark daily year-round. (501) 326-4871.
Crystal Vista In the Ouachita National Forest
Visitors can hike along a trail into a reclaimed crystal mine area and surface-hunt for crystals for free. To reach the site, travel south on Ark. 27 for about four miles and turn left on Owley Road. Continue for about four miles to the trailhead. (501) 867-2101.

Wills Crystal Mine
The fee for one section at the mine is $10 a day and for another section $20 a day for adults. Children age 12 and under dig for free. Digging hours are 9 a.m.-5 p.m. daily. Visitors should stop at the gift shop, located off Ark. 9 near Winona, to register to dig. (501) 594-5226 or (501) 565-8377.

West Crystal Mining Co.
Located four miles east of Mount Ida on U.S. 270. Call 1-800-457-9197 for more information.

For more information, contact the Mount Ida Chamber of Commerce at P.O. Box 6, Mount Ida, Ark. 71956; (501) 867-2723, or the Hot Springs Convention and Visitors Bureau, P.O. Box K, Hot Springs National Park, Ark. 71902. 1-600-SPA-CITY.

The Beryl Pit (Wal Gem Mine), Bancroft, Ontario, Canada
The new owners were hosing off the exposed pegmatite when I was there, and they were mulling over development techniques and possibilities. The hosing-off exposed vugs in the albite wall and in the floor, to maybe 3" across, quite unexpected because there's no history of big open spaces at the Beryl Pit — crystals are mostly locked in the feldspar. In the little sandbanks created by the water flow was found a curious thick, vaguely bluish 1" crystal, probably a chunky albite.

The goodies to look for are the neato pegmatite Be minerals, in the albite vugs. I'm hoping stuff like bertrandite or phenakite, beryllonite, etc., shows up. Never seen tetragonal xls, but I haven't exhaustively collected the place. I heard mention that samarskite xls were found, plus some good micro xls of rare stuff new to the pit, but I can't remember all the stuff.

Last summer I found good allanite, zircon, euxenite, and a textbook-perfect micro schorl xl, plus a molybdenite xl, of all things. Plus a few that I can't identify. The beryl xls are always shattered, but some are a bit glassy, with cabochon potential. During the Be drive in the war years they used to take out boxcar-loads of arm-long xls. Blue gemmy beryl is exceedingly rare, but you never know what you might come across. Apparently one was found last summer. Forget about finding terminated xls unless maybe you sledge for a week.

Of all the sites in the Bancroft area this has probably the greatest potential, especially for the micromounter. By the way, it's called the Beryl Pit now, the Wal-Gem name is out. The new owners are a triumvirate of long-time collecting families, and a small entrance fee is required, still payable at Kauffeldt's General Store in the mighty metropolis of Quadeville. For further info contact: Aqua Rose Gems & Minerals, 400 Highland Avenue, Orillia, Ontario, Canada, L3V 4E7 or phone (705)325-1102 or (905)824-4911 or (613)758-1083.
Canada 1996

[Nathan A. Schachtman, Haddon Heights, New Jersey, U.S.A., nschacht@voicenet.com]

Although we came back from our Canadian travels on the 24th of August, I am just getting around to unpacking some of the specimens I collected from the mines, quarries, prospects, roadcuts, etc., of the Canadian shield. As I told some of you, we take a cottage on Lake Baptiste, about 30 km from Bancroft, Ontario, and for a few weeks each year, I get to play at being a mineralogist, howl with the wolves, kayak, swim, and forget the demands of my office. This year, my office made it a little more difficult to do the forgetting. The day after I arrived, I had to turn around and fly out to Portland, Oregon, for a week of hearings. I returned to the cottage at the end of the week, but the day after I returned from Canada, I had to leave for Denver. Thus my delay in unpacking.

One of the first stops collecting was to return to the Highway 62 roadcut, near Maynooth, Ontario, which I had written about in Mineral News. It's still there, doing fine, thanks. I searched in the soft dirt adjacent to the area of the orange calcite veins and was still able to find nice chabazite crystals covering the pyroxenite, allanite crystals, and some gemmy diopside crystals. The roadcut is, however, running dry, and I doubt that it will continue to be so productive.

I didn't get to do quite as much collecting this year as in the past years. My business travel, and work, really did intrude. Still, I managed to get to well over a dozen localities, including:

- The Genessee 2 Mine: nice feldspar crystals, smokey quartz crystals
- Macdonald Mine: uraninite crystals, cyrtolite crystals
- The John Gole Quarry: fergusonite, cyrtolite, feldspar, allanite crystals
- The Goulding-Keene Quarry: natrolite crystals
- The York River Skarn Zone
- Highway 28 Roadcuts: pyroxene crystals, sphene, zircon crystals
- Monck Road Roadcut (Faraday Hill): uraninite, tremolite, molybdenite crystals
- Nu-World Uranium Mine
- Hwy 507 Roadcuts: graphite spheres, molybdenite, grossular, diopside crystals
- Hwy 648 Roadcuts: fluorite, scapolite, hornblende, molybdenite, magnetite crystals

These are some of the places I got to. Typically, it takes me a few months to go through my pickings to know for sure what I have collected, especially for the micromount material.

Chunky Gal Mountain, North Carolina

Coming from the south on 64 I go to the hard top road marked Deep Gap (there was a sign one a brown pole, but the sign is small) and go down to the dirt track (logging road) and drive down this to the camp sites I like on a small creek that has sand colored by bits of deep red garnet (on the left of the bridge or culvert depending on your point of view), using this as a base of operations go back to 64 and go back south to the first road on the left, this will be hard surfaced as it is the old road. Go down this road, you will pass over Buck Creek and find some smaller places to camp (if you go down the dirt road at the bridge you will find other places to camp along the creek). Staying on the old road (the surface is very rough and the road has been narrowed by nature to a one lane). When the old road ends it also goes back to the new pavement, here (before you get on the new road you will see a dirt road leading up the mountain) you can go up the mountain on a good dirt track that is also a logging road. At the top is a turn around/parking area with the remains of a forest services sign (the road goes on but don't follow it) at this point park and follow the trail up the mountain going right when you are offered a choice, you will find several "digs" by following the trails.

The newest digs are the best and you can find ruby/corundum pieces from small to thumb size with a little luck and a lot of patience.
Colorado

Jerry 00JMHUNT@BSU.EDU

I hope this isn't too late, I just returned from vacation to over 200 rockhound messages and am just getting around to them. Ironically, I was on Ruby Mountain a week and a half ago! I spent 2 weeks in Colorado and had a great time. About Ruby Mountain: Named for the garnets that are found there. It is actually a rhyolite intrusion (volcanic) and is noted for its high-quality garnets and an occasional topaz crystal. I was reading Steven Voynic's 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 gazillion apache tears! They are very small, only pea-sized but they are abundant, to say the least! I went up the mountain (actually it's just a hill compared to the surrounding area) and busted rhyolite 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!

Georgia Staurolite

Holly Camp, Georgia Mineral Society

We are sad to report that Mrs. Hackney, the owner of the Hackney Farm, has passed away. Her farm is a famous site in Fannin County, Georgia where we collect great staurolite specimens.

Her son said that "Everyone is still welcome as they have been in the past." This is good news for all of us who know how good these specimens are. He has 'bush-hogged' the area and is bringing in a backhoe to uncover more material for us Rockhounds. The $7.00 a carload ($3.00 per person if in a bus) fee will stay the same.

If you have never seen Hackney Farm staurolite, you're missing a real treat. Most of the material is black. Little or no cleaning is needed. There is a cool creek that flows 50 feet from the digs where you can screen (provided, but still bring your own) for your treasures. You will find a lot of single blades, most about one inch in length. You will also find an amazing amount of 60º X's. There are also 90 degree +'s ('Fairy Crosses'). But, what is truly wonderful is that you can also find trillings! My computer doesn't have a key for that shape. A trilling is when 3 double-terminated blades grow together and form a star with six ends. These are extremely rare anywhere, but I have found three there. There was an article about Hackney Farm in the Mineralogical Record a few years ago. By the way, staurolite is the State Mineral of Georgia.

It's a wonderful field trip and you can have great water fights. On a hot day, you sit in that creek and cool down under the trees. Sounds great, doesn't it? You can collect year-round, but the water does tend to get cold in the fall and winter. But, that shouldn't stop a true Rockhound. Right?
Hull Mine, California
[Via Fallbrook Gem & Mineral Society, Inc., San Diego, CA. 92131-2676]

As part of my three-day swing through southern California and southwestern Arizona a couple of weekends ago, I visited the Hull Mine, located in the Castle Dome district NE of Yuma, Arizona. Although fluorite was not the principal mineral mined there, I found some nice, blue, fluorite cubes (about one-half inch on each edge) on a crystallized galena and country rock matrix.

The Hull Mine is an abandoned, underground mine in a field of mineshafts which comprise one of the primary mining areas in the Castle Dome district. Although I am normally wary of entering abandoned mines, I regard this one as relatively safe as long as one carries an adequate source of light. One of the entrances is an adit which slopes downward at an angle of approximately 15 degrees and tunnels into the base of a hill. Shafts on the other side of the hill intersect the underground tunnels. The result of this is a very nice breeze which flows through the mine and provides fresh air while underground. A companion and I entered through the aforementioned adit. The tunnel is high and wide enough for three people to stand in side-by-side. The floor of the tunnel is dry and relatively flat. The only potential danger is from wires hanging from the roof of the tunnel (part of the old electrical system). Keep your eyes open, carry a good source of light, and watch where you're going.

We walked down to the 200-foot level, at which point we arrived at a T intersection. We took the left branch of the T and continued on for a couple of hundred feet to a pile of broken rock on the tunnel floor. It was this pile of rock, thoughtfully left by some previous visitors, in which we found the fluorite, galena, and my first-ever, self-collected specimen of wulfenite.

This was my first visit to the Hull Mine and I hope to return to continue exploring and collecting. Perhaps someone else who has visited this mine and knows more about its geology and mineralogy can provide more information about it.

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.
- Open: M-F during working hours and some weekends if permission is obtained.
- Tools needed: Masons hammer, handsledge, 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 a 50-cent piece in diameter but most are dime size.

New Mexico Collecting
[nmartin@bbn.com (Nathan C. Martin)]

I just returned from my first trip to New Mexico and I had a great time. While my wife attended a conference in Albuquerque I had three days to collect. The first day I went to the Harding pegmatite near Dixon, NM (a 125 mi drive from Albuquerque), That site is administered by the Univ. of New Mexico geology dept. and release forms and maps can be obtained from them. The rules are fairly restrictive; no digging deep holes in the dumps, no work inside mine adits, etc. Although I had hoped to find some microlite, I did not get down to the lower dump area where that material was reputed to be most likely to be found. I was also surprised to find that unlike Maine pegmatites there were very few (if any) vugs in the Harding so that there are not many well-defined crystals. There is a lot of massive beryl, quartz, and more lepidolite than I have ever seen in one spot. I collected some lepidolite and some beautiful rose muscovite samples and some other things I have yet to identify.

The second day I drove 120 mi west on I40 to the Zuni mountains near Grants to collect fluorite in prospects and dumps near the Mirabel mine. I collected a lot of fluorite, some massive and banded and some with small crystal groups. I also collected some samples with copper mineralization that I have yet to definitively identify. There was also a lot of barite but it was mostly either decomposed or broken. It's a beautiful spot at about 8800'
elevation. There is also a very accessible site for micros of garnet and topaz in vuggy volcanic boulders along NM-547 east of Grants (E. Grants Ridge) that I stopped at for a few minutes on my way back to Albuquerque. It looked like an interesting site for another trip.

On the third day I drove about 90 miles south to the Kelly mine. They are open from 9 AM to sundown. The fee is $10.00 which allows you to take away 10 lbs of material. Additional material is $2/lb so some diligent highgrading is required. Believe it or not it rained the entire day I was there which was terrific. It was not only cool but the exposed rock was well washed. There is one whale of a lot of rock to look through in the dumps and an incredible variety of mineralization. I made the mistake of so concentrating on looking for smithsonite (I didn't find any) that I probably passed up a lot of other good specimens. They pass out a list of 80 minerals that have been reportedly found there. There are several different mine dumps to look through so you should definitely plan for an entire day if you really want to cover the entire site.

Although the ratio of driving time to collecting time was higher than I would have liked, the New Mexico scenery made the drives worthwhile in themselves. Hope you have as much fun as I did!!

North Carolina Collecting
[Mining for Rubies and Sapphires in North Carolina by Ben Hymen, Minnesota Mineral Club, Rock Rustler News, 11/95]

When we think about Tennessee and North Carolina, we often think of the Great Smoky Mountains, Dollywood, football, and warm weather all year long. We seldom think of finding gemstones.

While on a business trip in Pigeon Forge, TN, I happened to walk into a local rock shop, and was able to glance at a nationwide rockhound atlas. I noticed that in the northwestern corner of North Carolina were several localities for mining gemstones; specifically rubies and sapphires! Since this was only 3 hours from my hotel, I rented a car and stayed the weekend to check this out further.

I am happy to report that there are indeed several good locations for these gemstones in North Carolina. There has been ruby and sapphire mining going on in this area since the early part of this century. The best places are found in the Cowee Valley, located 9 miles west of Franklin, NC. Franklin is just 40 minutes east of the North Carolina/Tennessee border. The geology of this area is perfect for the formation of corundum, from which rubies and sapphires are formed. This area is heavily mineralized from the formation of the Smoky Mountains to the west; it is also rich in rare earth minerals, rutile, quartz, gold, silver, and platinum have also been found here. The Cowee Valley is relatively small and isolated, once out of this area, you cannot find these same mineral deposits.

Some of the mines in this area were worked commercially, but the deposit was not rich enough to make it worth their while. There are over a dozen working mines in this area, all are set up to make it easy for the novice or experienced "miner" to find gemstones. A word of warning: many of the mines were exhausted years ago, and are being salted with low grade corundum and other low quality material from Asia, Africa, and other parts of the far east. You will pay a few dollars to mine there, and barely get your money's worth. I was able to find mines that were not salted, and did have some good luck. The mines that I personally tried were the Cherokee Mine, and Jacob's Mine, both guaranteed to have only native stones. Because of this, you won't find something in every bucket as many of these mines advertise, but when you do find something, it will be genuine native material.
Native rubies in this area are no longer common, and rarely of facet quality; Most are opaque and in fragments. The average size is ½ carat; Whole crystals are rare and highly treasured, regardless of size. Sapphires are more common, and are often bronze colored or clear. Many can be cabbed and some might even star. Whole crystals make wonderful micro mounts. I came away with a film canister full of ruby and sapphire specimens, including a small complete facet grade ruby crystal, and a complete 11 carat bronze sapphire crystal. About 10 of the fragments are big enough to cut.

Other minerals you may encounter are rutile specimens, often looking like small black grains of rice, and selenolite, a fibrous mineral that looks like a buff-colored tiger eye. Many of these stones make excellent cabs as well.

Another rarity is Rhodolite Garnet. The color of this stone from the Cowee Valley is lighter than rhodolite garnet from other localities. It was named after the rhododendrons that grow in the hills, and the shade of purple in these stones is found nowhere else. Good stones are rare, and can be worth up to $300 per carat uncut.

The best part about this area is the scenery. Franklin is only an hour from Smoky Mountain National Park, and the views are spectacular. There is a local farm nearby where the movie "Nell" was filmed. The whole area is steeped in history, and you could spend several days just driving around and exploring the countryside. There is also excellent shopping in this area, and prices are especially good on clothing. Local rock shops are also plentiful. There are at least 4 in downtown Franklin.

The adventures themselves are a lot of fun. It's not as dirty as other types of mining, and it's not strenuous. The dirt is pre-dug, and put in 1 gallon buckets. You pay a small admission charge, and 50¢ to $1.00 per bucket. Screens are also provided. You sit on a long bench in front of a flume of running water. You simply dump your dirt a little at a time onto the screen, wash off the gravel and pick through it until you see the flash or red or white. You quickly develop an eye for what to look for and are usually finding nice stones quickly. Some extra tools that come in handy would be a pair of tweezers, small brush, magnifying glass, and your own vial to put your finds. These items are not supplied by the mine owners, although some may provide an empty plastic film canister. Also bring lunch, as you may become so engrossed in looking for gemstones that you may forget to eat.

Although rare, some lucky "miners" have found some valuable stones in these mines, including one gentleman unearthing a large crystal of several thousand carats! It was featured in the Feb '94 issue of Lapidary Journal as the largest American Ruby ever discovered. I've seen this stone, and it is a spectacular specimen, although not translucent. He found it at the Cherokee Mine, and he carries it with him as a lucky piece!

I've heard stories from some of the locals about lucky people finding gem quality pigeon blood rubies worth several thousand dollars a carat. This can truly be a treasure hunt! The bulk of what you find will fit in a small container, so you can go there by plane and not have any hassles bringing your finds back.

The mines are open from May through October. One of the best times to go is the last weekend in July. This is the same weekend that the wholesale gem and mineral show is held in Franklin. It's a great time to see some spectacular specimens, get good pricing on stones and supplies, and check out the local mines.

If you go:
The following local mines are guaranteed NOT salted:
The Cherokee Mine
Jacob's Mine
Schuellers Mine.

Best places to stay:
There are many hotels in the area; if you go during the last weekend in July, book ahead of time as they will be filled up weeks in advance of the wholesale show. If you would like a very cozy and inexpensive stay, I can recommend the following
♦ Forest Cottages, Jim and Helen Hoffmeister, 308 Heritage Hollow, Franklin, NC, 704-369-9566
♦ Gemstone Cottages, Cowee Valley, 704-524-9854
(These are located 1/2 mile from the mines) Good luck and happy hunting!

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Oklahoma
[0003849437@mcimail.com (Steve Wheeler)]
Cephis Hall has a rock shop about 10 miles north of Broken Bow, OK on the East side of Hwy 259. Within this area of SE OK there is almost a million acres of logging land. It is privately owned but open to the public. Cephis arranges guided tours/digs throughout the area for Quartz crystals. $15/75 lb a day. Living in Dallas, I've collected several times with Cephis and have always come home with nice stuff (i.e. clusters ranging in size from 2" to 18" in diameter with points up to 1" in diameter and 4" long... I've also collected single points that were 6" long and 3.5" in diameter... I've seen and collected phantoms and double terminated points within these ranges as well).

Groups of 15 or more allow him to get a backhoe out to one of the seams he's discovered in the woods and prep the site right. Small groups or individuals are usually taken to existing sites previously excavated. Drive times and conditions from the shop vary with the location of the dig sites. All will require travel on dirt (logging) roads; most will not require four wheel drive.

Trips can be arranged year round although Thanksgiving week is deer season in OK and not a good time to be out in the woods. Required tools are hammers, chisels, screw drivers, buckets and a large pry bar. Camping / RV facilities and motels are numerous but I don't have a list. Beavers Bend State Park is very nice with camping, RV and cabins available. Broken Bow lake is just North of the park and is a premier fishing hole from what I understand. This is some beautiful country side! Information: Cephis & Joyce Hall (405) 494-6612, West Slope Rock Shop.

Ontario Betafite Location
[Nathan Schadmann]
I am glad you like the specimens. 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 5km 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. Betafite 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 longwave 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. If you would like more info on these sites, I will try to put a biblio together for you, and e-mail it along. I will try to respond to the other questions you raised in a private message, but I am copying this reply to the listservs in the hope that some of our other correspondents can help you out with additional information on these sites.

Renfrew, Canada
[Tim Jokela, Jr.]
This is going to be in 3 parts, the first some basic info and directions to the site, then addresses and phone #'s of
the people you should contact, and thirdly a bit of info on what you can expect to collect.
1) First of all, there are two sites, the Beryl Pit and the Rose Quartz Pit. While I have not recently scoured the rose quartz pit, I'm pretty sure that pretty much the only thing of interest is the rose quartz. (It is very nice, good pink; some facet grade, not prone to sun-bleaching, and the owners say some shows very large xl faces.) I've found some columbite, zircon, etc here, so take a look around, but your best bet is the Beryl Pit. The pits are separated by bush, and the road, within walking distance of eachother. A guy got lost a few years ago trying to walk from one to the other, and it was a nuisance finding him. Access to both is controlled. The rose quartz pit can only be entered with one of the owners, who will weigh and charge you for your quartz. The beryl pit requires a small fee, but you can pack out as much tonnage as you care to. The roads in the area are all good, parking is good, and if the owners are around they may let you drive right into the mines, but even if they don't the maximum walk is about 1/4 km, not a problem even for four trips in and out. Trips to each are run by the Chamber of Commerce during the Bancroft Gemboree in late July/early August.

The Beryl Pit is located in Lot 23, Concession XV, Lyndoch Twp, Renfrew County. It is about a mile N of Quadeville. Quadeville is about 45 km NE of Bancroft. To get to the tiny village of Quadeville take Hwy 28 from Bancroft to Hardwood Lake, where you go left on 514, then go right on 515. In Quadeville follow 515 to the Kauffeldt's General Store, kind of a run-down affair on the right. Ask the locals if you can't find it. There they will take the small fee and give you directions up the road to the beryl pit. The brochure I have says the pit is open every day from mid May to mid October, 9am-6pm.

2) These are the people to contact. They are very nice and very serious collectors, with a real love of pegmatites. Their acquiring these sites is a real blessing. They probably have stuff for sale too.

AquaRose Gems and Minerals Phone: 705-325-1102 or 400 Highland Avenue, 905-824-4911 or Orillia, Ontario L3V 4E7 613-758-1083.

This is a fairly old address but I think it's still accurate. Contact the Chamber of Commerce for all kinds of info, from maps to camping to collecting. They're responsible for the Gemboree and associated field trips, so they will give you lots of help. Plus the numerous area rock shops are glad to help. Bancroft & District Chamber of Commerce P.O. Box 539, Bancroft, KOL 1C0 Ontario

3) Collecting in the beryl pit involves a choice between rummaging through the dumps or working the pegmatite in situ.

The dumps offer a wide range of material, and you never know what you can find, especially if there's some fresh rock. Several years ago a friend collected a 7 cm terminated euxenite on the dumps, but these are fairly rare even in 1cm sizes. Last summer one of the fellows found a chunk of quartz with a couple of odd, rounded, 15mm purple fluorite xls locked in it. Chunks of green and reddish/brown feldspar can be found, and some superb "peristerite" is available. Crude quartz and garnet xls occasionally found, and it's fairly easy to find good black schorl xls, but rarely terminated. Beryl sections available. About 30 species have been found so far, with the list growing.

Back to the left of the dump is the pegmatite core exposed in a good-sized cut. A large water-filled hole is visible. The boundary wall is white platy feldspar with vugs and micro minerals. Last summer I sampled all along this wall, and after much work at the scope found some superb schorl micro xls, unusual UK metallic black xls, and a few others, rare-earth element (REE) minerals like allanite or fergusonite, which I can't identify. The white feldspar wall is kind of like collecting in a snow bank, you sink in a chisel and hope to get off a sizeable chunk, with bits of feldspar raining down. Some pyrites to 15mm found on this wall recently. Where this wall meets the floor may be particularly productive. Opposite the wall, about 15 feet away, opaque but occasionally fairly glassy green beryl xls occur, shot through reddish massive feldspar. The zoning I noticed last summer was interesting, with (if I remember correctly) a platey white feldspar layer, then a 14 cm thick layer of massive black schorl, followed by the beryl-xl bearing reddish/yellow orange feldspar, with a zone below that containing lots of platey black REE mineralxls, probably allanite with euxenite, with very nice micro zircons Found a very rare molybdenite micro xl in this zone. Collecting the beryl crystals is not the easiest thing in the world. It's not hard to remove the somewhat rotted feldspar, but the hexagonal beryl prisms are very fragile and terminations are rare. Sledges and prybars are required, but it's fairly easy work. Collected xl sections up to 5 cm across, and some about 10cm long here last summer. The problem is that usually once you have a nice crystal exposed you find another right beside it, and then more, so you have to break 3 to get one. If you get serious and lucky here you should be able to get xl sections of 20 cm or more, in pieces but still impressive. See MR V 13 #2 and #4.

Texas Collecting
[Todd A. Van Duren, tvd@vnet.ibm.com]
I made some calls earlier this week and found out the following: Both the Seaquist Ranch and Hoffman Ranch are still open to collectors, as stated in Gem Trails of Texas. I spoke with Mrs. Loeffler first (she's listed in the book as a
contact). Mrs. Loeffler wasn't able to provide any information not already contained in the book. Basically, go to the Grit Store, sign a release and pay the fee.

Next, I called Mike Seaquist, (misspelled 'Sequist' in the book). He said that topaz was indeed getting scarce on the ranch. "You'll have dig for it and even then you'll be lucky if you find something." The best prospects are to work the granite itself, rather than the creek beds. This means a great deal more work, but better rewards if something IS found. But even if the topaz eludes us, Mr. Seaquist assured us that quartz crystals, agate and petrified wood are abundant on the ranch.

**Upper Peninsula, Michigan**

[John Jaszczak, Adjunct Curator, Seaman Mineral Museum]

In Iron country (mostly around Marquette and Baraga counties) there are a few places I know you can collect. Best bets are: 1. the Champion mine near the town of Champion off of US 41 where there are large dumps full of at least hematite to collect. 2. Mt. Shasta garnet location. This is just off US 41 just east of the Mt. Shasta roadstop near Lake Michigan. There you can collect in the dumps for chlorite pseudomorphs after garnet which occur up to 6 or more cm across. Signs on US 41 near either Ishpeming or Negaunee (closeby) direct you to the Iron Mining Museum. In the Keweenaw you should stop early in your tip to Michigan Tech- park at a pay visitor lot or at a meter in front of the library, and walk toward the center of campus. The A.E. Seaman Mineral Museum is on the 5th floor of the "EERC" building. There is a blue sign in front advertising the new "Gold and Silver" exhibit. The museum is a must see! In addition to seeing the best of the copper country minerals and knowing what you can look for here, you can also see a fine display of world-wide minerals. The gift shop has a collecting field guide written by Bornhorst and Rose for $25 you should consider buying if you want to hunt around a lot. There are MANY old mine dumps you could look for with this book. The museum staff or the computer in the museum can also direct you to some good spots like the Laurium Mine dump or the Phoenix mine dump for collecting. The museum usually has some back issues of the Copper Country edition of Mineralogical Record to buy if you don't have it. In Hancock MI just across the Portage lake you should visit the Quincy Mine Hoist, steam hoist and underground tour. You can also tour underground at the Delaware mine in Keweenaw country. Maps at the chamber of commerce can direct you to agate collecting beaches. Visit Copper Harbor for beaches, food, tour of Ft. Wilkins, and good micro collecting at the Clark Mine (signs are posted to this). If you will be here from Aug. 5-11 you should just register for the Red Metal Retreat and get guided collecting tours, and underground collecting tour at the Caledonia mine and much more. Call the museum for a Retreat brochure. Keweenaw Peninsula Chamber of Commerce: 906-482-5240 or 337-4579. Seaman Mineral Museum: 906-587-2572; Tourism Council 906-482-2388.